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THE
CYCLOPÆDIA;
OR,
Universal Dictionary
OF
ARTS, SCIENCES, AND LITERATURE.

VOL. IX.

THE HISTORY OF THE

ROYAL SOCIETY OF LONDON

FROM ITS FOUNDATION TO THE PRESENT TIME

THE
CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

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CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

COLLISION.

COLLISION, from the Latin *Collisio*, a breaking, knocking, or dashing together, in *Philosophy* and in *Mechanics*, means the meeting, mutual striking, or congress, of two or more bodies, one of which at least is in motion. The collisions of bodies, and the results arising from those collisions, form by far the greatest part of the operations of nature, as well as of artificial mechanics; hence the industry of man has spared no pains in the investigation of the laws which regulate those motions, and in the performance of experiments tending to confirm and to illustrate the same. In the theory of collision or percussion, the simplest cases are considered first, and such, indeed, as cannot actually take place in nature; for instance, two bodies are supposed to move equally (that is, each of them, or one at least, to run through equal lengths in equal portions of time) in non-resisting mediums, and those bodies are farther supposed to be either hard, or soft, or elastic. A hard body is that whose parts retain their respective situation or figure in all cases, not yielding to any stroke or percussion. A soft body is that whose parts yield to any stroke, and have no power to recover their original situation; and lastly, an elastic body is that whose parts yield to any stroke, but presently regain their original form and situation. Now, in nature, (as far as we know) there are no bodies perfectly elastic or perfectly unelastic; including under the latter name both those that are perfectly hard and those that are perfectly soft. All the bodies we are acquainted with are partially elastic, but in various degrees; nor can their motions take place without meeting with some obstruction. Yet the laws of collision, under the above-mentioned suppositions, being demonstratively deduced from the general laws of motion, which are justly assumed as axioms, determine the pheno-

mena which would take place if those suppositions were real; it being afterwards more easy and practicable to estimate, and to allow for those deviations of practical results from the abstract theory, which arise from the imperfect elasticity of bodies, from resistances of mediums, from friction, &c.

The theory of collision is derived from sir Isaac Newton's third law of motion, which says, that action and re-action are always equal and contrary to each other. See *Laws of motion*.

Definition 1. *The respective velocities or celerities of bodies are proportional to the spaces which they describe in a given time.* Thus, if a body, A, passes through an extension of 10 feet in one second of time, whilst the body, B, runs through an extension of 100 feet in the same time, then the respective celerities of those bodies are said to be as 10 to 100; or as one to ten.

Def. 2. *The bodies are said to strike directly against each other, when in striking, there occurs no reason why they should turn towards one side rather than towards another; so that both before and after the stroke, the motion is in the same straight line, unless it be all destroyed.*

Def. 3. *In every other case the stroke is said to be oblique.* The principal proposition belonging to this theory, considers two bodies that strike directly against each other, and the result is concisely expressed by sir Isaac Newton in the following words: "the quantity of motion, that is gathered by taking the sum of the motions made towards the same part, and the difference of those made towards the contrary parts, is not altered by the action of bodies amongst themselves." For the sake of perspicuity we shall endeavour to demonstrate this proposition, by considering the two cases separately.

B

*THEOREM

THEOREM I.

If a body, A, (Plate XV. *Mechanics*, fig. 1.) strike directly against another body, B, which is either at rest, or moving in the same direction, but slower; the sum of the motions in both the bodies towards the same parts, will remain the same after the stroke, as it was before that stroke.

Let CD express the motion of the body A, and EF the motion of the body B; viz. that whilst A moves from C to D, B moves from E to F. Therefore, the sum of the motions is CD plus EF. Now, since it moves with greater velocity than B moves with, it necessarily follows, that A must overtake, and strike against B. And it will appear, that after the stroke the sum of the motions is the same as it was before, viz. CD plus EF. For since action and re-action are equal (3d law of motion), if A, by striking on B, communicates to it the additional motion FG; it must lose as much itself; viz. DK (equal to FG) must be subtracted from CD. So that after the stroke, CK is the motion of A, and EG that of B; and the sum of those motions is CK plus EG, equal to CD plus EF; for, since FG is equal to DK, add EF and CK to both, and it will be FG + EF + CK equal to KD + CK + EF; viz. EG + CK = CD + EF.

The various cases of this proposition are as follow: If FG is equal to CD, then K and C coincide, and CK vanishes or becomes equal to nothing (as in fig. 2.); hence, after the stroke, A will be at rest.

If FG exceed CD; then K will fall beyond C; and the motion of A will become retrograde or negative (as in fig. 3.) Therefore, the sum of the motions towards the same part is the difference between EG and CK; viz. EG minus CK.

If B stand at rest, then its motion becomes equal to 0, and in that case the sum of the motions is reduced to CD.

THEOREM II.

If two bodies, moving towards contrary parts, strike directly against each other, the sum of their motions towards the same parts (which is the difference of their motions towards contrary parts) before and after the stroke, will always remain the same towards the same parts.

Let the body, A (fig. 4.), move from C towards D, and let C D represent its motion, whilst the body, B, moves in a contrary direction from E towards F, and let EF represent its motion.

Make DH equal to EF; then CH is the difference of the motions towards the contrary parts, and is, at the same time, the sum of the motions towards the same part; viz. towards G. Now, after the stroke, the same, CH, will be as the sum of the motions towards the same part, viz. towards G.

Let the motion of B, after the stroke, be towards G, and let it be represented by EG. Therefore, the force communicated to B is FE plus EG, that is, FG. But (by the 3d law of motion) making DK equal to FG, DK will represent the motion lost by A; so that if DK be subtracted from CD, the remainder, CK, will be the motion of A towards G. Now, since DK is equal to FG, and DH is equal to FE; it will be DK minus DH, (viz. KH), equal to FG minus FE (viz. EG). Therefore, since KH is equal to EG; KH will represent the motion of B after the stroke, and CK will represent the motion of A; so that CK plus KH is equal to CH, and is the sum of the motions of both the bodies towards G.

If FG is equal to CD (as in fig. 5.); then K and C coincide, consequently the motion of A becomes equal to 0.

If FG exceeds CD (as in fig. 6.) K will fall beyond C, and the motion of A will be retrograde; but (since FG is equal to DK, and FE to DH) KH will be equal to EG; therefore, taking CK from both, CH will be equal to EG minus CK. But CH was as the sum of the motions towards G before the stroke, and EG minus CK is as the sum of the motions towards the same part; namely, as the difference of the motions towards the contrary parts after the stroke. Therefore, the sum of the motions towards the same part will be the same both before and after the stroke.

Having demonstrated the two simplest theorems belonging to the doctrine of collision, wherein the equality of the motions before and after the stroke has been considered, it is now necessary to examine the direction, the velocity, and the momentum of the bodies alter the stroke; and for this purpose the properties of the centre of gravity must be recollected.

But, that property of the centre of gravity, which is more immediately concerned with the present subject, is briefly expressed in the following lines:

If bodies, moving in the same straight line, strike against each other, the state of their common centre of gravity will not thereby be altered; viz. it will either remain at rest, or it will continue to move in the same straight line, exactly as it moved before the stroke. See CENTER OF Gravity.

THEOREM III.

Let there be two non-elastic bodies (viz. either perfectly hard or perfectly soft); and if one of them move in a straight line, whilst the other is at rest in that line, or is moving in the same direction, but at a slower rate, or is moving in the contrary direction; then those bodies must strike directly against each other, and after the stroke they will either remain at rest, or they will move on together, conjointly with their common centre of gravity.—Their momentum, after the stroke, will be equal to the sum of their momentums before the stroke, if they both moved in the same direction; but it will be equal to the difference of their momentums if they moved in contrary directions.—Their velocity, after the stroke, will be equal to the quotient that arises from dividing the sum of their momentums, if they both moved the same way, or the difference of their momentums, if they moved contrary ways, by the sum of their quantities of matter.

That, after the stroke, the two bodies must either remain at rest or move on together, is evident; for, since they are not elastic, there exists no power that can effect their separation. With respect to the momentum, it must be observed, that where the bodies meet (by the 3d law of motion), whatever part of the momentum is lost by one of the bodies, must be acquired by the other; therefore, if before the stroke the bodies moved the same way, their joint momentum, after the stroke, will be equal to the sum of their momentums before the stroke. If one of the bodies was at rest, then, as its momentum is equal 0, the joint momentum will be equal to the momentum of the other body before the meeting. If the bodies moved towards each other, then their momentum, after the meeting, will be equal to the difference of their former momentums; and if in this case their momentums are equal, then their difference vanishes; that is, the bodies will remain at rest after their meeting.

The last part of the theorem is evident; for the momentum of a body in motion is equal to the product of the velocity multiplied by the quantity of matter. See MOMENTUM. The

The weights and velocities of the two bodies before their meeting being given, the velocity, after the meeting, may be determined by the following method, which is applicable to the four cases of *figs.* 7, 8, 9, and 10. Let A and B be the two bodies, C their common centre of gravity, and D the place of their meeting. Make DE equal to DC, so that the point, D, may be between C and E; then DE will represent the velocity after their meeting; for, since the bodies, after their meeting, move together conjointly with their common centre of gravity; and the centre of gravity has the property mentioned immediately before the third theorem; it follows that the velocity of their common centre of gravity after their meeting, must be equal to its velocity before the meeting; *viz.* DE must be equal to CD, and is the same as the velocity of the two bodies after the meeting, because, then, they move together with the centre of gravity.

Fig. 7. shews when the bodies move the same way. *Fig.* 8. shews the body, B, at rest before the stroke, in which case B and D coincide. In *fig.* 9. the two bodies move towards each other; and *fig.* 10. shews the two bodies moving towards each other with equal momentums, in which case they will remain at rest after the meeting. In all those four figures, the respective velocities of the bodies are represented by AD and BD, and AB is their difference. The respective momentums are represented by the product of the weight of A multiplied by AD, and of the weight of B multiplied by BD. The momentum after the meeting is represented by the weights of both the bodies multiplied by DE.

Example of the computation of the first case, fig. 7.—Let A weigh 10 lb. and move at the rate of 4 feet per minute. Let B weigh 6 lb., and move at the rate of 2 feet per minute, and let the distance AB be 32 feet. The centre of gravity is found by saying $16 : 32 :: 10 : BC = \frac{32 \times 10}{16} = 20$ feet; hence AC = 12 feet. Put BD = x , and AD will be equal to $32 + x$. Then the time employed by A in moving from A to D, is equal to the quotient of the space, $32 + x$, divided by its velocity; *viz.* $= \frac{32 + x}{4}$. And the time employed by B in moving from B to D, is equal to the quotient of the space, x , divided by the velocity of B, *viz.* $= \frac{x}{2}$. But, since the bodies meet at D,

those times must be equal; that is, $\frac{32 + x}{4} = \frac{x}{2}$; and by the resolution of this simple equation, we have $64 + 2x = 4x$; and $x = 32 = BD$.

Then DE = DB + BC = $32 + 20 = 52$ feet; *viz.* after the meeting, the two bodies will move from D to E, which are 52 feet apart, in as much time as each of them employed in going to D; *viz.* 16 minutes. Therefore, in order to find how many feet per minute the bodies will run over after the meeting, divide 52 by 16, and the quotient, $3\frac{1}{4}$, is the answer.

The magnitude or quantity of the stroke is deduced from the third general law of motion, and from the nature of the momentum of a body in motion, which is equal to the product of the quantity of matter, or weight of the body, multiplied by the velocity, consequently in the same body the momentum is proportionate to the velocity. The particulars relative to the magnitude of the stroke, are expressed in the following theorem.

THEOREM IV.

If a body in motion strike directly against another body, the magnitude of the stroke is proportional to the momentum lost, at the concurrence, by the more powerful body. Also, when the latter body is at rest, the quantity of the stroke is proportional to the velocity of the former body.—If the second body be moving in the same direction with the first, but at a slower rate, the magnitude of the stroke will be the same as if the second body stood still, and the first impinging upon it with a velocity equal to the difference of their velocities.—And, lastly, if the bodies move directly towards each other, the magnitude of the stroke is the same as if one of the bodies stood at rest, and the other struck it with the sum of their velocities.

Thus much may suffice with respect to the congress or collision of non-elastic bodies. It is now necessary to state the particulars belonging to the congress of elastic bodies; *viz.* of those whose parts yield to any impression, but frequently recover their situation, by re-acting the contrary way with a force, which, in bodies perfectly elastic, is equal to the impression or stroke received. There are innumerable degrees of elasticity. See ELASTICITY.

THEOREM V.

When two bodies, that are perfectly elastic, strike directly against each other, their relative velocity (by which is meant the excess whereby the velocity of the swifter body exceeds that of the slower) will be the same before and after the stroke; viz. they will recede from each other with the same velocity with which they approached before the stroke.

The magnitude of the stroke (Theor. IV.) is proportional to the respective velocities. And in bodies that are perfectly elastic, the restoring force is equal to the compressing one; therefore, if the momentums of the bodies produced a certain compression, the elastic force must re-act on the bodies with equal power; hence the bodies will be forced to recede from each other with the same velocity with which they approached each other.

From what has been stated above, the results arising from the congress of bodies that are perfectly elastic, may be easily deduced in all the variety of cases in which the two bodies may be conceived to meet. The particulars upon which those results more immediately depend, are, first, that the distances of two bodies from their common centre of gravity are inversely as their weights; (see *CENTER of Gravity* and its properties); secondly, that the state or the uniform motion of the centre of gravity of bodies is not altered by the mutual action of those bodies on each other; thirdly, that in bodies that are perfectly elastic, the restoring is equal to the compressing force; and fourthly, that the distances of the bodies from each other, and from their common centre of gravity, are equal in equal times taken before and after the stroke; for in those two cases they move with equal velocities.

All the cases of direct congress of two perfectly elastic bodies are delineated in the figures 11, 12, 13, 14, 15, 16, 17, 18, and 19, in which A and B represent the two bodies; C is their common centre of gravity, D the place where they meet. A D expresses the velocity of A, BD the velocity of B, and C D that of the centre of gravity. Hence by inspecting the figures it will be easily discerned when both the bodies are in motion, or one of them is at rest; also their directions, &c. Then the rule for determining the velocities after the stroke is as follows:—Take a point E in the line AB, produced if necessary, so that the distance CE be equal to CD; then, after the stroke, the right line EA will
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express the velocity of the body A from E towards A, and the right line E B will express the velocity of B from E towards B.

In *fig. 11*, B is larger than A, (which is plainly indicated by the situation of the centre of gravity C), B is at rest, and A strikes against it. In this case, after the stroke, both the bodies will recede from the point D, with the velocities EA and EB.

In *fig. 12*, A, the larger body, runs against the body B, which is at rest. In *fig. 13*, the body A is larger than B, and they are both in motion the same way. In *fig. 14*, A is less than B; the rest as in the preceding case. In *fig. 15*, A and B meet at D, where A remains at rest. In *fig. 16*, A and B are equal; and after the stroke they recede with interchanged velocities. In *fig. 17*, the bodies are proportional to their velocities; hence the points C, F, D, and E, coincide. In *fig. 18*, A remains stationary at the place of congress D. Lastly, in *fig. 19*, though the bodies A and B meet at D between the points A and B, yet after the stroke they both move towards F.

The numerical computation of those cases may be easily comprehended by the following example, which is adapted to the case of *fig. 13*.

A and B are two elastic bodies. A weighs 2 lb., and moves at the rate of 8 feet per second. B weighs 1 lb., and moves the same way at the rate of 5 feet per second. The distance AB is 12 feet.

1. To find the place of the centre of gravity C, we have $A + B : B :: AB : CA$; *viz.* $3 : 1 :: 12 : 4$; so that $AC = 4$, and $CB = AB - AC = 8$.

2. To find the distance BD, put $BD = x$; and since the distances AD and BD are run over in the same time, the former at the rate of 8, and the latter at the rate of 5 feet per second; therefore we have $\frac{x}{5} = \frac{x + 12}{8}$; hence $8x = 5x + 60$; and $3x = 60$; or $x = 20 = BD$.

3. If the distance BD; *viz.* 20, be divided by the velocity of B (*viz.* by 5); the quotient 4, is the number of seconds, during which the bodies moved from their respective places A and B, to the place of their congress D.

4. $EC = CD = CB + BD = 8 + 20 = 28$; and $EA = EC - AC = 28 - 4 = 24$; which being divided by 4 (the number of seconds found above) gives 6 for the velocity of A after the stroke, in the direction from E towards A. Also $EB = EC + CB = 28 + 8 = 36$; which being divided by 4 (the number of seconds, &c.) gives 9 for the velocity of B after the stroke in the direction from E towards B. So that after the stroke, the bodies A and B will both continue to move the same way, but the former at the rate of 6, and the latter at the rate of 9 feet per second.

It is now necessary to apply the above theory to those cases which really occur in nature, and in the first, since all known bodies are partially elastic, we must shew how to estimate the results of the collision of such bodies. Thus, let A and B, *figs. 20* and *21*, be two bodies imperfectly elastic, C their common centre of gravity, and D the place of their meeting. Divide AC in *a*, so that AC may be to aC, as the force compressing the body, A, is to the force whereby it is restored itself. Also divide BC in *b*; so that BC may be to bC as the force compressing the body B is to the force whereby it is restored itself. Take CE equal to CD; then the right line Ea will express the velocity of A after the stroke, in the direction from E towards a, and the right line Eb will express the velocity of B after the stroke in the direction from E towards D.

In the foregoing paragraphs the distances have been reckoned from the centres of the bodies; but since the bodies must strike with their surfaces, and not with the centres, therefore, when great accuracy is required, the thicknesses of the bodies must be deducted from the distances. However, when the distances are considerable, and the sizes of the bodies proportionately very small, it is immaterial whether the distances be reckoned from the centres or from the surfaces of the bodies; the difference becoming insignificant.

When more than two bodies move in the same straight line, the computation of the velocity of each body after the various strokes cannot be expressed under any general rules; the variety of cases being too great, and often very intricate: yet when any particular case presents itself, the preceding rules will be found sufficient to determine the particulars; observing to apply the computation to the two bodies which, from the circumstances of the case, appear to strike first, then to one of those and the next, and so forth. But sometimes the equality of the bodies, their being contiguous to each other, and other favourable particulars, render the calculation pretty easy and obvious. Thus, if any number of equal and perfectly elastic bodies be at rest, contiguous to each other in the same straight line, and another body, equal to one of them, strike the first of them in the same straight line, with any velocity; then after the stroke the striking body and all the rest will remain motionless, and the last body only will move on with the velocity of the striking body.

If the movements, instead of being equable, as we have hitherto supposed, be either accelerated or retarded, the momentum for each single small portion of time, must be reckoned such as belongs to the velocity acquired at that particular moment. In curvilinear movements, the direction of the motion in each point is the same as that of the tangent to the curve at that point. Lastly, if the movements, either accelerated or retarded, be likewise curvilinear (as in the vibration of pendulums;) the momentum for each single point must be deduced from the degree of acceleration and from the direction of the tangent, at that particular point.

Hitherto we have considered the collision of bodies, which strike directly against each other; that is, in a direction perpendicular to their surfaces, and in the direction of their centres. It is now necessary to treat of oblique collision; for which purpose the doctrine of the composition and resolution of forces, or of movements, must be previously known. See *Composition and resolution of FORCES.*

THEOREM VI.

If a body, perfectly elastic, as A, fig. 22, strike obliquely at C on the firm obstacle BE, then, after the stroke, this body will be reflected from that obstacle in the direction CE, in such a manner as to form the angle of reflection ECF, equal to the angle of incidence ACB.

The oblique force, AC, being resolved into two forces, *viz.* DC perpendicular to the obstacle, and AD parallel to it; the effect on the plane is the same as if the body had advanced towards it directly from D, and (according to the laws already stated) the body A, after the stroke, would be sent back in the direction CD. But of the two forces into which the original force of A was resolved, this body retains the one represented by AD, since this force was not concerned in striking the obstacle; therefore, after the stroke, the body, A, is actuated by two forces, *viz.* one represented by CD, equal to AD, equal to EF; and the other represented by CF, equal to DA, equal to DE; hence it must move in the diagonal CE; and since the lines CF,

FE, are respectively equal to the lines CB, BA, and the angles at B and F are equal, being right angles; therefore the triangle, EFC, is in every respect equal to the triangle ACB; consequently the angle of reflection, ECF, is equal to the angle of incidence ACB.

It evidently follows, from this proposition, that the force of an oblique stroke is to that of the same stroke coming in a perpendicular direction, as the sine of the angle of incidence is to radius.

If the body, instead of striking upon a plane strikes upon a curve surface, the effect is the same as if it struck on a plane, tangent to that surface at the striking point.

This being premised, the application of the foregoing rules to the oblique collision of bodies will be illustrated by the following examples.

Let two non-elastic bodies A and B, *fig. 23*, move, the former in the direction AC, the latter in the direction BD, and let them meet at CD. Draw the line, MG, through their centres, and through the point of contact. From A and B, *viz.* the original situation of those bodies, drop AM and BN perpendicular on M G. Then the force of each body may be resolved into two forces, *viz.* that of A into AM and MC, and that of B into BN and ND. Of its two forces, A retains the force AM whilst MC is exerted against the other body. Of the two forces of the body B, the force BN is retained by it, whilst the force ND is exerted against the other body. Therefore, the actions of those bodies upon each other is exactly the same as if they moved directly one from M and the other from N; hence the above stated rules of direct collision, will serve to find out whether the bodies, after the stroke, will proceed both the same way, or different ways, and at what rate. But when their velocities have been thus determined; for instance, if it be found, that had the bodies moved directly from M and N after the stroke, the body, A, would have moved as far as O, whilst the body, B, would have moved as far as G; then it must be recollected, that, in the present case of oblique collision, the body, A, has retained the force AM; therefore, after the stroke, the body, A, is actuated by two forces, *viz.* one equal and parallel to AM, and another which is equal and parallel to CO, in consequence of which this body must run a compound course, which is found thus: Through the centre, C, draw CI equal and parallel to AM; through I, draw IE equal and parallel to CO, then the diagonal CE exhibits the velocity and the direction of the body, A, after the oblique concourse. With respect to the body, B, it has been said, that at the concourse this body retains the force BN, and that, if the bodies had moved directly towards each other, B would, after the stroke, have moved from D to G. Therefore, through D draw DH equal and parallel to BN, and through H draw HF equal and parallel to DG; and, lastly, the diagonal, DF, will represent the velocity and the direction of the body, B, after the oblique concourse.

If the bodies be perfectly elastic, then suppose it be found (by the rules for elastic bodies) that, after the supposed direct concourse, the body, A, would have been sent back to Q, in the same time that B would have been sent back to R; it follows, that after the oblique stroke, the body, A, will be actuated by two forces, *viz.* one equal and parallel to AM, and the other equal and parallel to CQ. The body, B, will likewise be actuated by two forces, *viz.* one equal and parallel to BN, and the other equal and parallel to DR; therefore, in *fig. 24*, draw QZ through Q, equal and parallel to AM; also through Z draw IZ equal and parallel to CQ; then the diagonal, CZ, represents the

direction and the velocity of the elastic body, A, after the oblique stroke.—Again, through R draw the line, RX, equal and parallel to BN, and through X draw the line, XY, equal and parallel to DR, then the diagonal, DX, will represent the velocity and the direction of the elastic body, B, after the oblique stroke.

Amongst all the cases of collision, we have hitherto omitted to mention the striking of a body upon an immovable obstacle. This has been done merely because the particulars belonging to it may be easily derived from the consideration of the foregoing cases; it being only necessary to consider this case as if it were that of the collision of two bodies, either elastic or non-elastic, or partially so, and to suppose that one of the bodies, which represents the immovable obstacle, is infinitely great.

There is a difference between the stroke of an elastic body, and that of a non-elastic one, which, not being very obvious, deserves to be mentioned. This is, that the effect of the blow of an elastic body upon another body, as upon a plane, is double to that of a non-elastic body, their masses and velocities being equal. This arises from the elasticity of the former, which, after the stroke, by endeavouring to recover its original figure, acts upon the plane with a force equal to the first impression; whereas a non-elastic body acts only with the first impression. See the article PERCUSSION. Also, if the reader wish to see the original investigation of the laws belonging to the collision of bodies, together with any analytical and experimental illustration of the same, he may peruse Dr. Wallis's paper in the Phil. Transf. No. 43; Mr. Huygens's paper, Phil. Transf. No. 46; Sir Christ. Wren's paper, Phil. Transf. No. 45; Gravelande's Mat. Ele. of Nat. Phil. edited by Descaguliers; Gregory's Mechanics, vol. i. chap. v.; and all the best works on mechanics.

COLLIUS, PETER, in *Biography*, of the college of Milan, flourished at the beginning of the seventeenth century, and was the author of a curious treatise entitled "De Animalibus Paganorum," printed at Milan in two vols. 4to. in the years 1622-3. In this work he decides without hesitation on the future happiness or misery of many virtuous and truly illustrious characters of the Pagan world. His conclusions were founded on conjectures, deduced from a comparative view of their means of divine knowledge, their lives and manners, their opinions and writings, united with the testimony of sacred and profane history. He published also a treatise "De sanguine Christi," and a quarto volume entitled "Conclusiones Theologicæ." In them all is a great display of singularity, accompanied with a good share of talents. *Nouv. Dict. Hist.*

COLLIWILLY, in *Geography*, a town of the island of Ceylon; 50 miles W. of Trincomaly.

COLLMEN, or CULLMEN, a town of Germany, in the circle of Upper Saxony, and circle of Leipsick; 6 miles E. N. E. of Mutfchen.

COLLOBRIERES, a town of France, in the department of the Var, and chief place of a canton, in the district of Toulon; 18 miles N. E. of Toulon. The place contains 1509, and the cañon 2933 inhabitants; the territory includes 322½ kilometres, and two communes.

COLLOCOCCUS, in *Botany*, Sloan. See *Cordia Collococca*.

COLLON, in *Geography*, a post and fair town of the county of Louth, Ireland, which is neat and well built; and which has improved considerably under the auspices of the late lord chief baron Foster, and his son the right honourable John Foster, the much respected speaker of the Irish house

of commons, when the union took place. It is 29 Irish miles N. from Dublin.

COLLONGE, a town of France, in the department of Lèman, and chief place of a canton, in the district of Genève; the place contains 1178, and the canton 8,947 inhabitants: the territory comprehends $212\frac{1}{2}$ kilometres, and nine communes.

COLLOPS, in *Ancient Geography*, an appellation distinguishing two towns of Africa; the one called "Collops Parva," appears to have been the same with *Cullucitana*, situate E. of the Sinus Numidicus; the other, called "Collops Magna," was, according to Ptolemy, the same with *Callu*, and situated N.W. of the same gulf.

COLLOQUIA, in *Ecclesiastical History*, a name given in Switzerland to assemblies of the protestant Grison clergy. Each league is divided into a certain number of districts, the ministers of which assemble twice every year; and these assemblies are called *colloquia*. Each colloquium has its president, and each league a superintendent, called a dean. The supreme authority in spiritual concerns is vested in the synod, which is composed of the three deans, and the clergy of each league; the synod assembles every year alternately in each of the three leagues. Candidates for holy orders are examined before the synod. The necessary qualification for admission into the church, ought to be the knowledge of Hebrew, Greek, and Latin; but many are ordained without the least acquaintance with either of these languages. Formerly Latin was solely used, as well in the debates of the synod, as for the purpose of examining the candidates; but at present that tongue is more and more disused, and German is employed in its stead. See **GRISONS**.

COLLOQUIUM, in *Læv*, (*a colloquendo*), a talking together, or affirming of a thing, laid in declarations for words in actions of slander, &c.

COLLUCIANISTÆ, in *Church History*, a designation given to the Arians, from the martyr Lucian, a presbyter of Antioch.

COLLUM, in *Anatomy*. See **NECK**, and **CERVIX**.

COLLURIO, in *Ornithology*, the name given by Brisson to the *Lanius Collurio* of the Linnæan *Fauna Suecica*; red backed shrike of English writers.

COLLURIO madagascariensis, of Brisson, the hook-billed shrike, *lanius curvirostris*.

COLLUSION, a secret understanding between two parties, who plead, or proceed, fraudulently against each other, to the prejudice of a third. This collusion is either apparent, when it shows itself on the face of the act; or more commonly, it is secret and artfully concealed by a show of honesty. This is a practice which the law abhors; and, therefore, when detected, it makes void all things dependent upon it, though otherwise in themselves good. Co. Litt. 109. 360. Plowd. 54. Collusion may sometimes be tried in the same action, wherein the covin is, and sometimes in another action, as for lands aliened in mortmain by a *quale jus*; and where it is apparent, the proof of it is unnecessary; but when it is secret, it must be proved by witnesses, and found by a jury like other matters of fact. 9 Rep. 33. The statute of Westm. 2. 13 Ed. 1. c. 33. gives the writ *quale jus*, and inquiry in these cases; and there are several other statutes relating to deeds, made by collusion and fraud. The cases particularly mentioned by the statute of Westm. 2. are of *quare impedit*, *assise*, &c. which one corporation brings against another, with intent to recover the land or advowson, for which the writ is brought, held in mortmain, &c. See **FRAUD**.

In the canon law, collusion, in matters of benefices, va-

cates the benefice, and incapacitates the person from holding any benefice at all.

COLLUTHIANS, in *Ecclesiastical History*, a religious sect, which rose about the beginning of the fourth century; on occasion of the indulgence shewn to Arius by Alexander, patriarch of Alexandria.

Several people being scandalized at so much condescension; and, among the rest, Colluthus, a priest of the same city; he hence took a pretence for holding separate assemblies, and by degrees proceeded to the ordination of priests, as if he had been a bishop; pretending a necessity for this authority, in order to oppose Arius. To his schism he added heresy; teaching, that God did not create the wicked; that he was not author of the evils that befall men, &c.—He was condemned by a council held at Alexandria by Osius, in the year 330.

COLLUTHUS, in *Biography*, a presbyter of Alexandria, was founder of the temporary Christian sect, at the beginning of the fourth century, above-mentioned. By the decrees of the council held by Osius, Colluthus was deposed of the episcopal honours with which he had invested himself, and the presbyters whom he had ordained were degraded. Colluthus submitted to the decree, and returned quietly to the duties of his office as a parochial presbyter; his followers likewise re-united themselves to the orthodox church. Noniv. Dict. Hist.

COLLUTION, *Collutio*, in *Medical Writers*, is sometimes used for the washing of the mouth, particularly, when done to clean or fasten bad or loose teeth; or free the gums, &c. from ulcers.

COLLUVIES, a term which Calcott and other writers on the universal deluge have applied to the fluid mafs, into which, according to their opinion, the strata of the antediluvian earth were dissolved, and their constituent corpuscles separated. See **DELUGE**.

COLLYBUS, $\kappa\omicron\lambda\lambda\upsilon\beta\omicron\varsigma$, in *Antiquity*, the same with what is now called the rate of exchange.

COLLYRÆ, or **COLLYRIDES**, a certain ornament of hair, worn by women on their necks. It was made up in the form of the small, roundish, cakes, called $\kappa\omicron\lambda\lambda\upsilon\rho\alpha\iota$, *collyre*.

COLLYRIDIANs, in *Church History*, a sect, towards the close of the fourth century, denominated from a little cake, called by the Greeks $\kappa\omicron\lambda\lambda\upsilon\rho\iota\delta\iota\alpha\iota$, *collyridia*, which they offered to the Virgin Mary.

This sect, it seems, consisted chiefly of Arabian women, who brought it from Thrace to Arabia, and who, out of an extravagance of devotion to the Virgin, met on a certain day in the year, to celebrate a solemn feast, and to render divine honours to Mary as to a goddess; eating the cake which they offered in her name.—St. Epiphanius, who relates the history of this superstitious ceremony, ridicules it. They sprung up in opposition to the Aatidico-Marianites.

COLLYRIUM, $\kappa\omicron\lambda\lambda\upsilon\rho\iota\omicron\nu$. This term was formerly applied, to any medicament, solid, or liquid, employed to restrain fluxions; but it is now entirely confined to wet applications, topically applied for this purpose in complaints of the eyes.

COLLYRIUM is also a name given to unguents used for the same purpose; as unguent of tully, and several others.

COLLYRIUM is also a denomination given, though improperly, to some liquid medicines used against venereal ulcers.

COLLYRIUM Samium. See **SAMIA terra**.

COLLY-WESTON Slate, a whitish kind of micaceous grit

grit stone, which splits into very thin lamina, and is much used for slating of buildings in the eastern and some of the midland counties of England; it is the produce of a stratum situated not far in the series from the Oalite or Ketton stone, so well known to builders. In this stratum, particularly near Stonesfield, in Oxfordshire, bones of animals of some unknown kind are frequently found lodged. See SLATE.

COLM, in *Geography*, a small island of Scotland, in the Frith of Forth, six miles S.E. of Dumferline.

COLMAN, GEORGE, in *Biography*, an English writer, was the son of Mr. Thomas Colman, British resident at the court of the duke of Tuscany. He was born at Florence about the year 1733. He received his school education at Westminster; and was entered as student at Christ-church, Oxford, where he engaged with Bonnet Thornton, in writing "the Connoisseur," a periodical paper of considerable merit, which was afterwards published in four volumes, 12mo. This work is remarkable for the humorous delineations of the manners of the age, and displays classical reading and taste. On leaving the university he entered at Lincoln's Inn, and was in due course called to the bar, but never followed his profession. In 1760, he produced two dramatic pieces which were received with great success, the first was entitled, "Polly Honeycombe," and the other "the Jealous Wife;" this last still keeps its place on the stage. In 1764, lord Bath died and left Mr. Colman a handsome annuity, which was increased on the death of general Pulteney, in the year 1767. In conjunction with Garrick, he brought out the "Clandestine Marriage," a comedy of great merit, and which maintains an undiminished reputation. In 1768, he purchased a share of the Covent Garden theatre; this, however, he soon disposed of, and purchased Mr. Foote's theatre in the Haymarket, which he held till his death in 1794, though he had for the five preceding years been incapable of any business, owing to a paralytic stroke with which he was seized in 1789, and which affected his understanding in such a manner as to bring on derangement and idiocy. Mr. Colman translated Terence's plays into a sort of blank verse: also "Horace's Art of Poetry," which added to his reputation as a classical scholar. In 1787, he collected, in three small volumes, a variety of pieces which he had published at different times, under the title of "Prose on several occasions, accompanied with some pieces of verse." Gen. Biog.

COLMAR, in *Geography*, a town of Germany, in the duchy of Holstein, five miles S.E. of Gluckstadt.

COLMAR, a large and well built town of France, and capital of the department of the Upper Rhine, seated on the river Recht, and surrounded by a wall, flanked with towers. It has a prefect and four courts of justice. The town contains 13,376, and the canton 14,429 inhabitants; the territory includes 55 kilometres, and two communes; 10½ leagues N. of Bâle. The principal trade of the inhabitants of Colmar, who are said to be very industrious, is in corn, and wine; and their chief manufactures are those of woollen cloth, callico prints, stockings, hardware, and gun-powder. The district consists of 142 communes or townships, distributed into 13 cantons, and comprehending a population of 144,821 inhabitants. Its whole territory includes 1680 kilometres. It has silver, copper, lead, antimony, arsenic, and beautiful crystal mines; and also a manufacture of gold and lace. N. lat. 48° 4' 44". E. long. 7° 22' 11".

COLMARS, a town of France, in the department of the Lower Alps, and chief place of a canton, in the district of Castellane; 22 miles N. of it. The place contains 898, and the canton 3585 inhabitants; the territory includes 285 kilometres and five communes.

COLMBERG, or KOLBERG, a town of Germany, in

the circle of Franconia, and principality of Anspach; 9 miles N.W. of it.

COLME, LA, a river of France, branching from the river, AA, at Watte, in the department of the Straits of Calais.

COLMENAR, a town of Spain, in Old Castile, on the confines of New Castile; 7 leagues N.W. of Talavera de la Reina.—Also, a town of Spain in New Castile, five leagues N.E. of Elcurial.

COLMITZ, a town of Germany, in the archduchy of Austria, four miles S.S.W. of Drossendorf.

COLMWORTH, a rectory in the county of Bedford, and hundred of Barford: the lofty spire of its steeple forms a very conspicuous object to the surrounding country. In the Government Trigonometrical Survey in 1799, its situation was determined by observations from Lilly-Hoe station, distant 97 617 feet, and bearing 0° 12' 52" S.E. from the parallel to the meridian of Greenwich; and from Lidlington station 75,944 feet; whence is deduced its latitude 52° 12' 49".3 N. and its longitude 22' 27", or 1^m 29'.8 W. of Greenwich.

COLN, a river of England, which passes by Uxbridge and Cobnook, and runs into the Thames, near Staines, separating the county of Middlesex from Buckinghamshire. The clearness and purity of the water of this river, issuing almost entirely in springs out of the chalk hills of Hertfordshire, have always been proverbial. This circumstance probably occasioned the cutting, at some distant periods, of two channels many miles in length, for diverting part of its waters across Hownlow-heath to Twickenham, and into Bushey-park; and a very principal part of the design of the Paddington branch of the Grand Junction Canal, in latter times, was for diverting part of its limpid streams, in order to supply the metropolis with water, to which purpose it is admirably adapted.

COLN, a river of Essex, which is navigable from the mouth of the Thames at Mersey island up to the town of Colchester. See CANAL.

COLN, a river which runs into the Thames at Cricklade.

COLNBROOK, a town of England, in the county of Bucks, on the river Coln, with a weekly market on Wednesday, three miles E. of Windfor, and 17 W. from London.

COLNE, a considerable market-town of Lancashire, England, is advantageously situated on a dry and elevated ridge. This place, says Dr. Whitaker, "is unquestionably the *colonia* of the anonymous Ravennes, and was probably never abandoned entirely, in the long and obscure period of Saxon history." At this place, there have been several Roman coins, and other antiquities found. The church is a spacious structure, and appears to have been "referred about the time of Henry VII or VIII." Here are a market on Wednesday, and two annual fairs. Colne is 218 miles N. of London, and contains 782 houses, with 3626 inhabitants. This town is situated in the hundred of Blackburn, near to the grand ridge on its western side, and also to the Leeds and Liverpool canal, and to the famous Foulridge tunnel upon it. It was once an object of contemplation to conduct a branch of the Rochdale canal to this town; but it was never accomplished. Whitaker's History of Whalley, 4to. See CANAL.

COLNUD, *de Cayenne*, of Buffon, in *Cornitology*, the bare-necked crow, *corvus nudus*.

COLOMBAUDE, the name given by Buffon to *motacilla atricapilla*, or black cap.

COLO, in *Geography*, a town of Poland, in the palatinate of Kalisch, 20 miles N. of Kalisch.

COLO, in *Ancient Geography*, a Roman colony, near the city

city of Constantina, in the kingdom of Algiers, in Africa: the ruins of it now remain, having a castle on a very high rock towards the sea-coast, with a garrison, under the command of an aga; under the protection of which is a small French factory, that deals with the Moors for hides, wax, and wool. The mountains of Colo abound with a large and fierce kind of monkeys, which the Moors have the art of catching with great facility.

COLOBI, a people of Africa, placed by Ptolemy in the Tr. *godytic* tract.

COLOBIUM, *Kolobos*, from *kolos*, I mutilate, among the *Andarts*, an upper garment, without sleeves, longer than the tunic.

COLOBOMA, in *Medical Writers*, is used for the preternatural growing together of the lips, or eyelids, or for the adhesion of the ears to the head.

COLOBON PROMONTORIUM, in *Ancient Geography*, a promontory of Ethiopia, near Egypt, placed by Strabo and Ptolemy in the Arabic gulf.

COLOBONA, a town of Spain, in Bætica, placed by Pliny in the district of Hispætis: now Trebuxena.

COLOBRASUS, a town of Afiæ, situate in the interior part of Cileæ Montana, which, according to Ptolemy, was a country of Pamohyia.

COLOCASIA, in *Botany*, Clus. See *Arum Colocasia*.

COLOCASITES, in *Ancient Geography*, an island of the Red sea, on the coast of Azania, a country of Ethiopia, according to Pliny.

COLOCOLO, in *Ornithology*, a name given by the people of the Philippine islands, to a bird called also there *castil*, and by some authors the *water raven*, *corvus fluviatilis*. This bird, as it is described in the Philosophical Transactions (n. 285), "is of the shape of a common raven, but is truly an amphibious bird, living more of its time under water than in the air; it is black in colour; its neck is remarkably long, and it feeds on fish, which it hunts under water, as they do one another; it feeds likewise on frogs, serpents, and shell-fish. It is common to see it under water in clear rivers, where it seems perfectly at ease, and runs about with great swiftness; at times it comes up to the surface, and dries its wings in the air and sunshine." It is understood by naturalists pretty generally, that the colocolo of the Philippines is no other than the common corvorant, *pelecanus carbo*, a bird known to inhabit moist parts of the world, and to delight especially in maritime situations, or in marshes, and other watery places, near the sea-coast.

COLOCYNTHIS, *COLOCYNTHIDA*, *Bitter Apple*, in the *Materia Medica*. The colocynth is a species of gourd (*cucumis colocynthis*, Linn.) brought from Aleppo and Cyprus, of a globular shape, about the size of the fist, white, smooth, of a fungous texture, divided internally into large cells, which contain a number of oblong seeds.

The pulp, which is the part used medicinally, is intensely bitter, nauseous, and acrid. It contains a remarkably large portion of mucilage so as to render slimy a considerable quantity of water when boiled with it; and, on this account too, the spirituous tincture is too thick to pass through a paper filter.

The colocynth, taken in substance, without any mixture or preparation, is one of the most violent purgatives that we are acquainted with, producing, when in a large dose (that is, when more than eight or ten grains), very severe griping pains, and often a discharge of blood, and leaving for some days symptoms resembling those of dysentery. It is said, too, to act upon the bowels when applied externally to the abdomen.

The activity of the colocynth renders it a valuable medi-

cine, when used with caution. It is seldom or never employed by itself, but is mix'd with aloes, and other purgatives, and much adds to their efficacy.

The only preparation of it retained in the London Pharmacopœia, is the extract (*extractum colocynthis composium olim est catharticum*), which is prepared by digesting in proof spirit, colocynth, aloes, scammony, and cardamom seeds, and afterwards evaporating the tincture to the proper consistence. This is one of the most certain and powerful purgatives we are acquainted with, and generally operates without much griping or inconvenience. It may be properly combined with calomel, if necessary, or, in cases of spasmodic pain of the bowels, with opium.

COLOCYNTHIS, in *Botany*. Tourn. Bauh. Pin. Ray. Moris. See *Cucumis colocynthis*.—Plum. See *TRICHOSANTHES amara*.

COLOCZA, in *Geography*, a town of Hungary, on the Danube, the see of an archbishop. This was formerly an important place, but it is now sunk into decay, in consequence of repeated wars; 136 miles S.E. of Vienna. N. lat. 46° 33'. E. long. 18° 36'.

COLODI, a town of Italy, in the republic of Lucca; 7 miles from Lucca.

COLOE, in *Ancient Geography*, a marsh of Ethiopia, according to Ptolemy, which, he says, was the source of the river Aitapis.—Also, a town, situated, according to Ptolemy, in the interior of Ethiopia; but, according to Arrian, it was a maritime town, and carried on a considerable commerce in ivory.

COLOEPHRYGES, a people of Greece, in Bœotia, called also *Anticondyles*, according to Steph. Byz.

COLOEPHRYX MONS, a mountain of Bœotia, Hefychius.

COLOES, *Enli Gheli*, a lake of Asia Minor, in Lydia, according to Strabo; called *Gigæa* by Homer. It was two leagues, or 40 stadia, to the N.E. of Sardes. Diana, furnished by the tombs of the kings of Lydia, and, among others, that of Aliattes, described by Herodotus, and compared by him with the grandest works of the Babylonians and Egyptians.

COLOGENAR, a town of Asia, situate near the Euphrates, and the town of Edessa.

COLOGNA, in *Geography*, a town of Italy, in the Paduan; 15 miles from Vicenza.

COLOGNE, PETER DE, in *Biography*, a protestant minister at Metz, in the 16th century. He was born at Ghent, and educated at Paris, from whence, at the advice of Robert Stevens, he retired to Geneva, to avail himself of the instructions of John Calvin, who persuaded him to devote his life to the work of the ministry. He embarked in the protestant cause with great zeal and ardour, and the superiority of his talents above those of his contemporaries, recommended him to the peculiar friendship of Calvin and Beza. He commenced his ministerial functions at Metz, in the year 1558, where he continued in the exercise of them either openly, or from house to house, in a private way, during the reigns of Francis II. and Charles IX. In the performance of his duty, he was occasionally subjected to the miseries of imprisonment and exile, until the dispersion of the protestant church at Metz, in 1659. From this town he went to Heidelberg, where he undertook the charge of a congregation, and where he died while he was a young man. He was the author of some original works, and translated others from the German into the French language, but as they were mostly on temporary subjects, it is not necessary to enumerate them. *Nouv. Dict. Hist.*

COLOGNE, in *Geography*, an archi-episcopal electorate of Germany, in the circle of the Lower Rhine, divided into several districts by other estates, and deriving its name from the city of Cologne. It was a bishopric in the year 314, and, in 799, was erected into an archbishopric by Charlemagne. In the ancient constitution of Germany, the archbishop assumed the title of born legate of the holy see, and arch-chancellor of the sacred empire for Italy. He gave his vote after the elector of Treves, and sat at the right hand of the emperor, at assemblies held in his own diocese, in Gaul, or in Italy. The metropolitan church, and chapter, which is composed of 25 canons, and 36 dignities, are at Cologne. Since the French revolution, and the subsequent arrangement of its territories, Cologne is a district of Roer, or Roor, comprehending 10 cantons, *viz.* Cologne, Bergheim, Brühl, Dormagen, Eifen, Juliers, Kerpen, Lechnich, Weyden, Zulpich, which include 204 communes, 1375 kilometres, and 137,215 inhabitants. Although this electorate is reckoned one of the most fertile countries of Europe, the bigotry, ignorance, and idleness of its inhabitants, who are mostly Roman Catholics, prevent its deriving those advantages from its productions, and particularly its commerce, which might reasonably be expected.

COLOGNE, the capital of the archbishopric above mentioned, and formerly one of the free and imperial cities of Germany, in the circle of Westphalia. It was taken possession of by the French in 1794, and is now the capital of the district that bears its name in the French department of Roer, and is said to contain 38,344 inhabitants. Cologne is situated, in the form of a crescent, on the banks of the Rhine, and fortified in the ancient manner; but its walls are in so decayed and tottering a state, that they are incapable of affording it any defence. The whole of its length, along the river, is about $\frac{3}{4}$ miles, two-thirds of which space is uninhabited; several of the squares and streets more resembling a field, or an uncultivated garden, than parts of an inhabited city. In traversing its environs one may observe more than 150 miserable farm-houses, with gardens, which furnish the city with all sorts of greens, butter, cheese, milk, &c. The streets are narrow, winding, and gloomy, and most of the houses are very high, old, and ruinous; and yet this city is said to contain, within its compass, more churches, chapels, and monasteries, than there are days in the year. The Roman Catholic university scarcely merits the appellation. The number of beggars that disgrace its police is very great, and it is said, that the propensity to idleness, gluttony, and begging, which prevails through the city and adjacent country, is sanctioned and encouraged by the example of the different orders of monks; whose chief object is to keep the people, who, with the exception of a few Protestant families, are Roman Catholics, in a state of ignorance and superstition. Two thirds of the inhabitants are either professed beggars, or ecclesiastics. The other third consists of a few patricians, merchants, and mechanics, on the produce of whose exertions and industry the rest live.

Cologne, upon the whole, is at least two centuries behind the other parts of Germany, with regard to improvement in the arts and sciences. Although no city in Germany is more favourably situated for commerce, the natural bigotry and idleness of the inhabitants lead them to forego the benefits which their situation affords them; and their trade has dwindled away to the manufacture of a few ribbands, stockings, lace, and tobacco. The vessels that may be always seen in the port of Cologne are very numerous; the quay, more than $\frac{1}{2}$ mile long, is continually crowded with ships; but the goods on board are almost wholly the property of foreign merchants. About a fortnight before

the fair at Frankfort begins, there is a great concourse of these merchants at Cologne, who repair daily from thence to Frankfort, by means of two commodious vessels containing from 150 to 200 passengers, which perform this voyage every other day during the fair. The Jews were expelled from Cologne in the year 1485, and from that remote period not one of them has ever obtained leave to settle there, or dared even to enter the city without permission of the magistrate. Under the old police, if a Jew came into the city, he was accompanied by a guard during his stay, and obliged to pay a duet for every hour of his continuance there. In the year 1618, the Protestants were all expelled, but some years after they obtained permission to return. The magistrates indeed gave them leave to erect a place of worship, which was destroyed by the infuriated mob as soon as it was finished. Since that event they have erected for themselves several handsome churches at Mulheim, three miles from Cologne, on the right bank of the Rhine. The trifling commerce of Cologne has been confined to a few Protestant families ever since the period of their return, who, it is observed, are the only opulent inhabitants of the place. The wealth of the churches at Cologne, at least before it was taken possession of by its new occupiers, was immense, particularly that of the cathedral. These churches are repositories of various relics that are held in high estimation by the superstitious catholics. The theatre is a roomy building, but not elegant. The town-house is an irregular stone edifice, awkward and in a ruinous state. The arsenal occupies part of a very narrow street; its contents are chiefly ancient arms, not proper for modern use; and the building itself is in a state of decay. The dealers of Nuremberg and Augsburg bring their toys in large quantities to Cologne for exportation to Holland, England, and America. The Spaniards and Portuguese carry on a very profitable trade with them in both the Indies. The inhabitants of Cologne derive a very considerable advantage from the importation of coals out of the adjacent countries of Berg, the electorate of Treves, the principalities of Saarbruck, and duchy of Deuxponts, which come by the Saar down the Moselle and the Rhine, and supply the want of wood-fuel, that is very scarce about Cologne. Some of these coals are round and large, and another sort consists of dust, which is mixed with clay and water, and formed into small cakes, manufactured in summer; and which, being gradually hardened by the heat of the sun, are stored up in large magazines erected for that purpose. These coal-cakes are sold at 15 shivers (about 1s. English money) per hundred; and it is said, that 100 of them will go as far as three bushels. Near this city some pseudo-volcanic remains have been traced, which are thought to be such as are mentioned by Tacitus at the close of the 13th book of his *Annals*, the effects of subterranean fire which ravaged the country of the Juhones. N. lat. $50^{\circ} 35' 21''$. E. long. $6^{\circ} 55'$.

COLOGNE, a town of France, in the department of Gers, and chief place of a canton, in the district of Lombes; six leagues E. of Auch. The place contains 769, and the canton 6096 inhabitants; the territory comprehends 117 $\frac{1}{2}$ kilometres, and 17 communes.

COLOGNE Earth, a substance used in painting, as a water colour, much approaching to amber in its structure, and of a deep brown. It has generally been esteemed a genuine earth, but has since discovered to contain a great deal of vegetable matter, and, indeed, it is a very singular substance.

It never constitutes an entire stratum in the earth, but is lodged among other strata in large flat detached masses. It is moderately dry, while in the earth, and of a soft

crumbly texture. When dried, it is of a deep, dusky brown, of a very close, compact, and fine texture, and very remarkably light; it is of a smooth, even surface, dry, but not harsh to the touch, crumbles easily to pieces between the fingers, and slightly stains the hands; it adheres firmly to the tongue, but not at all resembling the albugency of the boles, or any thing else of the mineral kingdom, but plainly resembling the taste of oak bark. It makes no effervescence with acids; if thrown into water, it swims on the surface, till thoroughly wetted; and if brought into contact with burning coals, it takes fire and burns of itself, till reduced to yellowish ashes.

It is easy to discern from this account, that, though this is generally esteemed an earth, and known to the world by no other name, it is no pure native fossil, but contains more vegetable than mineral matter, and owes its origin to the remains of wood which has been long buried in the earth. It is dug in Germany and France; the quantities consumed in painting, in London, are brought from Cologne, where it is found very plentifully; but our own kingdom is not without it, it being found near Birmingham, and on Mendip hills in Somersetshire; but what has been yet found there is not so pure or fine, as that imported from Cologne. Hill's Hist. of Fossils, p. 64. and Da Costa's Hist. of Fossils, p. 121.

COLOGNOLI, in *Geography*, a town of Italy, in the duchy of Tuscany; 6 miles E. of Leghorn.

COLOKITIA, or **KOLOKITIA**, a town of European Turkey, on the southern coast of the Morea, in a gulf to which it gives name: 25 miles S.E. of Mistra. N. lat. 36° 47'. E. long. 22° 34'.

COLOMAY, a town of Poland, in the palatinate of Red Russia; 5 miles N.E. of Halez.

COLOMBA, in the *Materia Medica*. See **COLUMBO**.

COLOMBEL, **NICOLAS**, in *Biography*, a French painter who was born in 1646, at Sotteville near Rouen, and became the scholar of Le Sueur, under whom he studied several years; he then went to Italy, where he assiduously copied the works of Raffaele and Nicolo Poussin; but though he enjoyed every advantage of education, and laboured to form his style upon the model of those great masters, the poverty of his genius ever appeared; and his pictures, though correctly drawn and carefully finished, generally wanted that elevation of thought and striking expression, which can alone give value to historic painting. However, in 1682, he sent four pictures which he had painted at Rome to Paris, and thereby gained sufficient reputation to cause his being chosen a member of the Academy upon his return to Paris in 1694. One of his most esteemed pictures is an "Orpheus playing on his Lyre," in the apartment of the menagerie in the royal palace. He died in the year 1717. D'Argenville.

COLOMBES, in *Geography*, a town of France, in the department of Paris, and chief place of a canton, in the district of St. Denis; 1½ league N.W. of Paris.

COLOMBEY, a town of France, in the department of the Meurthe, and chief place of a canton, in the district of Toul; 15 miles S.W. of Nancy. The place contains 858 and the canton 12,887 inhabitants; the territory includes 315 kilometers and 32 communes.

COLOMBIEN, **DE**, in *Biography*. See **VALENTINE**.

COLOMBIER, in *Geography*, a town of France, in the department of the Upper Saone, and chief place of a canton, in the district of Vesoul; four miles N. E. of Vesoul.

COLOMBIER, a town of Switzerland, in the principality of Neuchatel; two miles S.W. of Neuchatel.

COLOMBIERE, **CLAUDE DE LA**, in *Biography*, a

celebrated French Jesuit, was born near Lyons, in which city he prosecuted his studies, devoting most of his time to rhetoric and theology. Of the former branch of science he became a professor, and in the latter he was distinguished as a popular and impressive preacher. In this character he was noticed at the court of the duke of York, afterwards James II, of England, being made chaplain and confessor to the duches, until he was banished under suspicion of being engaged in a conspiracy. He returned to his native country in the year 1682, where he died at the age of 41. Colombiere published six volumes of sermons, which are elegant, pious, and simple; they have been often reprinted. He published also a "Collection of Orations" in Latin, delivered by the author as professor of rhetoric; a volume of "Moral Reflections;" two volumes of "Spiritual Letters;" and "A System and Office for the Solemnity of the Worship of the Heart of Jesus," which the Jesuits employed a considerable time in every Catholic country, as a powerful instrument in favour of the papal cause. Patru, a well known writer, describes Colombiere as one who thoroughly understood the nicest refinements of the French language. Nouv. Dict. Hist.

COLOMBINI, **COSIMO**, an engraver of Florence, who engraved a great part of the portraits of painters inserted in the magnificent work of the "Museum Florentinum." He flourished about 1754. Strutt. Heineken.

COLOMBONI, **DON ANGIOL MARIA**, a very celebrated painter of miniature and natural history, was born at Gubbio in the year 1608, and at a very early period of life became a monk of the order of Mount Oliveto. He made considerable progress in literature, and in the mathematics, and published at Bologna, in the year 1699, a book on Sundialling, entitled "Pratica Gnomonica, ovvero Tavole, colle quali ciascuno agevolmente puo far da se gli Orologi da Sole." But he was not less admired for his miniatures, and for his excellent drawings of herbs, flowers, and birds, which he drew with such taste and correctness, and finished with such extraordinary delicacy and softness, that he was styled the Giovanni da Udine of his time, and the great Guercino used to call him the Raffaele of his profession. He left two volumes of these drawings of birds, in which not only the beautiful colours and the delicacy of the plumage were admirably represented, but, what was more extraordinary, each appeared exactly in the attitude most usual to it or most characteristic. He spent great part of his life in Bologna, highly esteemed, and died in the place of his nativity in the year 1672. Bildinucci.

COLOMBRARO, in *Geography*, a town of Naples, in the province of Basilicata; 4½ miles S.S.W. of Turfi.

COLOMIES, **PAUL**, in *Biography*, was born at Rochelle; he embraced the Protestant religion, and followed his friend Isaac Vossius into England, where he attached himself to the cause of episcopacy, and even attacked the party among whom he had been educated, in a work entitled "Theologorum Presbyterianorum Icon," which raised him many enemies. He was, however, rewarded by being made librarian at Lambeth, and reader at the episcopal French church in London. Here he died in January 1692, leaving the reputation of great skill in bibliography. He was author of "Gallia Orientalis," in 4to. which was an account of Frenchmen eminent for oriental learning; of a similar work respecting Italy and Spain, with many others of considerable note at the time in which he flourished. Bayle.

COLOMNA, **FABIUS**. See **COLUMNA**.

COLON, in *Anatomy*, from *κολος*, *holos*; is a name applied to the greater part of the large intestine. See **INTESTINE**.

COLON, in *Grammar*, a point, or character, formed thus (:) serving to mark a pause, and to divide the members of a period. See POINTING. See also PERIOD, COMMA, and SEMICOLON.

Grammarians generally assign the use of a colon to be to mark the middle of a period; or to conclude a sense less perfect than the dot, or period; but a sense less perfect than the period, is an expression extremely vague and indeterminate.

Others say, a colon is to be used when the sense is perfect, but the sentence not concluded; but neither is this sufficiently clear and express. Add to this, that in practice, our best writers confound the colon with the semicolon.

F. Buffier attempts to fix the use of the colon; but he does not much distinguish it from the semicolon: he prescribes the use of either, indifferently, and calls them by a common name, *intermediate pointings*; as being mediums between the comma, and full point, or period. Their use, according to this author, is to distinguish the supernumerary members of a period. By supernumerary members are meant such as the precedent ones do not raise any expectation of; *i. e.* such parts as have indeed a dependence on what goes before, even though what goes before has a complete sense, independent hereon: *v. gr.* "the Augustan age was so eminent for good poets, that they have served as models to all others; yet did it not yield any good tragic poets;" where the supernumerary member, and the use of the colon, are obvious. The most obvious and sensible use of the colon, he adds, is, when the supernumerary member is distinguished by some conjunction; as, "notwithstanding, however, but, except that, unless, inasmuch as, yet, since, the rather as, provided that," &c. Some, indeed, use the colon in the middle of long periods, without any regard to supernumerary members: which custom was probably introduced to mark, that the breath is here to be taken almost as much as in a common period, in the place where the supernumerary period commences. But this, at best, is arbitrary; and the intermediate pointings may always be omitted in a period, if there be no supernumerary member, *i. e.* if there be no subsequent member, but what is expected from the precedent. As to the occasions where the colon is to be used, rather than the semicolon, there is nothing precise to be said of it; except that the colon shews the supernumerary member more detached, and sets it at a greater distance from the rest; and therefore marks a longer pause than the semicolon.

Accordingly, it seems preferable to use the semicolon before conjunctions adverbial, restrictive, conditional, &c. as, "nevertheless, but, excepting that, however, otherwise, provided that." Again, where the supernumerary phrase is not only supposed the precedent, but depend on them for their regimen, and are, as it were, new parts thereof; there the semicolon seems preferable to the colon: *v. gr.* "You are regardless of the goodness of God, who first chose you; a God who is only jealous of your heart for your own happiness; a God who could be equally glorious in destroying you by his justice, as in saving you by his mercy." Or thus: "The discourse consisted of two parts; in the first was shewn the necessity of fighting; in the second, the advantages that would redound from it." But this difference, it must be owned, has a dependence on something that influences all the points, and sways the whole doctrine of punctuation; *viz.* the length, or shortness, of the members and periods: for, when the phrases are long, we point higher than when short.

A later author, in an ingenious discourse, "De Ratione Interpungendi," marks the office of the colon, and its difference from the semicolon, &c. more precisely; a colon, on

his principles, serves to distinguish those conjunct members of a sentence, which are capable of being divided into other members, whereof one at least is conjunct. Thus, in this sentence, "as we cannot discern the shadow moving along the dial-plate, so the advances we make in knowledge are only perceived by the distance gone over;" the two members being both simple, are only separated by a comma: in this, "as we perceive the shadow to have moved, but did not perceive it moving; so our advances in understanding, in that they consist of such minute steps, as are only perceivable by the distance;" the sentence being divided into two equal parts, and those conjunct ones, since they include others, we separate the former by a semicolon, and the latter by commas: but in this, "as we perceive the shadow to have moved along the dial, but did not perceive it moving; and it appears the grass has grown, though nobody ever saw it grow: so the advances we make in knowledge, as they consist of such minute steps, are only perceivable by the distance." The advancement in knowledge is compared to the motion of a shadow, and the growth of grass; which comparison divides the sentence into two principal parts: but since what is said of the movement of the shadow, and likewise of the growth of grass, contains two simple members, they are to be separated by a semicolon; consequently a higher pointing is required to separate them from the other part of the sentence, which they are opposed to; and this is a colon.

Bishop Lowth observes, that a colon distinguishes a member of a sentence, whether simple or compounded, which of itself would make a complete sentence, and so requires a greater pause than a semicolon, yet is followed by an additional part, making a more full and perfect sense. He adds, that a colon may be also used, when a semicolon has preceded, and a greater pause is still necessary, though the sentence be incomplete; and that it is commonly used, when an example, or a speech, is introduced. *Introd. to Eng. Gram. ed. 1772. p. 207.*

COLONA, in *Botany*, Bosc. *Nouv. Dict. Hist. Nat. Cavan. tab. 370.* Class and order, *polyandria monogynia.*

Gen. Ch. *Cal.* five-leaved; leaves linear, coloured on the inside, caducous. *Cor.* Petals five, with a nectareous scale at the base. *Stam.* Filaments numerous, inserted into the top of a pentagonal column. *Pist.* Germ placed at the top of the column, in the centre of the stamens, tetragonous-globular; style longer than the stamens; stigma simple. *Peric.* Drupe globular, with four wings, opening into four parts. *Seeds* oval, two in each division of the drupe. Nearly allied to *Grewia*, and differing chiefly in the structure of the pericarp.

Sp. C. *dentata.* A tree. *Leaves* alternate, almost sessile, oval, toothed, very large. *Flowers* reddish, in axillary, solitary racemes, which sometimes form a panicle. A native of the Philippine islands.

COLONE, in *Ancient Geography*, a town of Asia Minor, in the Troade, placed by Strabo at the distance of 140 stadia from Ilium, in the territory of Lampascus; it was a colony of Milesians.—Also, a town of the same name, placed by Strabo near Chrysa; by d'Anville, S. of Troas.—Also, a town, mentioned by Anaximenes, cited by Strabo, and placed in Erythraea.—Also, a town of Greece, in Messenia; according to Ptolemy; now *Griffo*.—Also, a town of Greece, in the Phocide.—Also, the name of a rock, on the bank of the Thracian Bosphorus, over against the Cyanan island, at the entrance of the Euxine sea.—Also, a town of Greece, in Thessaly.—Also, a promontory near the river Lycus.

COLONEL, the officer who has the chief command of a regiment of horse, foot, dragoons, or artillery. The lieutenant.

tenant-colonel commands it in chief in the absence of the colonel, to whom he is subordinate, as the other officers are in like manner to him, when he is present.

COLONEL of a regiment of horse, is the first officer in it, and commands it when present. His duty consists chiefly in keeping the regiment complete; in having it composed of men and horses that are fit for service; in taking care to have them well exercised and instructed in the different evolutions, so that they may be able, on all occasions, to form themselves suitably to the ground they occupy or act on, or to the manner in which they may wish either to make or receive an attack. In France, Spain, and some other southern nations of Europe, colonels of horse have been usually called *maitres de camp*. But in Germany, and most northern nations, they are called *ritmeisters*.

COLONEL of dragoons. His principal functions are the same as those of a colonel of horse. But he ought to be also in some measure acquainted with the duties of a colonel of infantry, as his men are liable to act either mounted or dismounted.

COLONEL of foot, or infantry. His functions are more extensive and diversified than those of a colonel of horse, as the infantry are employed for a greater variety of purposes, and on a greater diversity of services. Colonels of infantry should be well acquainted with fortification, and with field-engineering (which, however, they seldom or ever are); since such a thorough and comprehensive knowledge of their principles, as enables an officer to apply them expeditiously and judiciously, is the best and safest guide to the proper formation and arrangement of troops in various situations, and to the advantageous occupation of ground and positions. A colonel of infantry should be particularly careful to maintain union and harmony among his officers, and contentment among his men; to acquire the esteem and confidence of both, and to make himself be respected by them; to which nothing contributes more than a steady, uniform, and impartial enforcement of subordination and discipline. He should likewise be peculiarly attentive to the health and comfort of his men.

COLONEL of Artillery; the commander of a battalion of artillery. His duties, when properly understood and attended to, are various and laborious, both in war and peace, and require, in order to be well performed, not only abilities, but also application, knowledge, and experience. He ought to be an able mathematician and mechanic, and should be acquainted with all the duties of an engineer, that are connected with the use and application of artillery in different situations, and to different purposes; the construction of batteries, platforms, field-works, the occupying of positions with artillery, to the best advantage, both as to direct and flanking fires, &c. Whatever situation he may be placed in, or on whatever service he is going, he should understand thoroughly what nature and species of ordnance is best adapted to it. He should be acquainted with all the best and most useful experiments, that have been made with artillery in the different nations of Europe; he should know the greatest distance at which walls can be battered in breach effectually; the different charges of powder, best adapted for different services, and different distances. And he should not only be well acquainted with the wide differences between the ranges of cannon-shot and shells in the air, and those which the parabolic theory gives for them *in vacuo*, but also be able to approximate, nearly to the truth, the distances to which projectiles will go in the air, thrown with given charges of powder, and given degrees of elevation. In short, he ought to know a variety of things, which few officers of artillery actually do know.

COLONEL of Engineers. See the article **ENGINEER**.

COLONEL, Lieutenant, is, as has been already observed the second officer belonging to a regiment, and commands it in the absence of the colonel.

COLONEL General of the French Infantry, or **COLONEL General d'Infanterie Francoise**: an appointment of great trust and authority, which took its birth, or originated, under Francis I. in 1544. It became an immediate gift of the crown, under Henry III. in 1584. It was at last suppressed, because it gave too many prerogatives, and too much power to the person who was invested with it. Under Louis XV. however, it was re-established in 1711, in favour of Louis, the first duke of Chartres. This officer had originally the right of nomination to every commission and place of trust in the infantry. He could order courts martial, and enforce the sentences awarded by them, without any suspension of his power in that respect, by an appeal to a superior tribunal; and he had a company in every regiment of infantry, which was called the colonel general's company.

COLONEL Général d'Infanterie de Suisses et Grisons. This appointment was not held of the crown; but it was almost always given to a prince. It took its rise in right of office under Charles IX. in favour of the son of the countess of Montmorency, killed at the battle of St. Denis. All the Swiss and Grison troops were subordinate to the colonel general, the company *des cent Suisse de la garde* excepted. He appointed colonels and captains. The lieutenants at last assumed, or refused, this right of nomination. But he still retained the right of naming and presenting to the king the officers of the nation, to be included in the promotion of general officers, and enjoyed several other prerogatives.

COLONEL Général de la Cavalerie légère et étrangère. This charge, or employment, was created in right of office under Charles IX. It was, however, known before his time, in 1449, under the title of "capitaine general de la cavalerie Albanoise." Under Louis XIII. there were two such colonels general, one of the French cavalry, and the other of the German cavalry. Though these general officers enjoyed great honours and prerogatives, the generals of the Roman cavalry, under the emperors, were persons of still greater importance. For they had the same authority over the troops and militia, that the kings and dictators had. The emperors treated them in their regulations and constitutions, as seignors of the highest rank, eminence, magnificence, and celebrity. They enjoyed an authority almost absolute, over all military people.

COLONEL General des Dragons, colonel general of dragons. This appointment was created in 1688, by Louis XIV. It was, like the preceding ones, favoured with an attribution of great honours and particular prerogatives.

COLONEL de Troupes Légères, colonel of light troops. This officer ought to be well instructed, both by study and experience, in the art of petty warfare, and the management of detachments. For, as he is almost always responsible for the corps confided to his charge, and forced to take advanced positions in an enemy's country, he is of consequence more exposed to be surprized, taken, or at least beaten.

COLONELLE, COMPAGNIE, the first company in a French regiment.

COLONI, ADAM, called the Old, in *Biography*, a painter who was born at Rotterdam, in 1634, but afterwards resided and died in London, in 1685. The subjects of his pictures were generally wakes, country fairs, rural subjects, and cattle; besides which, he made several copies from the pictures of the Bassans, with success. He had a son called **ADRIAN COLONI** the young, who received instructions from

from his brother-in-law, Van Dyck, in addition to the lessons bestowed on him by his father. He frequently painted the figures in the landscapes of Van Dyck, as well as in those of other masters; and sometimes imitated the touch of Salvator Rosa. At other times he produced pictures of history, but more generally those of cattle, conversations, or landscapes. Adrian died in the year 1701, aged 33. Pilkington.

COLONIA, *Caps*, in *Geography*, lies on the W. coast of Asiatic Turkey, N. of the gulf of Smyrna. N. lat. 39°. E. long. 26° 36'.

COLONIA, in *Ancient Geography*, an episcopal town of Asia, under the metropolis of Sebaste; situate in the first Armenia, and called also *Taxara*.—Also, an episcopal town of Asia, in Cappadocia.—Also, a town of Italy, in Etruria.—Also, a town of the Isle of Albion, in the route from Londinium to Lugwallium ad Vallum, between Cæsaromagus and Villa Faustini, according to the Itinerary of Antonine. Although our antiquarians are divided about the situation of Colonia, it seems, upon the whole, to be most probable that it was at Colchester, on the river Colne, from whence it derived its name.—Also, a town of the Damulii, according to Ptolemy, which some, as Camden and Baxter suppose, to have been Coldingham in the Mers, but which was more probably situated at or near Lanark, in Clydesdale. See COLDINGHAM.

COLONIA, in *Geography*, a town of Istria; five miles S.S.E. of Rovigno.

COLONIA Agrippina Ubiorum, in *Ancient Geography*, a town seated on the banks of the Rhine; now COLOGNE. It was built by the Ubii, when they left Germany to establish themselves in Gaul. Agrippina, the mother of Nero, fixed a colony of veterans in this place, and gave it her name in honour of the place of her birth.

COLONIA Equestris, a town of Gallia Belgica, assigned by Pliiny to the Helvetians; but by Ptolemy to the Sequani. The Itinerary of Antonine marks it under the name of "Equestris," between Bantua and Læca Laufanio. It was also called "Noiodunus," or "Niviodunum;" but when it became a colony, the Romans called it "Colonia Equestris." It is now *Nion*.

COLONIA Flavia, the town called CÆSAREA of *Palestine*.

COLONIA Julia, a town and Roman colony of Germany; now *Bonn*.

COLONIA Julia Celsi, a town of Spain, which was a Roman colony; now a village called *Xelsi*.

COLONIA Julia Hispania, a town and Roman colony of Italy, in Umbria; now *Spello*.

COLONIA Marcia, a town of Spain, which had the title of Roman colony; now *Marchara*.

COLONIA Senensis, a town of Italy, in Etruria, which was a Roman colony; now *Sienna*.

COLONIA Septimanorum Juniorum, a town of Gaul, with the title of colony; now *Béziers*.

COLONIA Trajana, now *Keln*, or *Keln*, was situated at a small distance from the Rhine, and about a mile from *Cleves*.

COLONIA Ulpia, is now *Cleves*, which see.

COLONIDES, called *Colone*, by Ptolemy, a town of Messenia, seated on an eminence on the coast which bore northwards to the west of the gulf of Messenia. Its inhabitants are said to have been conducted under the direction of an oracle, by a person named Colonus, from Attica to this country. In process of time they assumed the manners and language of the Dorians. The mountain Temathæ, called by Pausanias Temathia, commenced towards Colonis, and extended itself towards the north-west, as far as mount Egealcus.

COLONIS, an island of Greece in the Argolic gulf, according to Pliiny.

COLONNA, GIOV. PAOLO, Maestro di Capella di San Petronio di Bologna, in *Biography*, was the son of Antonio Colonna, alias del Corno, a celebrated organ builder of Brescia. He composed but few operas; indeed, we know of but one, *Amleir* in Cipro, for the theatre of Bologna, 1632; but he published about the latter end of the last century many excellent works for the church, of which P. Martin has given a list, to the amount of twelve, in the second volume of his *History of Music*.

It was the opinion of the late Dr. Boyce, that Colonna was Handel's model for choruses accompanied with many instrumental parts, different from the vocal. But it must, however, be owned, that Handel has greatly surpassed his model in energy, fire, and vigour of genius. The psalms of Colonna in eight real vocal parts, published at Bologna in 1694, have been very justly admired for their masterly composition. Paolucci has inserted the hymn, "Pange lingua," set in plain counterpoint of four parts by him, in a manner sufficiently simple and syllabic for the most zealous reformers of church music. His "Sacre lamentationi della settimana santa, a voce sola," published 1689, contain many pleasing and elegant fragments of pathetic recitative, which we should have admired much more if we had not previously been acquainted with the works of Carissimi, who had anticipated not only all the thoughts of Colonna in this species of music, but almost all those of every composer of the present century. The airs of these lamentations are too short to make much impression on the hearer.

Colonna had a controversy with Corelli in 1685, concerning the consecution of fifths in the first movements of the third sonata of his Opera 2da. Every lover of music will be sorry that the charge against Corelli should be well-founded; but it must be owned that the base is indefensible in the passage which has been condemned by Colonna, and was not likely to have passed uncorrected, even in an age much more licentious than that of Corelli.

Antimo Liberati, with whom Colonna was in correspondence at the time of this controversy, seems to defend Corelli's violation of the known rule against the consecution of fifths, in a letter written 1685. "Sopra un teguito di quinte," in which he reasons thus: "If a quaver rest, or even a fermiquaver, were not sufficient to satisfy the rule against fifths and eighths, a composer writing in many parts would have very narrow limits for the expansion of his genius and fancy, or for varying the harmony." But with due respect for the authority of Antimo Liberati, and with peace to the ashes of the gentle Corelli, the passage is unwarrantable, and seems the more inexcusable, as several better bases were easy to find, without altering his design, or distorting the effect of his trebles. It appears that the excellent theorist Berardi had a reverence for the professional erudition of Colonna, by his dedicating to him the seventh chapter of his "Miscellanea Musicale."

COLONNA, MICHAEL ANGELO. See ANGELO.

COLONNA, MARC-ANTONIO, bore arms from an early age in the service of the Spaniards, and rose to great military reputation. He was appointed by pope Pius V. general of his galleys, and served in the famous battle of Lepanto, gained against the Turks in 1571. On his return he pope honoured him with a triumphal entry after the manner of the ancient Roman conquerors. He possessed several high civil posts, as constable of Naples, and viscount of Sicily, and died in Spain in 1584. Moreri.

COLONNA, ASCANIO, was son of Marc Antonio, and educated under his father's roof by the celebrated Murcius.

He

He accompanied his father into Spain, and studied at the universities of Alcalá and Salamanca. Philip II. gave him an abbacy, and he was made cardinal by Sixtus V. At the death of the king his patron, he delivered a funeral oration, which he printed. He was himself a promoter of literature, and collected a magnificent library. Owing to his great skill in canonical law, and the support which he gave to the claims of the Catholic king, he was made viceroy of Catalonia. He afterwards wrote a canonical defence of the pope's conduct in his dispute with the republic of Venice. This and some other letters and harangues he published, and died at Rome in 1628. Moreri.

COLONNA, FÆLIUS. See COLUMNA.

COLONNA, FRANCESCO, was born about the middle of the sixteenth century, probably at Venice, and entered young into the order of Dominicans. The work by which he is chiefly known is "*Hyperotomachia di Poliphilo*," which signifies *the combat of Love in a dream, and the Lover of Polia*. It consists of fable, history, allegory, architecture, mathematics, &c. and is written in a language compounded of words taken from six or seven different languages. It was printed by Aldus in 1499, and a French translation was published in 1549, and has been several times re-printed. The original and translation have been in great request among collectors of books, as well on account of their rarity, as for the sake of the beauty of the numerous wooden cuts with which the work is decorated. Colonna died at an advanced age, at Venice, in the year 1527.

COLONNA, PROSPERO, a distinguished military commander, was younger son of Anthony prince of Salerno, and born about the year 1452. He engaged in the service of Ferdinand king of Naples, and after his death, in that of Charles VIII. king of France. When that prince undertook the conquest of Naples, Colonna, with his cousin Fabrizio, rendered him some signal services, but upon a change of politics, they returned to their former allegiance. Prospero assisted in the recovery of the kingdom of Naples: he was at the battles of Barletta and Garigliano, at which the French were worsted; and he signalized his valour and conduct at a variety of sieges and other military actions. In the year 1515, while attempting to defend the passage of the Adriant, he was made prisoner, and carried to France, but being liberated, he resumed his profession in order to revenge the disgrace that attached to him while a captive. He died in 1523, aged seventy-one, leaving behind him a very high character as a general; he was rather prudent and cautious than formed for remarkable enterprises. Though slow and inactive, he was, by constant vigilance, generally secured from surprize. He was the friend and patron of learned men. Moreri. Robertson's Hist. ch. v. vol. ii.

COLONNA, POMPEO, was brought up by his uncle Prospero, and destined by him for literary pursuits. The young man inclined to the profession of arms, and distinguished himself as a military man till he was compelled to assume the ecclesiastical character. He was made bishop of Rieti, and obtained many lucrative benefices. He was, however, little attentive to the duties of his sacred office, and so regardless of the decorum that ought to be attached to it, that he accepted a challenge, and tore his cassock to pieces that he might not be prevented from fighting. On a false report of the death of pope Julius II. in 1512, Pompeo joined in raising the cry of liberty, and took possession of the capital. For this he was deprived of his benefices, but by the interest of his uncle, matters were again accommodated, and in 1517, he was elevated to the rank of cardinal. Still, however, inclined to turbulent measures, his conduct gave

his enemies the opportunity of charging him with the intention of putting the pope to death, in order that he might succeed to that high dignity: he was accordingly deprived of his offices, in which he was reinstated on account of some important services which he rendered to the reigning pontiff. He was afterwards viceroy of Naples, where he died in 1532. He was esteemed a patron of literature, and wrote a poem "*D. laudibus mulierum*," chiefly in praise of Vittoria Colonna. Moreri. Robertson's Hist. ch. v. vol. ii.

COLONNA, VITTORIA, a learned lady and poetess, was born at Marino in 1490. At the age of seventeen, she married Ferdinand Francis D'Avalos, marquis Pescara, who, by her influence, was dissuaded from accepting the kingdom of Naples, which was offered him after the victory of Pavia, in order to detach him from the service of the emperor Charles V. After his death, which happened in 1525, she lived in retirement, devoting herself to poetry; she kept up, with much credit to herself, a friendly and learned correspondence with some of the most celebrated literary characters of the age. In 1541, she retired to the monastery at Orvieto, and from thence she went to St. Catharine in Viterbo, but in 1547, she returned to Rome, where she died. Her poems have passed through many editions, and have been printed with the commentaries of learned men. Moreri.

COLONNA, in *Geography*, a town of European Turkey in Dalmatia; 24 miles N. of Spalatro.—Alto, a town of Italy, in the Campagna di Roma; 12 miles from Rome.—Alto, a cape of Naples, on the E. coast of Calabria Ultra. N. lat. 35° 6'. E. long. 17° 26'.

COLONNADE, the name given to any range of insulated columns. See PORTICO.

COLONNE, in *Geography*, a town of France, in the department of the Jura, and chief place of a canton in the district of Poligny; 2 leagues W. N. W. of Poligny.

COLONNI, a cape on the coast of the Morea, in the Mediterranean. N. lat. 37° 32'. E. long. 24 11'.

COLONOSSIS, in *Ancient Geography*, a place of Asia, in Lycæonia.

COLONSAÏ, in *Geography*, one of the islands of Scotland, called the Hebrides. It belongs to Argyllshire, and as it is separated from Oranfay, merely by a narrow channel, which is dry at low water, Colonsay and Oranfay may be considered but one island. Although the eminences of the former cannot correctly be termed mountains, they are high, rugged, and covered with heath. The arable land, which consists of about 3000 acres, produces early and tolerable crops, as the soil is light and mixed with sand along the shores; part of this land has lately been converted into pasture, and numbers of black cattle are fed on the two isles. A monastery of Cistercian monks formerly flourished in Colonsay, and the remains of the walls of the abbey gave place some years past to a farm house; a priory attached, stood in Oranfay, where the ruins still remain, and are considered superior to any other religious building in the Hebrides, with the single exception of Icolmkill; there are besides fragments of several chapels in Colonsay. The inhabitants make large quantities of kelp from the seaweed found on the coast; and the banks which surround the islands produce plenty of fine coral. The population is estimated at about 720, and the duke of Argyll is the principal proprietor.

COLONSAÏ, *Little*, an island, and one of the Hébrides, situated between Gometra and Staffa. There are several specimens of basaltic pillars in the Lesser Colonsay, but it has no other inhabitants than one family who attend a few sheep.

COLONUM, a place of Greece, in Attica. Here was a forest

a forest consecrated to the Eumenides. Sophocles, according to Suidas, was born in this place.

COLONUS, an husbandman, or villager, who was bound to pay yearly a certain tribute, or at certain times of the year, to plow some part of the lord's land; and from hence comes the word *colonus*, who is called by the Dutch *boor*.

COLONY, *COLONYA*, is properly a number of persons of all sexes and conditions, transported into a remote province, with a view of remaining there, and for the purpose of cultivating and inhabiting it; but among commercial nations, the term is used in a larger but less proper sense, and applied to the temporary residence of merchants and agents in another country. The word colony originally signified no more than a *farm*, i. e. the habitation of a peasant, *colonus*, with the quantity of land sufficient for the support of his family; "quantum colonus unus arare poterat." It is derived from the Latin word *colos*, I till or cultivate; hence *colonus*, a husbandman, and *colonia*, a body of farmers, sent to cultivate the ground in a distant country, and, by metonymy, the place itself. From the Latin the word has passed, with scarcely any alteration, into the modern languages of the west of Europe.

We may distinguish, generally, four kinds of colonies; *viz.*
 1. Those that serve to ease or discharge the inhabitants of a country, where the people are become too numerous, so that they cannot any longer conveniently subsist together.
 2. Those established by victorious princes and people, in the middle of vanquished nations, to keep them in awe and obedience.
 3. Those that are formed by emigrants, driven from their native country by oppression and persecution to seek a foreign settlement, and to subsist first by agriculture, and afterwards by commerce.
 4. Those that may be called "colonies of commerce;" because trade is the sole occasion and object of them.

To the *first* class we may refer the colonization which took place in the earlier ages of the world, and which served to disseminate the human race, first through the various regions of the east, and afterwards through other more remote parts of the globe. At this early period colonization was of course more frequent than it is at present. The increase of a tribe beyond the limits of a comfortable subsistence upon the lands which were occupied, would be a sufficient motive for inducing the younger members of the society to remove from the prospect or actual pressure of want, to some unoccupied territory. Some authors, however, are of opinion that soon after the deluge, when the descendants of Noah became numerous, a division of the ancient continent and its adjacent islands was made, probably by lot, among the heads of the several families. This opinion seems to be in some measure supported by the authority of Moses, who says, (Gen. x.) on mentioning the children of Eber, that the name of one of them was "Peleg" (division), for in his days was the earth divided." (See DISPERSION.) However this be, the gradual extension of the habitations of mankind must have corresponded with their increase; and it seems to have been unrestrained by claims made upon the uncultivated spots. But this unlimited right of dispersion has long since ceased in most parts of the world; and hence it has become necessary for colonists, who seek new scenes for their labours, either to unite with the natives as friends, or to subdue them by conquest, if the colony is founded upon hostile principles. At a subsequent period, the different states of ancient Greece, such were Athens, Sparta, Corinth, and Argos, possessed territories of very limited extent; and the increase of population gave rise to various emigrations from all those states. The colonies of the Dorians resorted chiefly to Italy and Sicily, which, in

the times preceding the foundation of Rome, were inhabited by barbarous and uncivilized nations; those of the Ionians and Eolians, the two other great tribes of the Greeks, to Asia Minor and the islands of the *Ægean* sea, the inhabitants of which seem at that time to have been pretty much in the same state as those of Sicily and Italy. The emigrations now mentioned, and some others of a similar nature, were undertaken by private individuals, with no authority from the government; and as they were generally directed towards distant and transmarine settlements, they retained but a slight connection with their original countries. The parent state, indeed, considered the colony as a child, at all times entitled to great favour and assistance, and owing in return much gratitude and respect; but, moreover, considered it as an emancipated child over whom no direct authority or jurisdiction was claimed. The colony settled its own form of government, enacted its own laws, elected its own magistrates, and made peace or war with its neighbours as an independent state, which had no occasion to wait for the approbation or consent of the parent city. The colonists, indeed, remembered the land of their fathers with filial affection and respect; they honoured its gods, by offerings of first-fruits to their temples; they retained a predilection for its customs and laws, as well as its religion and language; they yielded to its citizens the place of distinction at public games, and to its priests the holy honour of first inspecting the entrails of sacrifices. In war they generally followed the fortunes of the metropolis, as allies upon equal terms; but as they were perfectly independent, received no protection from her, and often equalled her in resources, they always refused to come forward as auxiliaries, when unfair terms were proposed. Thus, the Sicilian colonies refused to admit an Athenian army into their territories, for the purpose of selling, on an expedition; and, in the Persian war, the republic of Syracuse, when intreated by the Lacedæmonians to aid the common cause, refused to send any assistance, unless their chief magistrate, Gelon, were allowed to command the united forces. Sometimes the parent country, conscious of her superiority and strength, attempted to exact from the colonies, as matter of right, the usual marks of filial attachment. Thus, Corinth was despised by her colony at Corcyra, for her inferiority of wealth and trade; and she endeavoured to obtain by force, the usual tokens of remembrance. The colonists appealed to Athens, who took their part, and retained them as useful allies, especially during the Peloponnesian war. Potidæa, another Corinthian settlement, took the part of Athens, until her impolitic tyranny urged it to throw off the yoke, and appeal to Sparta and Corinth. After a long and severe struggle, the Athenians were successful; sent new colonies to occupy the confiscated and vacant lands; continued their oppressive government; and retained their dominion over Potidæa, until the invasion of Philip. When the progress of Cyrus exposed the Asiatic colonies of Greece to extreme danger, they in vain applied to Sparta for assistance; and, being soon conquered by the Persian monarch, they remained in subjection, until the victories of Platæa and Mycale restored them to freedom; but despairing of long maintaining their independence, they formed a strict alliance with Athens, who availed herself of the opportunity of a general alarm, to propose an universal contribution from all her colonies and allies, for the great purpose of resisting the Persian power. We might cite many other instances to exemplify the independence of the Grecian colonies on the states from which they originated. Nevertheless, the benefits in point of civilization resulting to barbarous countries from colonies of private adventurers, migrating

grating from countries more advanced in the knowledge of those arts which meliorate the condition of human life, have entailed honour on those who imparted them, and claimed returns of respect and gratitude from those on whom they were bestowed. From this mode of colonization, reciprocal advantages have been derived. The natives already in possession of the country, to which colonies have migrated, are benefited by the introduction of new arts; while, at the same time, the adventurers receive the reward of their knowledge, valour, and conduct, by the superior degree of influence which they acquire beyond what they would have possessed if they had remained in their own country. Thus individual adventurers, who have fitted out expeditions at their own charge, and conducted colonies to a permanent settlement by their own skill and valour, have, in some memorable instances, attained even to supreme authority. This seems to have been the case with regard to the colonies anciently established by Ægialeus in Sicily, by Inachus in Argos, by Cærops in Attica, by Janus in Italy, and by Cadmus at Thebes in Greece. From the veneration in which the memory of these adventurers, who were mostly of Egyptian origin, were held, it is evident that they had imported into the countries where they settled great and important improvements. The great literary renown which Athens acquired in progress of time has rendered us better acquainted with its early history; so that we can form some idea of its primitive laws. The regulation of the connexion between the sexes is recorded as being due to Cærops; from whence some etymologists, as Eustathius, deduce the origin of the appellation *Ætes*, by which he was distinguished. The collection of the inhabitants into towns and villages, is said to have been an improvement of his immediate successors, who, it is probable, also introduced the regulation of local jurisdictions, and the division of the land in property among the then existing heads of families, to be inherited by their descendants. This seems to be, in fact, the main foundation of perfect civilization, by introducing this inequality of condition, as some of the families increased or prospered more than others, which, notwithstanding the reveries of some speculative politicians, is absolutely necessary to civilized life. This mode of colonization is seldom attempted in more modern times, because the maritime nations of Europe have laid claim to all heathen lands which their subjects discovered, and have prevented even their own subjects from endeavouring to ameliorate the condition of these countries, by attempting the formation of independent Christian states. The Jesuits had, indeed, formed a considerable establishment for the improvement of the natives in South America; but it gave umbrage to the Portuguese government, and the neglect of military affairs rendered the overthrow an easy undertaking. The Moravian brethren have similar settlements in the most northern parts of America and Europe, where the inhospitality of the climate is such, that the country is not worth contending for. The establishment of the Macedonian dynasties in Asia and Egypt; and, in later times, that of the northern tribes in the southern parts of Europe and of Asia, are signal examples of this mode of colonization. It is notorious, that it was for the establishment of colonies, referred to the first class above-mentioned, that, during the declension of the Roman republic, those torrents of barbarous nations, issuing, for the generality, out of the north, over-ran the Gauls, Italy, and the other southern parts of Europe; and, after several bloody battles, divided it with the ancient inhabitants, and blended their own habits and manners with those of the nations which they subdued, or in which they obtained either temporary or permanent settlements.

To the second class of colonies belong those of a military nature, which served as guards or garrisons, for the maintenance of a conquered country. The Romans recurred to this mode of colonization more frequently than any other nation; and added, to the original motive, that of providing retreats for the aged and worn-out soldiers; as also for the settlement of the poorer classes of Roman citizens. Nor were the interests of the rich forgotten, in the establishment of Roman colonies. The spirit of the Roman laws having restrained the mercantile classes to their proper rank in society, the capital accumulated by their commanders, during the long continued and widely extended successes of the Roman republic, was of course invested in land. The extent of Italy was too small for the capital, thrown, by this means, into agriculture; and the capitalists were therefore obliged to seek new lands, on which it might be employed. It appears that the eastern shores of the Mediterranean sea were, at the time of their falling under the Roman dominion, in the highest possible state of cultivation. The provinces seated on these shores, were, therefore, the scenes of oppression rather than of improvement, and the plunder accumulated there, was transferred to Gaul, and other western provinces, to be employed in the purchase and improvement of land, or in loans to those who resided there. The high rate of interest allowed by the Roman laws, made it also far better to employ money in loans than in commercial speculations, which cannot be supposed, in the restricted and degraded state of Roman commerce, to have yielded the same profit as the former. Seneca, the philosopher, is said to have had, at the time of his death, no less than 600,000 *l.* sterling due to him from the colonists in Britain; the sudden calling in of which produced a rebellion. Besides Rome, like most of the other ancient republics, was originally founded upon an Agrarian law, which divided the public territory in a certain proportion, among the different citizens who composed the state. The course of human affairs, by marriage, by succession, and by alienation, necessarily deranged this original division, and frequently threw the lands, which had been allotted for the maintenance of many different families, into the possession of a single person. To remedy this disorder, a law was made restricting the quantity of land which any citizen could possess to 500 jugera, or about 350 English acres. This law, however, was neglected or evaded, and the inequality of fortunes went on continually increasing. The greater part of the citizens had no land, and without it the manners and customs of those times rendered it difficult for a freeman to maintain his independency. The people, therefore, became clamorous to get land, and the rich and great, we may readily imagine, were determined not to give them any part of theirs. To satisfy the unquiet and clamorous people, it was frequently proposed to send out a new colony. Accordingly, Rome assigned them lands, generally in the conquered provinces of Italy, where, being within the dominions of the republic, they could never form any independent state; but were, at best, merely a sort of corporation, which, though it had the power of enacting by-laws for its own government, was at all times subject to the correcton, jurisdiction, and legislative authority of the mother city. The sending out of a colony of this kind, not only gave some satisfaction to the people, but often established a sort of garrison, too, in a newly conquered province, of which the obedience might otherwise have been doubtful and precarious. Some of these colonies were of a civil, and others of a military nature. In their manners and internal policy, the colonies formed a perfect representation of their great parent; and they were soon endeared to the natives by the ties of friendship and alliance; they effectually disused a reverence for the Roman name, and a desire, which was seldom

dom disappointed, of sharing, in due time, its honours and advantages. A Roman colony, whether we consider the nature of the establishment itself, or the motives for making it, was altogether different from a Greek one. The words, accordingly, which, in the original languages, denote those different establishments, have very different meanings. The Latin word, *colonia*, signifies simply a plantation. The Greek word *κωλονια*, on the contrary, signifies a separation of dwelling, a departure from home, or a going out of the house. In conformity to this distinction of names, we may observe, that the colonial settlements of the Greeks were placed in distant countries, and amongst barbarous tribes. They were established, not in Greece, or in the states immediately in the neighbourhood, which had already been well peopled, but in Gaul, Sicily, and the south of Italy; in Cyrene and Egypt; in Illyria and Asia Minor. The Roman colonies, on the other hand, were at first planted in the immediate vicinity of Rome. During the second Punic war, the city was surrounded by no fewer than 30 establishments of this kind; which served as so many garrisons or advanced posts for her defence. Ancient authors mention no less than 164 colonies settled in Italy, from the foundation of Rome to the death of Augustus; whereas those planted in all the provinces were only 199. From this consideration it appears, that the Italian colonies were materially different in their constitution and uses from the colonies of the provinces. The emigrations from Rome to the conquered towns and lands of Italy, and afterwards of the foreign provinces, were the operations of war and plunder. Whenever an Agrarian division of conquered territory was proclaimed, the discontented citizens presented themselves in a body; and if a sufficient number did not offer to form a legion for retaining the conquest, which they called a colony, the deficiency was supplied from all the tribes by lot. As this system of conquering policy was effected slowly, until the whole of Italy had been subdued, no emigration ever took place to any transmarine, or transalpine countries. Among the Romans there were two kinds of colonies; those sent by the senate, and those that were military, consisting of old soldiers, broken and disabled by the fatigues of war, who were thus provided with lands, as the reward of their services. The colonies sent by the senate were either Roman or Latin, i. e. they were composed of Roman or Latin citizens. The colonies of Roman citizens had the right of suffrages, and could reclaim the rights of citizens whenever they chose to remove to the capital. The Latin colonists lost their rights for ever, nor had they any right of suffrages without an express permission. According to Ulpian (lib. i. D. de Cens.), there were other colonies, which had little more than the name; only enjoying what they called *jus Italicum*, i. e. they were free from the tribute and taxes paid by the provinces; such were the colonies of Tyre, Berytus, Heliopolis, Palmyra, &c. Between all the Roman colonies and the metropolis, there subsisted the closest connexion. The form of colonial government was modelled upon that of Rome. The laws, if not changed at once, were gradually moulded by the spirit of the Roman jurisprudence; the officers were almost all sent from the capital; the mandates of the republic were more promptly obeyed in the provinces than in the city itself;—in a word, the establishments which have been called colonies, and, compared to those of modern times, or of the Greeks, were military stations; garrisons, placed in conquered countries; advanced posts of a great army, of which the commander in chief held his head quarters in Rome, and occasionally made a progress through the different cantonnments. From these settlements taxes were levied, according to a census;

and, after paying the expences of their own government, they transmitted a revenue to the Roman treasury. Men were raised for the Roman army according to a muster-roll. When the grandeur of the Roman name extended across the ocean and the Alps, the rights of citizenship became valuable, as the title to power, honours, and plunder. The allies, or colonial and provincial settlements of Italy, then demanded the communication of this privilege; and the refusal produced that "Social war," which may be justly deemed the end of the regular republican constitution. In consequence of the Julian law, which terminated this war, and of other laws afterwards passed, all the states of Italy, whether allies, colonies, or prefectures, obtained the full rights of Roman citizens. Until the year U.C. 640, no colony but one, which never flourished, had been planted beyond the confines of Italy. The military colonies, introduced by Sylla, and much favoured by Augustus, were remarkable only for a form of government more entirely military than that of the other settlements. All were equally subordinate to the central government, and equally obedient to its decrees.

The first foreign colony which the Romans planted was in Carthage, A.U.C. 710, when Julius Cæsar formed the plan of restoring that deserted city by means of a colonial establishment. The first colony planted in Italy was that of Capua, A.U.C. 4. The practice of sending Roman colonies to the provinces, where they did not enjoy all the privileges of the Italian colonists, was very common after the experiment of Julius Cæsar. He himself transplanted 80,000 citizens in this manner. (Sueton. in Jul. Cæs. c. 42.) After the time of Augustus, who planted 28 colonies in Italy (Suet. in Octav. c. 46.), the custom of planting Italian colonies seems to have been abandoned. His successors did not plant so many as 20; and preferred forming those settlements beyond seas. Livy does not even mention a transmarine or transalpine colony; although he constantly relates the foundation of those in Italy, Dacia and Britain, the most difficult and insecure of the Roman conquests, had only, the former four, and the latter five, Roman colonies. Twenty-five colonies were settled in Spain; and Africa, the most peaceable of all the Roman possessions long before the downfall of the commonwealth, received, after the usurpation of Julius Cæsar, no less than 57 colonies, exclusive of Egypt. From these circumstances we may be led to conclude, that the Italian establishments were founded with different views, and in a different age of the Roman history, from the settlements in the provinces.

M. Vaillant has filled a volume in folio with medals struck by the several colonies, in honour of the emperors who founded them. The ordinary symbol they engraved on their medals was either an eagle, as when the veteran legions were distributed in the colonies; or a labourer holding a plough drawn by a pair of oxen, as when the colony consisted of ordinary inhabitants. On all the medals are seen the names of the Decemviri, who held the same rank, and had the same authority there as the consuls had at Rome.

In the political relations of the Roman settlements with their parent city, there is some resemblance to the political relations of modern colonies with their mother countries. But in the policy of a state so neglectful of every thing, except war, we cannot expect to find any parallel to those commercial views, by which the plantation of modern colonies has been undertaken, and their connexion with the European governments maintained. The objects of the Romans, in planting their colonies, were conquest and plunder; so that detachments of emigrants incorporated with, and governed, the old possessors of the soil. In modern

den times the chief objects have been trade and agriculture; the most important settlements have been made in desert countries, or districts, whose ancient inhabitants were extirpated by the first settlers. In this respect then, the Roman colonies rather bear a resemblance to the Asiatic establishments of modern Europe; but they differ from these too, in the structure of their government. The constitution of the Italian colonies was formed upon the Roman model, and varied with its changes. The provincial governments of Hindoostan, and the islands of the Indian ocean, very little resemble those of their European masters, and are rather allied to the spirit of the oriental legislation. The provincial governments of the Roman transmarine territories bore, in every respect, the same kind of relation to the metropolis, which the East Indian establishments do to the states of Europe. The inhabitants retained, in a great degree, their own laws; they were ruled and oppressed by a Roman magistratus, and an army, composed partly of Roman, partly of native troops; their country was the scene of every criminal excess in politics and manners, and the source of large supplies to the plunderers of the world.

The species of colonies now described is not restricted to the Romans, but it has been adopted by almost every nation, both ancient and modern, with very little variation. To it we may refer the establishment of the Normans in England, and of the English in Ireland. In a still later period, the Portuguese and Dutch have established themselves in India; but the English East India company have, on the contrary, repressed, as far as possible, the colonization of the countries they possess there, as these directors observe that "the energy or the European character becomes obliterated in the course of a few generations."

The commerce of Carthage, together with her extensive continental possessions, enabled her to provide for her increasing population at home. The want of an outlet for inhabitants formed no part of the motives that induced the Carthaginians to settle foreign colonies. Their colonial establishments, indeed, were most probably founded in the same manner with the transmarine and transalpine provinces of the Romans—conquered countries, retained in subjection, from ambition and pride, by means of a Carthaginian governor, and a few followers; prompted by idleness, or the love of change, or the desire of distinction to follow in his retinue. However, the relations of the new establishments with the mother country were different, in several respects, from the relations which connected the distant parts of the Roman dominions with the metropolis. The Carthaginian colonies were, in reality, trading correspondents to the mother country; and should have found a place under the 4th class of colonies rather than here, if they had not been immediately connected with the Roman. It is probable that the Carthaginians received the surplus of the rude produce of Sicily, Sardinia, and Spain, which Africa did not yield, and exported thither those manufactures, which would naturally be raised in a country fully peopled, and long habituated to traffic. From the superiority of their navigation too, the skill of the Carthaginian merchants, their connexions long established with the Levant, more particularly with the great emporiums of the East, Tyre and Smyrna, and from the greater trading capitals of those rich merchants; they would most likely furnish the colonies or provinces with Asiatic commodities, of which Carthage would be the natural entrepôt for the countries to the west of the Mediterranean. History has preserved two traces of commerce and navigation between the Carthaginians and Romans, conceived in the true spirit of the modern colonial policy; for which see Polyb. l. iii. c. 22, or Brougham's Colonial Policy, &c. vol. i. p. 21, &c.

In this connection we might mention another species of external colonies, produced by the dispossession of weaker states by those who are stronger, in order to extend their borders, or to possess some advantageous situations for trade, or for war. The bigotry of the Europeans, at the time of the discovery of the West Indies, led them to look upon the natives of those countries in a very unfavourable and contemptuous light, on account of their being heathens and idolaters, and made them heedless as to the measures they adopted for their own security, so that they could but obtain the object of their wishes. The great disproportion also in the numbers of the invaders and of the natives, in some measure, impelled the Europeans to adopt the most severe methods, to perpetuate the terror which the natives had originally manifested at the effects of their fire-arms. The consequence of those ferocities was, that the natives of most of the islands were soon exterminated, except in some very small ones which the Europeans left unnoticed. On the continent, however, the natives still exist, as they have there sufficient space to retire from the neighbourhood of their visitors.

To the *third* class belong those colonies that have been formed by refugees from countries, in which they were oppressed or persecuted. Thus the emigrants, who fled from the religious broils in which France, the Low Countries, and Germany have been involved, found safety in England, and introduced many of these manufactures and arts, which have contributed to the commercial superiority of Great Britain. Norwich, Canterbury, and even some of the most populous districts of the metropolis, have owed the industry and productions of their inhabitants to these colonies; and, in like manner, part of Pembrokehire, in South Wales, has been peopled by a colony from Flanders. The colonies of North America were originally planted by men who had quitted their native country, either from a love of civil and religious liberty; or from a desire to better their fortunes, by laying out a small capital in the improvement of land; or from the necessity of finding employment in a country where labour bore a high price. Anxious only to live in peace and freedom, with a competency for themselves and their families; these men centered all their views in the spot to which they removed their fortunes and persons; they gave up for ever the thoughts of returning to the countries which they left behind them; and transferred to their new homes all those ties which had formerly bound them to Europe. The woods of the northern continent were cleared by men of small capital content with a living profit, attached to the soil, which owed its cultivation to their labours, and entertaining no idea of removing from it. By degrees the influence of local attachment binds them to a spot, which necessity had made the object of their choice; and in process of time the desire of depositing their bones in a country which had received and cherished them, succeeded to the obliterated partiality for the place of their birth. The first settlers of all the colonies of N. America were men of irreproachable characters, though not very enlightened in their views, or polished in their manners. Many of them fled from persecution; others on account of an honourable poverty; and all of them with their expectations limited to the prospect of a bare subsistence in freedom and peace. The greater part of them viewed their emigration beyond the Atlantic, as a taking up of the cross; and bounded their hopes of riches to the gifts of the spirit, and their ambition, to the desire of a kingdom beyond the grave. A set of men more conscientious in their doings, or simple in their manners, never founded any commonwealth. It is, indeed, the peculiar glory of N. America, that, with a very few exceptions, its empire was originally founded in clarity and peace. In process of time, however, new emigrants

grants flocked to this extensive country, as it became more open and improved, whose views, principles, and character were very different from those of the first settlers. Many of them were persons in very indigent circumstances; they were of different sects, or of no perceptible religion at all; and of different nations, though the English greatly predominated. Some of them were convicts, who after confinement in goals were banished for their crimes; many of them persons of desperate fortunes, to whom every place was equally unwelcome; or men of notoriously abandoned lives, to whom any region was acceptable, that offered them a shelter from the vengeance of the law, or the voice of public indignation. But a change of scene would naturally produce some salutary effect upon characters the most dissolute. This mixture of various population was soon blended, by the influence of those simple manners that are formed by an agricultural life, into one nation of husbandmen, whose character has communicated itself, in a great degree, to the most profligate of those whom compulsion or despair from time to time introduced. While purity of manners was in this way preserved, that firmness of principles in religion and politics was maintained, which had so eminently contributed to the establishment of the colonies. Sentiments of freedom might find an asylum in America; when, even in Switzerland, it could no longer be lawful to think beyond the rules. Nevertheless, the circumstances of the N. American colonies produced some other effects not quite so favourable, upon the taste, and in what, in common conversation, we call the manners of the people. The solitary nature of agricultural labour, and the seclusion of the husbandman's residence, surrounded only by his own family and servants, are very inimical to all sorts of refinement, and to every ornamental accomplishment; whilst the settlers of the new colonies were occupied with the useful, they neglected the agreeable arts of life; and voluntarily threw themselves back some centuries, in most branches of civilization, instead of prosecuting the improvements of those branches, from the point to which the mother country had brought them at the era of their emigration. In consequence of their peculiar circumstances and occupations, the Americans have always possessed a numerous, virtuous, and athletic peasantry; but they have numbered few fine artists, or accomplished orators; and, indeed, an ingenious writer, to whom we are much indebted in the compilation of this article, proceeds so far as to observe, with a latitude of expression scarcely allowable, that "the word American has never yet (so far as I know) been coupled with either poetry, or painting, or music." The history of manners in N. America, says this writer, is the general history of manners in every new community, of which agricultural industry forms the basis. The peculiarities (perhaps accidental), which marked the situation and habits of the first settlers, have likewise produced some effect upon those of their descendants, without in the least modifying their character as an agricultural nation. The love of civil and religious freedom was connected with an anxious attention to all matters of controversy, whether in politics or in faith; and as the settlers were equally incapable of understanding either, so they were chiefly captivated with the more abstruse of the two sciences; and affected great depth in the things appertaining to grace, spirit, incarnation, and all the sublime mysteries of the Christian dispensation. These fruitless speculations were the only literary inheritance which they transmitted to their children. But although they had left the old world for the sake of liberty of conscience, they too soon manifested what they understood by liberty of conscience. By that term they meant (like many other advocates of liberty) the propagation of

their own peculiar tenets; and they shewed that they only wanted the power to propagate their creed (like their European oppressors) by that method of mental perfusion which consists in burning the body. They allowed every man entire liberty of conscience, provided that he used that liberty in adopting their own standard of faith. Accordingly, while in Old England the spirit of fanaticism was operating the downfall of government, and minging itself with every pursuit of the age, to the universal debatement of manners and sentiment; in New England, the heterodox were persecuted by the impulses of the inward light; or parties were formed, and armies marshalled, and millions led by the subtle principles of a metaphysical theology. But the Falklands and Sydneys had no parallels to temper the unclassical rage of the American bigots; and even the Cromwells and Bradshaws found but poor representatives in the stupid fanatics of Bolton and Salem. Long after the mother country had relinquished, for ever, the acts of persecution, they found votaries in the constituted authorities of the colonies; and the northern states at the end of the 17th century, afforded the disgraceful example of that spiritual tyranny, from which their territories had originally served as an asylum. The century, which has just elapsed, moderated this odious spirit; but to this day, the northern states are chiefly distinguished from the others, by a taint of religious bigotry;—as the character of the middle states is modified by the greater mixture of different nations, which have contributed to people them;—and that of the southern provinces, by the admixture of negro slaves. In the middle states, the mercantile spirit has gained more ground than in any of the rest: the diversities of race have rendered the sentiments of patriotism, and the love of liberty, less ardent; while the variety of religions has prevented the introduction of that fanaticism, of which we have traced the effects in the north. In the southern states the contrast of servitude has mingled an aristocratical spirit with the manners of simple husbandmen; and the climate, by promoting the growth of an article, belonging to the class of luxuries, has given rise to a species of agriculture bordering upon the great gains and uncertain prospects of commercial speculation. In all the colonies, however, of the northern continent, a respectable national character may be said to prevail. If their intercourse with the mother country would have had no tendency to civilize or adorn her, it could certainly have in no degree contributed to the corruption, either of her moral or political habits; and the most rapid interchange of population could only have tended to embellish the American society and to vary its accomplishments, while it rendered a service to the British manners, by the intercourse of a more simple and virtuous people. Unfortunately, the very circumstances which necessarily laid the foundation of those habits and that national character insulated the population of the country from that of the old world. The colonies were stationary for the same reason that they were respectable; and the circulation of its inhabitants, with all its effects upon both parts of the empire, has been maintained and accelerated in other colonies, placed in circumstances which rendered those effects unfavourable, at least to the mother country. For the change that has taken place with regard to the principles and manners, the religion and liberty of the several colonies of N. America, since they have acquired a new government, and been formed into the *United States*; see this article, and also an account of the several states themselves under their appropriate titles.

The fourth class of colonies comprehends those that are denominated *commercial*, and which have been established at different periods, by the English, Dutch, French, Spaniards,

Portuguese, and other nations; and which are still maintained, in a greater or less degree, with a view of keeping up a regular intercourse with the natives, or of cultivating the ground, by planting sugar-canes, rice, indigo, tobacco, cotton and other commodities. See *CHARTER Governments*.

The principal of this kind of colonies are those that have been established in North and South America; particularly Peru, Mexico, Canada, Virginia, New England, Carolina, Louisiana, Hudson's bay, the Antilles islands, Jamaica, Domingo, and the other islands of the West Indies; also, in Africa, Madagascar, the cape of Good Hope, cape Verd, and its islands, and all the coasts extended thence as far as to the Red sea; and likewise in Asia, the famous Batavia of the Dutch, and Ceylon; Goa, Diu, of the Portuguese; and some other less considerable places of the English, French, Danes, and other nations, in the East and West Indies.

The establishment of the European colonies in America and the West Indies, if we except those of North America to which we have already alluded, did not originate in necessity; but it was the result of ambitious and interested views. The Dutch, indeed, may plead in favour of the extension of their own settlements and commerce, that the colonial system is necessary to their subsistence and prosperity. Their territory is small, and generally undistinguished by its fertility; and therefore they have recurred for the necessities of life to the ports of more fruitful and less populous countries. Habituated to industry, and excelling other nations in nautical skill, instead of confining themselves to the exchange of their own manufactures for the rude produce, or the manufactures of other nations, they employed themselves in circulating the produce and manufactures of other countries; and, more attentive to this occupation than to the arts of working up the produce which they imported or raised, they became a nation, not of farmers or manufacturers, but of fishermen, merchants, and sailors. Constrained by other circumstances belonging to their country, when compared with other nations, they were obliged, by the disadvantages of their situation and the oppression of their Spanish masters, to put forth every possible effort of fortitude and perseverance. By industry, frugality, and labour, these people not only soon outstripped all their contemporaries in riches and naval skill, but amassed a much greater share of wealth, and gained a more formidable influence over the destinies of the world, than so small a tribe ever acquired in any age. Their steady attachment to the principles of freedom and toleration served as a concurring mean of their advancement and prosperity. The necessary consequence of extensive opulence, acquired by a people who have not a proportionably great territory, is, that the means of advantageously employing their capital will become gradually more and more difficult; the profits of its employment more confined, and its accumulation more slow. Such a people will naturally seek some new opening for settlement or commerce, by acquiring territory in distant quarters of the globe. Should they fail in this way, the overflowing wealth of the nation must infallibly emigrate, as it were, into the service of foreign countries, where the profits are greater than they are at home. Hence we find that the Dutch became, in a sense, the brokers of Europe; and that they advanced sums to foreign states and their subjects, which were enormous. It is probable, says an ingenious and accurate writer, (Mr. Brougham), that the Dutch have frequently been creditors, at one time, to the amount of much more than 300 millions sterling to their own government, and to foreign states, of which we may reckon two-thirds in foreign loan: an immense sum of surplus capital to have been accumulated by a nation possessed of no greater territory than the principality of Wales, without

any good harbours, or any natural produce fit for exportation; a territory, 120 times less extensive than the European dominions of Russia, which is constant y running in debt with all the world! A people possessed of such an overflowing capital, was, of all people, that which stood the most in need of foreign colonies; and this for two reasons:—in order to obtain a new opening, of whatever kind, for the stock which could not be employed at home, or which, for want of this employment, was drawn into the service of foreigners; and in order to secure the possession of this opening at all times under its own command. The acquisition of colonial possessions is the only means by which the United Provinces can possibly avoid the decline of its mercantile prosperity and political importance, and supply their natural deficiency of territory, the cause of their instability, as it was the cause of their rise and progress. An opening for capital may then be obtained always under the command of the state. The possession of colonies must be as advantageous to the community of the United Provinces, as agreeable to individual capitalists and adventurers. It has certainly preserved the commercial excellence of the republic for a long series of years, and enabled this ancient state to retain its place among the great powers of Europe instead of being swallowed up by its neighbours, or reduced to a few fishing villages. No nation of Europe depends so much upon colonial policy as Holland; nor is any so liable to be affected, in every member, by the slightest variation of colonial affairs. See *Dutch East India Company* and *Dutch West India Company*. The whole return of the Dutch colonies, above 20 years ago, was calculated (says Mr. Brougham) at 24 millions of florins—exported in 150 vessels, navigated by 4000 men, and paying, in freight, 4 millions 5 hundred thousand florins—in commission and insurance, 2½ millions. The Dutch merchants exported to them merchandize (including negro slaves) to the value of 6 millions. The most unfortunate circumstance in the colonial policy of the Dutch has always been their bad treatment of slaves. (See *NEGROES AND SLAVES*.) The colonies of Holland have also suffered, in general, from the importation of negroes being too scanty to answer the demands of the proprietors. Upon the whole, it is observed by the writer so often cited in this article, that in no country is there so great a demand for new colonies as in the United Provinces. To no part of Europe are colonial possessions so valuable; none would be so irretrievably ruined by their loss; none would be so much benefited by their extension.

The views of Spain in its colonial establishments were directed from the beginning of their connection with America to the pecuniary advantages likely to result from them. In consequence of the representation of Columbus, the council of Castile determined to take possession of countries of which the inhabitants were incapable of defending themselves. The pious purpose of converting them to Christianity sanctified the injustice of the project. But the hope of finding treasures of gold there was the sole motive which prompted them to undertake it; and to give this motive the greater weight, it was proposed by Columbus, that the half of all the gold and silver which might be found there should belong to the crown. This proposal was approved of by the council. The tax was easily paid whilst the defenceless natives were plundered; but as they were stripped of all that they had, which, in St. Domingo, and the other countries discovered by Columbus, was completely done in six or eight years; and when it became necessary to dig for it in the mines, it was impossible to pay the tax. The rigorous exaction of it occasioned first the total abandonment of the mines of St. Domingo, which have never been wrought since; and it was afterwards reduced, by successive defalcations, to a 20th part of the produce of the gold mines.

mines. The tax upon silver, which was a fifth of the gross produce, was reduced to a tenth in the course of the last century. All the other enterprises of the Spaniards in the New World, subsequent to those of Columbus, seem to have been prompted by the same motive. It was the sacred thirst of gold that carried Ojeda, Nicuesa, and Vasco Nunez de Balboa, to the isthmus of Darien, that carried Cortez to Mexico, and Almagro and Pizarro to Chili and Peru. Impelled by the prospect of immense gain to establish colonies in America, the first object of the Spanish monarchs was to secure the productions of these colonies to the parent state, by an absolute prohibition of any intercourse with foreign nations. They took possession of America by right of conquest; and, having reason to apprehend the loss of their infant settlements, on account of their feebleness, their extent, and the reluctance with which the vanquished nations submitted to their dominion, they guarded, by every possible method, against the intrusion of strangers. As their possessions were extended, the spirit of jealousy and exclusion increased; and, in order to their greater security, a system of colonizing was introduced, to which the history of mankind afforded no parallel. In the ancient world, as we have already seen, colonies were of two kinds; either migrations from a country overstocked with inhabitants, or military detachments, stationed as garrisons in a conquered province. The colonies of some Greek republics, and the swarms of northern barbarians which settled in different parts of Europe, were of the first kind; and the Roman colonies were of the second kind. In the former, the connection with the mother country quickly ceased, and they became independent states; in the latter, the dependence continued, because the separation was not complete. The Spanish monarchs, in their American settlements, took what was peculiar to each, and studied to unite them. By sending colonies to regions so remote, by establishing in each a form of interior policy and administration, under distinct governments, and with peculiar laws, they disjoined them from the mother country. By retaining in their own hands the rights of legislation, as well as that of imposing taxes, together with the power of nominating the persons who filled every department, civil or military, they secured their dependence. At first, as we have already observed, the precious metals were the only objects that attracted their attention. Afterwards they sought for such productions of the climate as, from their rarity or value, were of chief demand in the mother country; and they forbade the establishment of several species of manufacture, that were likely to interfere with those of the mother country. Their clothes, furniture, instruments of labour, luxuries, and even a considerable part of the provisions which they consumed, were imported from Spain. In return, the colonists supplied the produce of their mines and plantations, which was conveyed only in Spanish bottoms. The commercial intercourse of one colony with another was either absolutely prohibited, or limited by many jealous restrictions. All that America yields flows into the ports of Spain; all that it consumes must issue from them. No foreigner can enter its colonies without express permission; no vessel of any foreign nation is received into their harbours; and the pains of death, with confiscation of moveables, are denounced against every inhabitant who presumes to trade with them. Thus the colonies are kept in a state of perpetual pupillage; and by the introduction of this commercial dependence, a refinement in policy, of which Spain set the first example to the European nations, the supremacy of the parent state hath been maintained over remote colonies, during 2½ centuries. Several maxims were also adopted and enforced

with regard to the restrictions of settlers, the state of property, and the ecclesiastical policy of the colonies, which served very much to discourage emigration from Europe, and the increase of population in America. If we advert to the state of Spain, and compare it with that of Holland, we shall soon perceive, that the Spaniards, possessing a country fifteen times more extensive than Holland, of incalculably greater fertility, enjoying all the benefits of the finest climate in the world, surrounded with natural barriers of defence, and blessed with every advantage of situation which can facilitate commercial intercourse, and yet maintaining not much more than one-fourth of the Dutch population, are evidently independent of colonial possessions. All the industry, skill, and capital of the natives, may find ample employment in raising, manufacturing, and circulating the produce of the soil, or in exchanging the superfluous part of that produce for the commodities which abound in other countries. But, though it would have been sounder policy in the Spanish government to have promoted a spirit of industry at home, than to have established distant colonies, yet it cannot be denied, that she has received very great benefits from them, and such, in their nature and value, as more than counterbalance the injury they have occasioned. At the period of their first establishment, the interior industry and manufactures of Spain were so prosperous, that, with the product of these, she was able both to purchase the commodities of the New World, and to answer its growing demands. Under the reigns of Ferdinand and Isabella, and Charles V., Spain was one of the most industrious countries in Europe. Her manufactures in wool, and flax, and silk, were so extensive, as not only to furnish what was sufficient for her own consumption, but to afford a surplus for exportation. When a market for them, formerly unknown, and to which she alone had access, opened in America, she had recourse to her domestic store, and found there an abundant supply. By this new demand, furnishing answerable employment, the spirit of industry must have been enlivened and encouraged; and the manufacture, population, and wealth of Spain might have gone on increasing in the same proportion with the growth of her colonies. However, by the great and sudden augmentation of power and revenue, which the possession of America brought into Spain, sober plans of industry were overturned, and opulence, rapidly acquired, produced a taste for what is wild and extravagant, and daring in business or in action. The genius of Charles V. in some measure counteracted the pernicious influence of this inundation of wealth and of the subsequent interruption of it; but under Philip II. its effect, both on the monarch and the people, became conspicuous. Philip, possessing an extravagant opinion of his inexhaustible resources, and, at the same time, an ambition connected with moderate talents, thought himself equal to any undertaking. Accordingly he waged open war with the Dutch and English, encouraged and aided a rebellion in France, conquered Portugal, and maintained armies and garrisons in Italy, Africa, and both the Indies. Thus Spain was drained both of men and of money. Under the weak administration of his successor, Philip III., the vigour of the nation declined, and the bigotry of the monarch expelled near a million of his most industrious subjects; so that early in the 17th century, Spain felt such a diminution in the number of her people, that from inability to recruit her armies, she was obliged to contract her operations. Her flourishing manufactures were fallen into decay. Her fleets, which had been the terror of all Europe, were ruined. Her extensive foreign commerce was lost. Agriculture was neglected, and one of the most fertile countries in Europe hardly raised what was sufficient

for the support of its own inhabitants. In proportion as the population and manufactures of the parent state declined, the demands of her colonies continued to increase. The rage of emigration prevailed, and the strength of the colonies was augmented by exhauling that of the mother-country. The emigrants depended upon Spain for almost every article of necessary consumption. But Spain, thinned of people and destitute of industry, was unable to supply their increasing demands. She had recourse to her neighbours; and the manufactures of the Low Countries, of England, of France, and of Italy, which her wants called into existence, or animated with vivacity, furnished in abundance whatever she required. In a short time not above one twentieth part of the commodities exported to America was of Spanish growth or fabric. All the rest was the property of foreign merchants, though entered in the name of Spaniards; so that the treasure of the New World may be said henceforward not to have belonged to Spain. Before it reached Europe, it was anticipated as the price of goods purchased from foreigners. Thus the possessions of Spain in America have not lived as a source of population and of wealth to her, in the same manner as those of other nations. From the close of the 16th century she was unable to supply the growing wants of her colonies; and the pernicious effects of this disproportion between their demands and her capacity of answering them, were farther aggravated by the mode in which she endeavoured to regulate the intercourse between the mother-country and the colonies. Such was the monopoly at which she aimed, and which she wished to maintain, that she did not vest her trade with her colonies in an exclusive company; a plan which had been adopted by nations more commercial, and at a period when mercantile policy was an object of greater attention, and ought to have been better understood. The Dutch gave up the whole trade with their colonies both in the East and West Indies, to exclusive companies. The English, French, and Danes, have imitated their example with respect to their East-Indian commerce; and the two former have laid a similar restraint upon some branches of their trade with the New World. The wit of man cannot, perhaps, devise a method for checking the progress of industry and population in a new colony, more effectual than this. From this error in policy Spain was preserved, probably by the high ideas which the early formed concerning the riches of the New World. Gold and silver were commodities of too high value to vest a monopoly of them in private hands. The crown retained this alluring branch of commerce; and in order to secure it, enjoined the cargo of every ship fitted out for America to be inspected by officers at Seville, and then to receive a licence for the voyage; and on its return, that a report of the commodities which it brought should be made to the same board, before it should be permitted to land them. By this regulation all the trade of Spain with the New World centered in the port of Seville, and was brought into a form, in which it has been continued with little variation, almost to our own times. See GALEONS and FLOTA.

The trade of Spain with her colonies being thus restricted, was conducted on the same principles which directed that of an exclusive company; and the whole of it was exported by a few wealthy houses, formerly in Seville, and since the year 1720 in Cadiz; these, by combinations easily formed, prevent that competition which preserves commodities at their natural price; and, by acting in concert, to which mutual interest prompts them, they may raise or lower the value of them at pleasure. This restraint of the American commerce to one port, not only affects its domestic state, but limits its foreign operations. In these circumstances, and

whilst the evils resulting from them found no effectual remedy, Spain, with dominions more extensive and more opulent than any European state, possessed neither vigour, nor money, nor industry. At length the violence of a great national convulsion roused the slumbering genius of Spain. As soon as the Bourbons acquired possession of the throne, it was the first object of Philip V. to prohibit the admission of foreign vessels into any port of Peru and Chili; and a Spanish Squadron was employed to clear the South Sea of intruders, whose aid was no longer necessary. After the treaty of Utrecht, which terminated the war, new embarrassments occurred in consequence of the assistance, or contract for supplying the Spanish colonies with negroes, conveyed to Great Britain, as the price of peace; (See *ASSISTENTE*) and the additional privilege of sending annually to the fair of Porto-Bello, a ship of five hundred tons, laden with European commodities. By the operations that succeeded these grants, and by the activity of private interlopers, almost the whole trade of Spanish America was engrossed by foreigners. Guarda costas, and regillar ships were introduced. (See each of these articles). Since the reign of Philip V., sentiments with regard to commerce, more liberal and enlarged, began to spread in Spain. At length Charles III. in 1764, appointed packet-boats to be dispatched on the first day of each month, from Corogna to the Havannah or Porto-Rico. From thence letters are conveyed in smaller vessels to Vera-Cruz and Porto-Bello, and transmitted by post through the kingdoms of Terra-Fermé, Granada, Peru, and New Spain. Other packet-boats sail regularly once in two months, to Rio de la Piata, for the accommodation of the provinces to the east of the Andes. With this new arrangement for conveying speedy and regular intelligence, a scheme of extending commerce has been more immediately connected. Each packet boat is a trading vessel, and is used for facilitating the exchange of Spanish products, for an equal quantity of that of America. This was soon followed by a greater degree of enlargement. In the year 1765, Charles III. laid open the trade to the windward islands, Cuba, Hispaniola, Porto-Rico, Margarita, and Trinidad, to his subjects in every province of Spain. He reduced the duties on goods exported to America, to the moderate tax of six in the hundred, on the commodities sent from Spain. He allowed them to return to any port at pleasure. This ample privilege was afterwards extended to Louisiana, and to the provinces of Yucatan and Campeachy. Such have been the benefits experienced from the relaxation of the ancient system of commerce between the mother-country and her colonies, that Spain has been induced to permit a more liberal intercourse of one colony with another. In 1774 Charles III. published an edict, granting to Peru, New Spain, Guatemala, and Granada, the privilege of a free trade with each other. The towns to which Spain has granted the liberty of trade with any of her colonies, are Cadiz and Seville, for the province of Andalusia; Alicante and Carthagena, for Valencia and Murcia; Barcelona, for Catalonia and Arragon; Santander, for Castile; Corogna, for Galicia; and Gijon, for Asturias. These are either the ports of chief trade in their respective districts, or those most conveniently situated for the exportation of their respective productions. Prior to the allowance of free trade, the duties collected at the Custom-house at the Havannah, were computed to be 104,208 pesos annually. During the five years preceding 1774, they rose at a medium to 308,600 pesos a year. In Yucatan, the duties have risen from 8,000 to 15,000. In Hispaniola, from 2,500 to 5,600. In Porto-Rico, from 12,200 to 7,000. The total value of goods imported from

Cuba

C O L O N Y.

Cuba into Spain, was reckoned, in 1774, to be 1,500,000 pesos. From another statement, it appears, that the exports to Spanish America in 1778, were made in 170 ships; were worth about 74 millions of reals vellon, and paid above $3\frac{1}{2}$ millions of duty. The imports from thence, in the same year, were made in 130 ships, valued at $74\frac{1}{2}$ millions, and paid nearly 3 millions duties. In 1788, the value of the exports had risen to above 300 millions, and that of the imports to above $804\frac{1}{2}$ millions. The duties upon both exports and imports exceeded 55 millions. This rapid increase can be ascribed to nothing but the effects of the free trade; and notwithstanding all the clamours raised by the Cadiz merchants, we find that this city was the first to enjoy the advantage of the change; for the imports of Cadiz from America in 1788, were three-fourths of the whole colonial imports; and the exports of Cadiz thither were considerably above two-thirds of the whole colonial exports. Spain has likewise directed particular attention to the interior government of her colonies. For an account of the Philippine colony, see ACAPULCO and MANILA.

The revenues which Spain derives from America, arises from taxes of various kinds, which may be divided into three capital branches. The first contains what is paid to the king, as sovereign of the New World; to this belongs the duty on the gold and silver raised from the mines, and the tribute exacted from the Indians; the former called "the right of signory," and the latter "the duty of vassalage." The second branch comprehends the numerous duties upon commerce, which are very minute and oppressive. The third includes what accrues to the king, as head of the church, and administrator of ecclesiastical funds in the New World. In consequence of this he receives the first-fruits, annats, spoils, and other spiritual revenues, levied by the apostolic chamber in Europe; and is entitled likewise to the profit accruing from the bull of *Crusado*, which see. The whole amount of the net public revenue of Spain, raised in America, is stated by Dr. Robertson as not exceeding a million and a half sterling. Spain and Portugal are the only European powers which derive a direct revenue from their colonies, as their quota towards defraying the general expence of government. All the advantage, that accrues to other nations from their American dominions, arises from the exclusive enjoyment of their trade; but, besides this, Spain has brought her colonies to contribute towards increasing the power of the state, and, in return for protection, to bear a proportional share of the common burden. The amount of the Spanish revenue, above stated, comprehends only the taxes collected there, and is far from being the whole of what accrues to the king from his dominions in the New World. The heavy duties imposed on the commodities exported from Spain to America, as well as what is paid by those which she sends home in return; the tax upon negro slaves, with which Africa supplies the New World, together with several smaller branches of finance, bring larger sums into the treasury, the precise extent of which Dr. Robertson cannot pretend to ascertain. But if the revenue which Spain draws from America be great, the expence of administration in her colonies bears proportion to it.

The total amount of the public revenue of Spain from America and the Philippines, from the most recent information stated by Dr. Robertson, is as follows:

Alexavalas (excise) and aduanas (customs), &c.	2,500,000
in pesos fuertes, - - -	3,000,000
Duties on gold and silver, - - -	1,000,000
Bull of <i>Crusado</i> , - - -	2,000,000
Tribute of the Indians, - - -	300,000
By sale of quicksilver, - - -	300,000

Paper exported on the king's account, and sold in the royal warehouses, - - -	300,000
Stamped paper, tobacco, and other small duties, - - -	1,000,000
Duty on coinage of, at the rate of one real de la Plata, for each mark, - - -	300,000
From the trade of Acapulco, and the coasting trade from province to province, - - -	500,000
Affitto of negroes, - - -	200,000
From the trade of <i>Mahé</i> , or herb of Paraguay, formerly monopolized by the Jesuits, - - -	500,000
From other revenues formerly belonging to that order, - - -	400,000
Total	12,000,000

Total in sterling money £ 2,700,000

Deduct half, as the expence of administration, and there remains net free revenue, £ 1,350,000

From the above detail, and upon a general view of the subject, it appears to be absurd to deny, that Spain has derived very great benefits from her colonial possessions. Nevertheless, many very enlightened men have maintained, that the downfall of the Spanish power has been owing, in a great measure, to the extension of dominion which followed the discovery of America. To this purpose an appeal has been made to the authority of Dr. Smith, the well known and much approved author of the "Wealth of Nations." "That the monopoly," he observes, "of the trade of populous and thriving colonies is not alone sufficient to establish, or even to maintain, manufactures in any country, the examples of Spain and Portugal sufficiently demonstrate. Spain and Portugal were manufacturing countries before they had any considerable colonies. Since they had the richest and most fertile in the world, they have both ceased to be so." However, Mr. Brougham has remarked, that the tenor of this observation is confined to the statement of a fact which cannot be denied, that the period of the decline which the Spanish and Portuguese manufactures have experienced, coincided with the period of the Spanish and Portuguese colonial greatness. But the whole argument proceeds upon a view of the subject, formerly discussed, that colonial monopolies in general have been hurtful, from their effects on the wealth of the mother-country. Mr. Brougham has accurately examined this subject; and in the prosecution of his inquiry, he has shewn, in what manner the prosperity of Spain has been influenced by the discovery of America; and he has investigated the question, whether the acquisition of rich and extensive colonies can be charged with having caused the decline of the mother-country, and whether, in short, any bad consequence whatever is imputable to this augmentation of empire.

By those who have maintained, that Spain has been materially injured by her colonies, it has been alleged, that by an immoderate extension of territory, the Spaniards have been led to the neglect of the territory, which they formerly possessed. But although Spain, and also Portugal, may have severely suffered in this respect, it is seldom, if ever, that, from the nature of colonial power, any such consequences can arise to the mother-country from the possession of the most widely spread colonial dominions. In the case of Spain especially, whatever neglect there may have been in the management both of the mother-country and the colonies, the mal-administration of both those parts of the empire must evidently have arisen from other causes besides their being united under one crown. Farther, the vast outlet to population which the Spanish colonies

lonies afford has been thought by many to be detrimental to the mother-country. They allege that the population of Spain has been drained by the demands and temptations for men which the colonies afford. Our author suggests a variety of considerations that tend to invalidate this objection. The indolent and adventurous, the nobles and soldiers of fortune, and men of considerable property, were the principal emigrants at the first settlement of the Spanish colonies in America; as conquest or plunder, and mining in search of the precious metals were the only modes in which wealth was then sought. Besides, the drain of emigration has been chiefly confined to the population of the maritime provinces of Spain; and the whole amount of the emigration, at different periods, cannot be estimated very high. It has been said that the rage for emigration to America was so much abated in a short time after the discovery, chiefly by the ruin of many who flocked thither, that in the year 1550, there were not above 15 thousand Spaniards in all the New World. From other documents it has been inferred, that the whole amount of those who have emigrated to the Spanish colonies, during a period of three centuries, does not exceed 500,000. The drain of the Spanish population must therefore be wholly inadequate to account for the decline of the Spanish resources, and the slow progress of the Spanish population. It is no less chimerical to imagine that the capital which has been drawn to the colonial agriculture and mining, can have impoverished the mother-country in any considerable degree, than to suppose that the colonial emigration can have drained her population: and it is, therefore, to causes different from the emigration of inhabitants, and of capitals, that we must ascribe the depopulation, the indolence, and the poverty of Spain. In order to account for the depopulation of Spain we may recur to the ravages of the plague, which, during three years in the middle of the 14th century, carried off two-thirds of the whole population of the peninsula, and which about three centuries afterwards, destroyed 200,000 persons in the southern provinces;—to the destruction occasioned by death and famine;—to the cruel and insane policy of Ferdinand, who, as an expression of gratitude to God for the successes of his arms, expelled from his dominions the whole tribe of Israel;—to the still more bloody and impolitic measures of his successor, who, about a century afterwards, drove out all the Moorish race;—and to the constant persecutions and rebellions of these two classes during the interval between the great and general expulsions, which produced the effect of suddenly eradicating from the kingdom all the industry and skill which had raised it to such a pitch of opulence and glory. The number of the Jews, who, in the year 1492, were butchered or driven out, is reckoned by some authors at 800,000 persons, by others at 800,000 families; and the number of the Moors driven away by the edict of 1609, cannot be computed at less than a million. The best informed writers state the loss to the country at these two periods, and intervening intervals, to have amounted to between two and three millions; consisting of the most useful and valuable part of the community. We might enumerate other causes of the decline of Spain, arising from restrictions and imposts, and a miserable system of law and police, both at home and in the colonies, which operated much more fatally than the acquisition of colonial dominions, and which, indeed, counteracted any benefit they might otherwise have afforded. It is surely a proof, says Mr. B., that the downfall of a country was not caused by its colonial possessions, but by some evil in the national policy common to all its branches, when we find that the æra of adversity was common to both the contiguous and remote provinces, and that the same circumstances which raised up the colo-

nies, and increased their beneficial effects upon the wealth of the parent state, have elevated the parent state also, rescued her from inactive obscurity, and placed her in the career of general improvement, in which her neighbours are engaged in both quarters of the globe.

The Portuguese, incited by a spirit of discovery, and by a view to the great profits accruing to the Venetians from their commerce, during the 14th and 15th centuries, made several attempts, in the course of the 15th century, to find out a way by sea to the countries from which the Moors brought them ivory and gold dust across the desert. In process of time they discovered the Madirias, the Canaries, the Azores, the Cape de Verd islands, the coast of Guinea, that of Loango, Congo, Angola, and the Cape of Good Hope. They also extended their views to the East Indies, and afterwards to America. During the 16th century, the empire of Portugal was more extensive than any over which the dominion of other states has ever prevailed; and the territories that composed it, though almost all held by the right of recent discovery and conquest, were not, like those of Spain and Russia, subdued and retained with ease; nor were they tracts of useless country, thinly peopled, possessed only of unimproved natural resources, and inhabited by a few tribes of wandering savages mingled here and there with nations somewhat more civilized. The Portuguese conquests were gained with difficulty from nations far advanced in refinement and capable of resistance; the extension of their territory obtained from right of discovery, that is, seized from less civilized nations, was equal to the most opulent of the dominions possessed by Spain, and possessed by tribes much more warlike than the Mexicans or Peruvians; and the length of sea-coast, with various convenient ports, which bounded the eastern dominions of Portugal during this brilliant period, was sufficient to insure the most important commercial advantages from their intercourse with the metropolis. The whole western coast of Africa, with the greater part of the east coast and the Cape of Good Hope, was subject to the dominion of the Portuguese, and occupied at favourable intervals by their garisons and factories. They also possessed the whole southern coast of Asia, together with as many of the Indian islands as they chose to settle in, from the gulf of Persia to China and Japan, where they had a few important commercial stations. This unparalleled extent of naval territory gave them the undisputed command of all those seas, and enabled them to carry into execution the ordinary schemes of the mercantile system with uncommon vigour and success, by confining all intercourse with Asia and Africa to their own European territories. The power, adds the writer whom we are now citing, which they possessed over the interior of those vast and opulent regions, supported their commercial establishments, and enabled them to gratify with unexampled licence that tyrannical spirit which has always, though in different degrees, signalized the intercourse of European states with the refined and amiable inhabitants of their Oriental provinces. Such, during the whole of the 16th, and the greatest part of the 17th century, was the magnificent outline of the Portuguese empire in Africa and Asia. The romantic descriptions of their own authors, corroborated by the testimony of other nations, their rivals and enemies, are sufficient to prove that the achievements and wealth of their nation in the provinces of the Eastern empire were superior to any which it could boast of elsewhere; and the remains of the Portuguese dominions in Africa, where at this day 15 kings are tributary to the court of Lisbon, together with the glittering fragments of the Asiatic empire, corrupted by bad policy, as well as dismembered by

foreign conquest, may convince us of the important relations which the provincial wealth and power of this nation must have formerly borne to its whole resources. The East Indian possessions of Portugal, during the 16th century, threw into their hands the whole commerce of Asia, which, long before the discovery of the passage by the Cape of Good Hope, had formed one of the greatest trades carried on between any two parts of the world; had enriched and refined the whole European empire of Rome, and raised the inconsiderable republic of Venice to a degree of power formidable to all the great nations of the continent. The same commerce, divided among several states, has, since the downfall of the Portuguese dominions, sensibly enriched all those nations, and continues to form a very great part of their extended trade. We may judge, in some degree, of the extent of the trade carried on by the Portuguese in their Asiatic settlements, some time after their eastern empire had begun to decline from the completion of the English and Dutch, by a single fact. In the year 1611, the English company's servants, in one of their voyages to Surat, saw a single Portuguese merchant fleet, consisting of 240 sail, bound for one place, and destined only for the commerce of the northern and most thriving settlements. (Anderson's *Hist. of Commerce*, ii. 245, 263.) The African and Asiatic provinces, however, must be considered as conquered territories, held in subjugation by a few troops and squadrons of ships; not as colonies peopled by emigrants from the mother country, or by a race in which those emigrants and their descendants bore a considerable proportion. Of these vast dominions the Portuguese were nominal possessors; the treasure and blood of the metropolis were wasted in wars with the native powers, and the relations of commerce were on every occasion postponed for those of conquest and dominion. These circumstances have eventually proved fatal to the Portuguese dominion in the East, which has at length been transferred to other powers of superior policy and strength.

The Portuguese trade with India, though rigorously confined to the subjects of the mother country, was never put into the hands of an exclusive company, incorporated by charter, except for a short time, about the year 1731, when the experiment was unsuccessfully tried. The sovereign granted, from time to time, privileges of fitting out vessels, under limitations, to private co-partners and individuals, who thus enjoyed a monopoly of the supplies required both by the Asiatic and European provinces. The monopoly had been generally velleid in the crown, until the year 1752, when it was said to be abolished; but several important articles still continued subject to the royal privileges, and could only be bought in India and sold in Europe on the king's account. From the splendid pre-eminence which the Portuguese trade with India once possessed, it has sunk to a few annual voyages, in consequence of the reduction of the Portuguese empire in the East, and the bad management of the trade and settlements that still remain. With a view to its revival, new exclusive grants have been made to mercantile adventurers in Europe, and an exclusive company has been established at Goa (the chief East Indian settlement) for the management of the whole trade with China. These absurd managements have taken place since the year 1752, when the evils perceived to arise from monopolizing policy, induced the sovereign to abandon several of his exclusive rights, and to pretend that the East Indian commerce was thrown open. While the Portuguese conquests were rapidly pursuing each other in the East, the discovery of Bengal, opened a new field of exertion in the West. Brazil, however, compared

with Asiatic conquests, was regarded with indifference, and slowly peopled by malefactors, and by those whom the persecuting spirit of the times drove, from the mother-country. Among the emigrants of this period, sacrificed to the cruel bigotry of the inquisition, was a great body of Jews, who carried over with them to the colony the skill and industry with which they had enriched and strengthened the European dominions of Portugal. Under their cultivation the natural wealth of this fruitful territory began to appear, and by degrees to attract the attention of government. All the Portuguese subjects, who chose to settle in Brazil, were permitted to subdue large tracts of country, and to hold them as fiefs of the crown, with absolute power over the natives whom they had conquered, and with all the prerogatives of royalty, except capital jurisdiction, coinage, and tithes, which were invariably reserved to the sovereign. These great territorial lords thus acquired an almost absolute authority, over domains often extending 40 or 50 leagues along the sea-coast; and generally leased out parts of their possessions to sub-vassals for terms of 2 or 3 lives. This arrangement immediately attracted to the colony a number of adventurers and opulent persons from the mother country. The importance of this colony, in consequence of the whole territory of Brazil, and the cultivation of various useful articles, gradually increased; and its traffic with the parent state, would have proved a great mutual benefit; if an erroneous policy had not confined it to a few ports in each part of the empire. Annual fleets from Lisbon and Oporto alone were permitted to carry on this rich commerce, under regulations similar to those of the Spanish flotas and galleons. Four emporiums, *viz.* Olinda, St. Salvador, Paraiba, and Rio Janeiro, were appointed for the destination of those squadrons, and the supply of the whole colony. The 18th century opened with a discovery of gold and diamond mines; and since that period many regulations have been adopted, which have proved pernicious both to the colonies and to the parent state. Companies were established at Peru, Pernambuco, and Maragan, which did not long survive the downfall of Pombal, the Portuguese minister: these have ceased to exist above 20 years, after proving highly injurious to both the mother country and the colony during an equal period of time. A new and more liberal system has been introduced; but the royal monopolies still exist in their full force, and obstruct the growth, as well as the circulation, of the most valuable staple produce which Brazil supplies. Since Portugal has experienced the irretrievable loss of her rich East Indian commerce, and a diminution of the traffic formerly carried on with Africa, Brazil is of great importance to her. This colony is better governed and peopled than any of the Spanish dominions; its proximity to Africa and connection with the Portuguese settlements there, afford great facility in the increase of its cultivation, by means of negroes; the possessions of Brazil gives Portugal considerable weight in the continental politics; and the possession of this noble colony, besides yielding a clear revenue to the mother-country (above one-fourth of the whole national income) is the source of a great proportion of her whole commerce;—the imports from them being nearly equal to the whole imports from the other countries of Europe.

The colonies of Sweden and Denmark, are too insignificant to influence, in any considerable degree, the prosperity of the parent states, and bear a less proportion to the whole imperial resources than those of any other nation. The exclusive companies, which for a long series of years monopolized all the colonial trade of both these countries, have been peculiarly injurious. See *COMPANY, Danish and Swedish*.

For an account of the colonies of France and England, the limits of our article oblige us to refer to the articles FRANCE and ENGLAND, WEST INDIES, EAST INDIES, and COMPANY, and the several individual islands of the West Indies.

There are some other kinds of colonies, besides those above enumerated, of which we shall give a brief account. Conquered subjects or prisoners of war have been sometimes removed to particular and select places, either for safe custody, or for the cultivation of waste lands. The ancients more frequently practised this species of colonization than the moderns, who prefer exchanging the prisoners on each side. The Romans, in particular, were constantly accustomed to remove the more active and daring nations to a distance from their native abodes, and to oblige them to reside in some select place which was probably less defensible than their own country, and where, of course, they would be more under command. We are not, however, without some examples of this kind, even in our own times. The Maroons, or remnant of the Spanish slaves, who had been relinquished by their masters, and left on the island of Jamaica, when the Spaniards were expelled by the English, after having long gallantly resisted the forces brought against them, at last submitted to one of his majesty's officers, upon condition of not being sent off the island. To this submission they were induced by the fear of a new species of warfare with which they were threatened, *viz.* the use of blood-hounds to discover their retreats. But the legislative assembly of the island not only refused to pay the Spanish police-runners their stipulated bounty, but also took advantage of some unavoidable delays in the performance of the treaty to annul it altogether, and to transport the Maroons to Nova Scotia, whence they were afterwards removed to Sierra Leone. On account of this flagrant act of injustice the commanding officer of his majesty's troops indignantly refused a handsome sword, which the assembly offered him for his services in putting an end to a war which had been so long protracted. See MAROONS.

Another kind of colonization is the removal of convicted criminals, or of debtors, to some desert spot, in order to work the mines, or break up the land, and thus prepare it for more respectable colonists. The Russians use this mode of colonizing their vast lands in Siberia. But the most interesting colony of this description, particularly to Englishmen, is that of New HOLLAND, which see.—Also, BOTANY BAY, and New South WALES.

Great sums of money have been, and still are, annually expended on this colony, but it has hitherto languished; partly from the disproportionate number of the sexes, and the idle habits of the convicts, but still more from some radical defects in its administration, many parts of which render it more like a mere job for contractors and agents, than a well regulated system for the gradual reformation of the criminals, and for rendering them useful subjects in future. The dissensions also which have taken place among the officers there, cannot but have tended to injure the colony. These dissensions seem to have originated in some measure from the governor being always a naval officer. The absurdity, for such we must esteem it, of a naval officer commanding in chief on shore, merely because he went to the place by sea is fully equalled by several others, which demonstrate how inadequate the undertaking were the framers of the system by which the colony is regulated.

During the first ten years, *viz.* from 1787 to 1797 inclusive, the number of convicts sent to New South Wales

was 5765 men and women, and 93 children, being in all 5858 persons. The expence of transporting, feeding, and governing them, during that period, amounted to 1,087,230*l.* being above 177*l.* for each, exclusive of the expences previous to their embarkation.

The number of convicts remaining was as follows:

Men convicts in the settlement	-	2175
Women	-	939
Convicts sent out in 1796 and 1797,		
Not arrived	-	695
Total	-	3802

So that a loss of 2049 convicts had been sustained in this short period; an evident proof of the most glaring mismanagement. On the first of September, 1796, the agricultural state of the colony was as follows:

	On account of government.	In possession of private persons.
Acres of land in cultivation	1700	3719
Horses	14	43
Black cattle	150	77
Sheep	191	1340
Goats	111	1316
Swine	59	1810

The later accounts which have been received are equally unpromising. The spirit of dissension has increased, and spread itself to every rank: so also has the depravity of the convicts, in consequence of their not being separated, and placed under the controul of steady persons who have an interest in watching over their moral improvement. Indeed, the viciousness of the convicts increased by fellowship, and even many of the free settlers have, from the force of evil example, acquired the same bad habits. The quantity of land cultivated on the public account is too great, and the numerous public works absorb the labour of the convicts, and leave but few of them to be hired out to settlers. These circumstances, together with the ill selection of the convicts, and of the settlers, as to their former employments, contribute to the want of success in the colony.

It certainly is not improper to send, as matter of favour, criminals to remote and desert places to procure their own livelihood, furnishing them at first with a few necessaries, and then leaving them to their own industry, or to supply the free settlers in those places with convicts for servants, in order to free them from the heavy expence incident to their procuring servants from a distance. But the idea of transporting large bodies of criminals to an immense distance, and employing them, under a strong guard, in public works, where few such works can possibly be wanted, and in cultivating land in the produce of which they have no interest, does not seem to have been happily chosen, or very promising, even in theory; and we may add, that practice, upon a very extensive scale, has completely shewn its futility.

The Romans, it is true, transplanted their prisoners of war to distant countries, and employed them on public works; but these works were carried on in well inhabited countries, and were designed for the facilitation of the intercourse between the several parts of the empire, or for adorning the cities with marks of the Roman grandeur.

We believe, however, that the colony of New South Wales might be made to answer much better, if a few simple regulations were adopted, and particularly if the employment of so many convicts on account of government was abolished, and the convicts left more to their own industry.

It was formerly observed in Virginia, that the colony languished so long as the cultivation of the ground, &c. was carried on as a public concern, but that it immediately began to flourish when the lands were divided, and every one left to shift for himself.

The want of capital and experience among the majority of the convicts, forms no objection; as, by furnishing those accustomed to husbandry, gardening, or useful trades, with the necessary seeds and tools, and "a very sparing allowance of provisions, to be gradually diminished," there can be no doubt but that, in a very short time, they would not only be able to repay the advances made them, with interest, but also to pay a gradually increasing rent. As to those bred to no profession useful in the colony, they might be let out by auction, for a year at a time, until they had acquired sufficient experience: and a fourth part of their wages might be deducted and laid by, to form a stock when they were capable of using it, another part being paid into some benefit society.

Hitherto we have spoken of external colonies, or those in which the colonists recede from their mother-country, and establish themselves in foreign land, without, however, submitting to their form of government.

It now remains to treat of those colonies in which large communities of foreigners are, for some particular reasons, permitted to enter and settle in a country; which colonies differ from those founded by private adventurers, only because they do not so strongly affect the political system of the country.

The Russian government, having immense tracks of waste lands, some of which are advantageously situated for mines or for commerce, has, as we have already said, bestowed great attention in endeavouring to people these tracks, as well by foreigners as by natives. The Prussian government has also bestowed the same laudable attention to the improvement of the waste lands in its possession; and it even went so far as to require from the Poles a tribute of marriageable virgins, with a stipulated portion for each.

To this species of colony belongs what is usually called the Babylonish captivity of the Jewish nation, and which is erroneously supposed to have been a removal of the whole nation in a state of slavery; whereas it evidently appears, from their own records, that it simply meant the residence of the Jewish chiefs, and of their priests, at the court of the king of Babylon. The number of persons carried off by the king himself, was (2 Kings, xxiv.) only 10,000; a number surely applicable only to the higher classes. The officers which many of them held in the Babylonian court, and subsequently in the Persian, are a proof, that although they were, for obvious political reasons, required to reside at court, their situation there was perfectly honourable. It is probable, however, that their removal might occasion the gradual emigration of a number of other families, who followed them for the sake of employment, and spread over the Babylonian dominions; as their number was found to be greatly increased, when they were allowed by the Persians to return. They then amounted (Nehemiah, vii. Ezra, iii.) to 49,697 persons.

Many other instances may be found, both in ancient and modern history, of this importation of people. The conquered Greeks filled the capital of the Roman empire, and, by the versatility of their talents, acquired the same influence over the masters of the world, as the modern French (who frequently boast of their Greek origin) have over the fashionable part of our own country. By means of this influence, they introduced among the Romans all the vices for which they were notorious; and to the baneful

effect of their influence, we may justly attribute, in great measure, the downfall of the empire, since they introduced a love of dissipation, and of showy, but trifling acquisitions, instead of the more solid attainments which were required, before they contaminated the public mind.

The importation of slaves into a country, may be regarded as a kind of internal colony of the most important, because dangerous nature. When the slaves are numerous, they are not only retained in subjection with difficulty, (being in general far superior in bodily strength) but they are also of very doubtful fidelity, and ever ready to join any invader, or to flock to the standard of any military adventurer. There is yet still greater danger if an independent state exists in the neighbourhood, and particularly if it should consist of revolted slaves (as has lately happened in St. Domingo), because the greater energy of an independent government enables it to prosecute any ambitious designs of conquest with decided advantage over a delegated authority.

It is, therefore, highly impolitic that slavery should be constantly permitted in any country; and, although, for the sake of bringing labourers to any particular spot, it may be tolerated at first, it is the bounden duty of every state to take decisive measures to convert the slaves, by degrees, into free subjects, and to put a stop to the importation, as soon as the colony has obtained a certain population, and further to take some steps in order to liberate the slaves already imported, or at least to make their offspring free at a certain age. Thus it will be requisite for the colonist to attend to the welfare of his present stock, and to introduce talk-work, whereby he will be changed, in time, from a commercial capitalist, or a needy planter, into a landed gentleman. He will then be solicitous only for his rents, and deprecate the idea of keeping more land in hand than is necessary for the support of his establishment, or to serve as an example of perfect cultivation and grazing to his tenants, to the most industrious of whom he might furnish capital and favourable leases, in order to enable them to improve his own land.

To a neglect of this salutary precaution, we may attribute the present dangerous state of the Dutch and English colonies in the West Indies, since, notwithstanding the length of time that they have been established, the state of society in them is as crude and semi-barbarous as it was at the time of their being first settled.

It was probably owing to a similar neglect that the western provinces of the Roman empire were so speedily subdued by the northern adventurers. The Roman provincials, like the planters in the West Indies, seem to have had little repugnance to a change of masters; partly because the resident planters were thus relieved, at least for some time, from the claims of their creditors; partly because the agents were enabled, in many cases, to convert the plantations to their own benefit; and, lastly, because both were equally afraid that, in case the war was protracted, they should lose their slaves. See SLAVES.

As to their intrinsic nature, colonies are either *agricultural*, which grow within themselves the principal articles of their food and subsistence; or they are *commercial*, which depend upon other countries for the necessaries of life, and devote themselves to the traffic of a few staple commodities. The northern states of America and the Bermuda island are so many instances of agricultural colonies; while the West-Indian islands, together with Virginia and Maryland on the continent, are examples of commercial colonies.

In respect to the advantages or disadvantages of external dependent colonies, no person has more thoroughly consid-

dered the subject than Mr. Brougham, in his elaborate treatise "On the Colonial Policy of the European Powers." The adoption of all the positions advanced by that ingenious writer, may indeed be somewhat hazardous; especially if we consider the great degree of doubt and uncertainty which hangs over all political speculations, on account of the difficulty, and still more the danger of making experiments on those subjects; to say nothing of the want of means for ascertaining whether the effects are ascribed to the right causes, when (as is usual in human affairs) so many causes concur in producing those effects.

The first advantage arising from colonies dependent upon any country, is the extension of the home trade; for such in fact the trade between the mother-country and the colony may fairly be considered, because the whole of the profits is retained within the state; whereas in foreign trades, one of the profits, either that of the buying, or of the selling merchant, goes to enrich a foreign state. The trade of a colony also produces a considerable augmentation of the mercantile navy of the mother-country, and, at the same time; as the ships and their crews are constantly retained within the power of the state, there is far less danger of the sailors being enticed into foreign service, than if part of their time was spent in foreign ports. The European nations have anxiously endeavoured to confine the trade of their colonies to the merchants of the mother-country by positive regulations; but Mr. Brougham thinks this solicitude is absurd and even nugatory. Merchants will, in all countries, prefer dealing with their own countrymen, with whose language, laws, and habits of thinking they are acquainted. And this is more especially the case in commercial colonies, as they require in general such large advances of capital, that few persons would be inclined to invest sums upon private foreign security.

But the greatest utility of colonies, is the affording an opening for the employment of the superfluous population of the mother-country, which must otherwise either emigrate to the neighbouring foreign nations, or die of want at home. The inhabitants, indeed, of agricultural colonies, are in general stationary, and, as it were, lost to the mother-country; but these colonies only attract those who cannot get employment at home, or in the commercial colonies, or those who are in such desperate circumstances that they are obliged to fly from home to avoid the importunities of their creditors. Commercial colonies, on the other hand, have for the most part only a temporary population, as the colonists, after spending a part of their time in the colony, generally return home with their fortunes improved, and carry with them, to the mother-country, the same spirit of improvement to which they owed their success in the colony.

Commercial colonies have a further advantage, in furnishing employment for those large capitals which would otherwise be employed upon the more distant foreign trades, or lent to foreign states.

We shall now say a few words respecting the disadvantages arising from the possession of colonies; these are so great that the economists have loudly declaimed against the utility of forming such establishments; but they have committed a fundamental error, in considering colonies as foreign states. They ought rather to be considered as mere extensions of the parent state, into regions adapted to the production of articles which cannot be raised at home. A circulation of inhabitants is kept up by the commercial intercourse between the colony and the mother-country, and also by the weakness incident to parts remote from the seat of government. So that, as the colonies require, at all times, the fostering care of the mother-country, they are

generally filled with the troops of the parent state and their followers, and the ports are constantly resorted to by its shipping, both mercantile and warlike. It were needless to insist upon the powerful attractions resulting from their common origin, their identity of language, and their similarity of habits in thinking; as the effect of these, in producing a good understanding among nations, must strike the most inattentive observer.

One of the principal disadvantages of colonies, is the wars into which they seem to draw the nations which possess them. But although it is certainly true that external commercial colonies do, in the present times, generally become the seat of warfare between such of the belligerent powers as possess them, it cannot be allowed that they are the causes of the war; for as they increase the frontier to be defended, those nations which possess them will be less ready to engage in hostilities; and it is the weakness of the colonies, (on account of their deficient population preventing the raising of regular troops in them), that is the principal cause of the enemy chusing rather to invade them, than to force his entry into the parent state. The want of a powerful landed interest, in colonies of this nature, tends also to attract the hostilities of the enemy, as the possession of them is seldom disputed with the obstinacy which marks the resistance to invasion in old settled countries; the defence being limited to the small number of troops which the parent state can spare without endangering her own safety, and whose exertions are impeded by the mixture of an ill-disciplined militia, and of volunteers, unaccustomed to service, and deploring their fate in being freed from their own homes.

This unfittedness of external colonies, which are always understocked with inhabitants, to contribute supplies of men for the general defence of the state, is usually considered as a disadvantage; but it cannot in reality be esteemed to be one of much consequence. Even in the parent state itself, it is only in those manufacturing districts that produce articles, the demand for which is variable, that the recruiting service meets with success; in those where agriculture prevails, or in which a staple commodity is manufactured, that service is in general unsuccessful. It cannot, however, be of any consequence, in regard to the general population of the empire, whether the mother-country supplies soldiers, or whether they are raised in the colony, and their place supplied by fresh settlers.

It is only the total want of system, both in the planting and subsequent management of the English colonies, that rendered them at first, and still keeps several of them expensive burthens to the mother-country; as those of other countries not only pay, in general, their own expenses, but also furnish a surplus revenue for the service of the empire.

It will appear, from what we have already said, that a great difference of political strength subsists between agricultural and commercial colonies. The former are much stronger internally, and capable of affording, with their own resources, a more obstinate defence to the attacks of the enemy. But this strength renders them refractory, and difficult to be controlled; hence they require either early restraint, and the observance of a strict discipline, or they must be relinquished as dependencies, and incorporated into the mother-country, as has recently been found necessary in respect to Ireland. On the other hand, although the weakness of commercial colonies renders them much more dependent on the state to which they belong, yet, from the debts with which they are in general loaded, they are ever ready to submit to any invader; especially if the change can be made to a state, where the merchants possess larger

larger capitals than those of the state to which they have already been subjected; as this affords them a hope, not only of being released for some time from the claims of their ancient creditors, but also gives them reason to suppose they may be able to procure still greater credit from their new masters. Every person acquainted with West Indian affairs must acknowledge the truth of this remark; and with respect to other parts, we have, ourselves, twice experienced the facility and even eagerness with which the Cape of Good Hope was surrendered to us.

The want of mercantile capital which our enemies in the West Indies do not as yet possess, is the principal security we have that those colonists will rather chuse to remain under our dominion than fall into the hands of other powers, as they would, in that case, be obliged to diminish their cultivation in consequence of the diminution in the advances made by the merchants upon their future crop. And as to any attempts at independence, the mother-country has a considerable security in the precarious situation of the inhabitants, in consequence of the number of their slaves and the discontent that generally prevails among them. This latter circumstance, might, by those who think the possession of colonies, and the monopoly of their trade, are of great benefit to a nation, be thought to afford a good argument against the abolition of the slave trade, as tending indirectly to lessen the dependency of the colonists. But we may remark, that the greater strength of the colonies, arising from their internal improvement in consequence of the abolition of the slave trade, would more than counter-balance the danger of their revolt, as they would, in consequence of such strength, run less hazard of falling into the hands of an enemy. And the event of the American war has fully proved, that even in the case of the colonies revolting, when they had acquired sufficient strength, the commercial intercourse between the two countries would continue, and probably rapidly increase; so that the government would, at the worst, lose only an expensive incumbrance. It can only be by the influx of foreigners, belonging to a mercantile nation, in such numbers as to acquire a preponderance in the state, so as to alter the fundamental laws and language of the colony, that any great change in its commercial relations would be effected.

The most serious disadvantage of colonies, is that they divert the capital of the nation from the improvement of the mother-country; although this improvement is certainly the most advantageous employment in which the capital of any nation can be engaged. It has indeed been asserted, that the labour of one man on the continent of America, produced more to the state than four at home; but this must be regarded as the mere rant of visionary politicians, being totally unfounded and absurd in the highest degree; for the subjects at home being directly taxed, must yield far more revenue than those in the colonies, who are in general only indirectly taxed to the common service of the empire, by the customs levied upon the commercial intercourse of the two countries. The same persons asserted that each white person in Virginia and Maryland, took off from ten to twelve pounds a year of the growth or manufactures of the mother-country. But the custom-house books are sufficient evidence that this calculation was much over-rated; for the exports to those colonies were never more than 300,000*l.* a year, and therefore, allowing them to contain, as was stated, 120,000 white persons, the consumption of each person was only 1*l.* 13*s.* 4*d.* a head. The whole of the exports to America, when at the highest, was only about 834,000*l.* a year: and this tends to show that it is better to retain the industry of the inhabitants of any coun-

try within its own sphere, and encourage the cultivation of the waste lands, than to divert it to distant colonization. It may, however, be sometimes necessary, as a measure of precaution, to secure the possession of distant places, when it is known, or suspected, that the usual enemies of the state intend to colonize them; but it is extremely imprudent to foster these distant colonies at the expense of the mother-country, as is done in respect to the British colonies. When an old settled country is improved to the highest, then, and then only, can it be necessary to provide outlets for the employment of the surplus capital of its subjects, by conquering, or purchasing some poor country, with a view to its improvement.

As to internal colonies, the encouragement of foreigners, and especially the importation of foreign slaves, must, in general, be regarded as errors in politics. The procuring of a stock of labourers in the first stage of breaking up a new and uninhabited colony, the introduction of new manufactures, or of new commercial relations, can alone justify such measures. And surely it is far better to endeavour to attain these ends by other means. The removal of idle and disorderly persons from great cities, the sending out intelligent travellers into other countries, the encouragement of experimental philosophers and chemists, together with the apprenticing of clever youths to merchants in foreign countries, would probably be equally efficacious. See Smith's *Wealth of Nations*, B. iv. chap. 7. Robertson's *Hist. of America*, vol. iii. Brougham's *Inquiry into the Colonial Policy of the European Powers*, 1803, vol. i. and ii. passim. Paley's *Principles of Moral and Political Philosophy*, vol. i. p. 381. Edwards's *West Indies*, vol. ii.

COLONY of Bees. See HIVE.

COLOONY, in *Geography*, a small post-town of the county of Sligo, Ireland, remarkable for the check given to the progress of the French troops under general Humbert, in September, 1798, by the gallantry of lieutenant-colonel Vereker with about 300 men chiefly of the city of Limerick militia. Though col. Vereker was obliged to retreat in consequence of the number of the enemy, yet he saved the town of Sligo, and by the delay he occasioned, enabled marquis Cornwallis to come up with and entirely subdue the French force. Colony is 98 Irish miles N.W. from Dublin, and five S. from Sligo.

COLOOR, or COLORE, a town of Hindoostan, in the circar of Guntoor, which possesses a diamond mine on the southern bank of the Kistnah, and not far from Condavir.

COLOPENA REGIO, in *Ancient Geography*, a country of Asia in Cappadocia; Sebastopolis and Sebaste are towns of this country.

COLOPHON, a town of Asia Minor now *Atolofco*, or according to others, *Belvidere*. It was one of the chief cities of the Ionian league, seated near the sea, and not, as Piny calls it, an inland city, in the small river Halefus, N.W. of Ephesus and S.E. of Smyrna. It was founded by Mopsus, grandson of Tiresias, and, in process of time, Damafichtlon and Promether, sons of Codrus, conducted a colony hither. It was destroyed by Lyfimachus, and its inhabitants were sent to people Ephesus; but after his death it was rebuilt in a more convenient situation. The Colophonians were such excellent horsemen, that those, for whom they declared themselves, were sure of victory; whence the trite proverb "*Τον Κολοφωνα ιππευεις, colophonem addere*," i. e. to put the last hand to a work, or successfully to terminate it. Colophon was the birth-place of Nicanor, and one of the seven cities that claimed Homer, who lived there some time, as Herodotus informs us. The ancients mention a famous grove and temple of Apollo Darius in the neighbourhood

bourhood of this city; whence some have said that he derived this appellation, though others say that he was called from a mountain bearing that name. The small town of "Notium," on the same coast, often mentioned by Livy, belonged to the Colophonians, and the Romans allowed it the same privileges, which they granted to Colophon itself. Pliny informs us, that they collected in the vicinity of Colophon, a resin of a yellowish red colour, which being bruised, emitted a strong odour; and hence some have derived the name of *Colophony*, now frequently called "Spanish wax," or "Grecian resin," as it is brought from one or the other of those countries. Its episcopal see was subject to the metropolis of Ephesus.

COLOPHON, a town of Greece in Epirus.

COLOPHONIA, in *Botany*, Commers. See *BURSERA pariculata*.

COLOPS, in *Geography*, the name given by Dion to a river of Pannonia, called *Colapis*, by Strabo.

COLOQUINTIDA, in the *Materia Medica*. See *COLOCYNTHIS*.

COLOR, in the *Ancient Music*. See *COLOURS*.

COLOR *Indicus*. See *INDICUS Color*.

Color nero e rosso, Ital. black and red, in *Music*. We have seen in Bene's college, Cambridge, old music books of Henry VII's time, in which some of the notes were black, and some red.

COLORADO, in *Geography*, a river of New Mexico, in the south-western part, which flows into the northern part of the Vermilion sea, or gulf of California, called by D'Anville *Colorado de los maytzes*. The course of this river, which is generally from N. E. to S. W. sometimes W. may be computed at 600 British miles. It is called Rio Colorado, or Red river, because the waters acquire that colour from the red clay on which the rains fall. Its stream is deep and copious, and is capable of considerable navigation. The neighbouring savages, who swim across it by a peculiar artifice, are denominated *coconiaropas*, which see. This river is joined from the east by a large river, called Gila, which, however, is everywhere fordable. The country between these rivers is said to be an upland desert, without water or pasture. On the other side of the Colorado, the country is said, on the contrary, to be very fertile, and the natives rather fond of cultivation. It is thought that considerable rivers also join the Colorado from the west, flowing from the same chain of mountains that supply the sources of the Rio Bravo, in lat. 40°. Among these the Zaguuanas is the most lengthened stream, and may therefore be regarded as the Colorado itself. On the west of the Colorado, the river of Maityrs, and that of Pyramids, have umbraceous terminations, perhaps in the same lakes, or, perhaps in the Colorado. In lat. 39° W. long. from Madrid, 110° 3', there is a large lake without a name, which receives two considerable rivers from the east, one of which is called Euenara. From lat. 42° to 43°, and under the same meridian, extends another lake, which, though not fully explored, seems to be that of Imperices, where the factors Velez and Escalante terminated their discoveries, and the same fit inland knowledge of the Spaniards. If, indeed, the Spaniards have explored that part of the country, they conceal their in ornament.

On the east of the same chain, from which springs the Rio Bravo, arise two rivers, which probably join the Mississippi; and it appears that the eastern river of Colorado has been confounded with another river of the same name, with the epithet of Nuevas, which probably joins the Atkanza or Akasala. See *COLORADO* or *Riviere Rouge*, infra.

COLORADO, a river of New Mexico, which runs into the Bay of St. Bernard, in the gulf of Mexico.

COLORADO, *Riviere Rouge*, or *Red River*, a river of North America, in Louisiana, which runs into the gulf of Mexico, or rather joins the Mississippi river, before it falls into this gulf, some miles above New Orleans.

COLORADOS, *Los*, a numerous cluster of small islands or rocks, near the N. W. coast of the island of Cuba.

COLORATURA, in the *Italian Music*, is used to denote all sorts of variations, trillos, diminutions, &c. that can render a song agreeable.

COLORBASIANUS. See *COLARBASIANUS*.

COLOREDO, in *Geography*, a town belonging to the state of Venice, in the country of Friuli; seven miles N. W. of Udina.

COLORETTI, MATTEO, in *Biography*, was born at Reggio, in the year 1611, and is spoken of by Tirabochi and the abbé Lanzi, as a most excellent painter of portraits.

COLORIFIC earths, in *Mineralogy*, a class or tribe of earths, in the arrangement of Kirwan, described by him as strongly staining the fingers. Of these he enumerates four families, viz. red, yellow, black, and green; the red is the reddle, or rubrica fossilis. Rothel. Laffi, o. 973. Of dark cochineal red colour, or intermediate between brick and blood red, having neither lustre nor transparency; fracture, earthy, sometimes conchoidal; fragments, 1; hardness, 4; sp. gr. inconsiderable; adhering pretty strongly to the tongue; feeling rough; assuming a polish from the nail; strongly staining the fingers; falling immediately into powder in water, and not becoming ductile; not effervescing, nor easily dissolving in acids. When heated to redness, crackling and growing black; at 150° the specimen (Lefke, o. 973) melted into a dark greenish yellow frothy enamel. It differs from red ochres only by containing more argill. The red colour proceeds from oxygenation, and the absence of acid. The mere air of water is expelled by heat, the browner it grows. The yellow, Gellebard, Lefke, o. 1093, is of an ochre yellow colour; as to lustre, externally it often hath some gloss, but internally none; transparency, 0; fracture earthy, often inclining to the conchoidal; fragments, 0; hardness, 3; sp. gr. inconsiderable; adheres strongly to the tongue; feels smooth, or somewhat gray; takes a high polish from the nail; strongly stains the fingers; in water it immediately falls to pieces with some hissing; and afterwards to powder, without diffusing itself through it; does not effervesce with acids, nor is easily soluble in them; heated to redness, it crackles, hardens, and acquires a red colour, and gives a reddish break. At 156°, Mr. Kirwan melted the specimen, Lefke, (o. 1093) into a liver brown porous porcelain mass. This yellow earth differs from ochres only in containing a greater proportion of argill; the yellow colour proceeds from the calc of iron, highly oxygenated, and probably containing both water and acid. Those earths which contain a large proportion of iron, have rather an orange colour. According to the analysis of M. Sage of Paris, who has the merit of preserving to his countrymen the immense gains acquired by the Dutch from converting this yellow earth into what is there called "English red," it contains 50 per cent argill, 40 oxyd of iron, 10 water, acidulated by vitriolic acid. Mem. Par. 1773, 313. The 3d family, or black, black chalk. Schwartz, Krude, Z. chen, Schifer, Lefke, 3, 972; Pierre noire of Briffon, p. 16, is of a greyish black colour; lustre, 0; transparency, 0; fracture imperfectly curved slaty; fragments 1, partly flat, partly long subultry; hardness, 5; sp. gr. 2, 114. by Kirwan's trial by Briffon, 2 186 before absorption of, 2, 277 after absorption of water; adheres slightly to the tongue, feels smooth, assumes a polish from a knife; gives a black break, and marks black; in wa-

ter does not readily moulder, but if taken out cracks in a short time; does not effervesce with acids, nor easily dissolve in them; heated to redness, it crackles and becomes reddish grey; and contains somewhat vitriolic. The 4th family, green earth. Lefke, o. 1013, is of a greyish green colour; found generally in lumps in the cavities of other stones, or externally investing them; lustrous, o; transparency, o; fracture, earthy, fragments uneven, sometimes verging to the conchoidal; fragments, 2; hardness, from 6 to 7; sp. gr. 2.637; sometimes feels smooth, does not assume a polish from the knife, nor adhere to the tongue, nor stain the fingers, nor mark while dry, and when wet but slightly, in water it often crumbles after standing about half an hour; does not effervesce with acids, nor is easily soluble in them; heated to redness, it crackles and becomes of a dark reddish green colour; at 147°, the specimen (Lefke, o. 013) melted into a black compact glass, resembling that of basalt; which shews it to consist of silice, argill, iron not much oxidated, and oxyd of nickel, from which the green colour is derived, besides water. Kirwan's Elem. of Mineralogy, vol. i.

COLORINA, or COLARINA, in *Ancient Geography*, a town of Arabia Felix. Ptolemy.

COLORISATION, or COLORATION, in *Pharmacy*, a term applied to the several changes of colour which bodies undergo in the various operations of nature, or art; as by fermentation's, lotions, coctions, oxydations, &c.

COLORITES, in *Ecclesiastical History*, a congregation of Angulin monks, instituted about 1530, and so called from *Colorita*, a mountain near Morano, in Calabria, where a church was erected to the Virgin Mary.

COLORNO, in *Geography*, a town of Italy, in the Parmesan; 7 miles N. of Parma.

COLOS, a town of Transylvania; 4 miles N. of Colosvar.

COLOSER SALT MINE, in Hungary; the stratum of rock salt in this famous mine, is of the enormous thickness of 60 fathoms; the diameter of the excavation made therein by the miners, is 50 fathoms. "Boni's Hungary," p. 140, 143.

COLOSVAR. See **COLOSVAR**.

COLOSSAL COLUMN. See **COLUMN**.

COLOSSE, in *Ancient Geography*, now *Chonos, or Konos*, a city of Phrygia Major, in that part called Pacatiana, seated on an eminence, on the south side of the Meander. It was built by the river Lycus, near the place where, according to Herodotus (l. vii. c. 50.) it begins to run under ground, as it does for five furlongs before it rises again, and flows into the Meander. This city was situated at an equal distance between Laodicea and Hierapolis, and to this place Xerxes came in his expedition against Greece. All these three cities perished by an earthquake, says Eusebius, in the 10th year of Nero, or about two years after St. Paul's epistle was sent to the Christians at Colosse. The government of this city was democratic, and its first magistrate bore the title of archon and praetor. This city, having been forcibly transferred to the Persians by the Macedonians, passed afterwards to the Sacerdotes. After the defeat of Antiochus III. at the battle of Magnesia, it became subject to Eumenes, king of Pergamus. And when Attalus, the last of his successors, bequeathed his dominions to the Romans, this city, with the whole of Phrygia, formed a part of the proconsular province of Asia, which division subsisted till the time of Constantine. After the reign of this prince, Phrygia was divided into Phrygia Pacatiana, and Salutaris, and Colosse was the sixth city of the first division. It afterwards took the name of Chonos, or Konos.

COLOSSIANS, Epistle to the, in *Biblical History*, a canonical epistle, addressed to the Christians at Colosse by the apostle Paul, and conveyed to them by Tychicus and Onesimus, towards the close of St. Paul's first imprisonment at Rome, which was about the year of our Lord 63, or the 9th of the emperor Nero. As Timothy joins with the apostle in the salutation at the beginning of this epistle, he was still at Rome, and not yet sent away to Philippus; and hence Dr. Lardner concludes, that this epistle was written about the same time with that to the Philippians, in the year 62, and some time before the end of it. Although it appears from this epistle, that a Christian church was established at Colosse; we have no account by whom, or at what time, it was founded. Some have concluded from chap. ii. 1. that St. Paul had never been there himself. It is not, however, improbable, though no mention occurs of this fact in the history of the Acts, that the Colossians might have been converted while Paul resided at Ephesus, considering more especially that he spent no less than three years in that city, and preached with so much success, that St. Luke tells us, (Acts, xix. 20.) that "all they who dwell in Asia heard the word of the Lord, both Jews and Greeks." (See Acts, ch. xvi. 6. xviii. 23.) Dr. Lardner, arguing from the testimony of Theodoret (tom. iii. p. 342, 343.), who lived in the 5th century, alleges a variety of considerations, inducing him to think, that the churches of Colosse and Laodicea, had been planted by St. Paul, and that the Christians there were his converts. Of these we shall only select the three following, viz. that the apostle was twice in Phrygia, in which were Colosse, Laodicea, and Hierapolis (Acts, xvi. 6.); that he does in effect, or even expressly say, that he had dispensed the gospel to the Colossians (Epi. ch. i. 21—25); and that from several passages which occur in this epistle, it appears, that the apostle is not writing to strangers, but to acquaintance, disciples, and converts.

The Christians of the church at Colosse seem, from the honourable testimony that is born to them in this epistle, to have maintained an honourable character for their party, and the zeal they discovered for the gospel; nevertheless, we find, from the cautions addressed to them in the second chapter, that they were in some danger of being drawn aside by the subtleties of the Heathen philosophers, and the insinuations of certain Jewish zealots, who insisted upon the necessity of conforming to the ceremonies of the Mosaic law. Accordingly, the grand design of this epistle is to excite the Colossians, by the most persuasive arguments, to a temper and behaviour worthy of their sacred character, and to secure them from the influence of those Pagan sophists, or Jewish bigots, who would seduce them from the purity of the Christian faith.

COLOSSUS, a statue of enormous or gigantic size.

The most eminent of this kind was the colossus of Rhodes, one of the wonders of the world, a brazen statue of Apollo, so high, that ships passed with full sails betwixt its legs. It was the workmanship of Chares, a disciple of Lysippus; who spent twelve years in making it: it was at length overthrown by an earthquake, B. C. 224. after having stood about sixty-six years. Its height was a hundred and five feet: there were few people who could encompass its thumb, which is said to have been a fathom in circumference, and its fingers were larger than most statues. It was hollow, and in its cavities were large stones employed by the artificer to counterbalance its weight, and render it steady on its pedestal.

On occasion of the damage which the city of Rhodes sustained by the above-mentioned earthquake, the inhabit-

ants sent ambassadors to all the princes and states of Greek origin, in order to solicit assistance for repairing it; and they obtained large sums, particularly from the kings of Egypt, Macedonia, Syria, Pontus, and Bithynia, which amounted to a sum five times exceeding the damages which they had suffered. But instead of setting up the colossus again, for which purpose the greatest part of it was given, they pretended that the oracle of Delphos had forbidden it, and converted the money to other uses. Accordingly the colossus lay neglected on the ground for the space of 894 years, at the expiration of which peridi, or about the year of our Lord 653, or 672, Moawvas, the 6th caliph or emperor of the Saracens, made himself master of Rhodes, and afterwards sold their statue, reduced to fragments, to a Jewish merchant, who loaded 900 camels with the metal; so that, allowing 800 pounds weight for each load, the brass of the colossus, after the diminution which it had sustained by rust, and probably by theft, amounted to 720 thousand pounds weight.

Some critics observe, that the colossus of Rhodes gave its own name to the people among whom it stood; and that many, at least among the ancient poets, call the Rhodians *Colossians*: hence they advance an opinion, that the Colossians in scripture, to whom St. Paul directs his epistle, are, in reality, the inhabitants of Rhodes. Of this sentiment are Suidas, Calepine, Munster, &c.

The basis that supported it was of a triangular figure: its extremities were sustained by sixty pillars of marble. There was a winding stair-case to go up to the top of it; from whence one might discover Syria, and the ships that went to Egypt, in a great looking-glass that was hung about the neck of the statue. This enormous statue was not the only one that attracted attention in the city of Rhodes. Pliny (l. xxxiv. c. 37.) reckons 100 other colossuses not so large, which rose majestically in its different quarters. Besides these, here were to be seen five others, the work of Briaxis, and representing divinities. Among the antiquities of Rome, there were seven famous colossuses: two of Jupiter, as many of Apollo, one of Nero, one of Domitian, and one of the Sun.

COLOSTRUM, or **COLOSTRA**, in *Medicine*, the first milk of any animal after bringing forth young, called in common *breastmilk*.

It is remarkable that this milk is generally cathartic, and purges off the meconium; thus serving both as an aliment and medicine.

The same name is likewise given to a disease which this thick coagulated milk sometimes occasions.

An emulsion prepared with turpentine, dissolved with the yolk of an egg, is sometimes also called by that name.

COLOSVAR or **CLAUSENBURG**, in *Geography*, the *Zemlja* of the ancients, by the Hungarians called *Kolofovar*, and in Latin *Claudicopolis*, a town of Transylvania, seated on the first branch of the river Samos, and surrounded by an ancient thick wall, where the states of the province usually assemble. The university was suppressed in the year 1782. The Unitarians, who formed one of the sects received in Transylvania, established their principal seat in this place: 255 miles E.S.E. from Vienna, and 45 N.N.E. from Belgrade. N. lat. 46° 57'. E. long. 22° 21'.

COLOT, **GERMAIN**, in *Biography*, a famous lithotomist, of the 15th century, practised surgery at Paris, during the reign of Lewis IX., from the year 1461 to 1480, and was in great favour with that prince. He was the first regular bred surgeon who practised lithotomy. The operation before his time had been enquired by persons practising no other part of surgery. Regular practitioners had

probably been deterred from interfering in the business, from reverence to the authority of Hippocrates, who obliged his disciples to swear they would not perform the operation, "Nec vero calculo laborantes fecabo." He ingratiated himself with some of the itinerant practitioners, saw them perform the operation, and began with cutting dead bodies. Having communicated his ideas to the physicians of the court, they obtained leave from Lewis, that he might operate on a condemned criminal, who was attacked with the stone in the bladder. The criminal consented, on the condition promised, that he should be pardoned the crime he had committed. The operation was successfully performed, the patient recovering, it is said, in fifteen days. Colot obtained great reputation by the cure, which was rewarded by a pension from his sovereign. The time of his death is not known. Eloy, Dict. Hist.

COLOT, **LAURENCE**, a descendant of Germain, from whom he acquired the art of cutting for the stone, was in great reputation, in the early part, and to the middle of the 16th century, for his skill in performing the operation, by what is called the greater apparatus. By this method the urethra and neck of the bladder are necessarily cut through, which subjected the patients, not infrequently, to fistula, and other inconveniences, yet by his dexterity in operating these accidents were often avoided, which gave him so much credit, that he was sent for to visit patients in Flanders, and other distant countries. To retain him in France, Henry II. made him his surgeon in ordinary in the year 1550, rewarding him with a pension, adequate to the loss he sustained, by being prevented visiting patients in foreign countries. He also created for him the post of lithotomist to the royal family, which was continued to three of his descendants. Philip, the last of them, died in 1656, aged sixty-three years.

COLOT, **FRANÇOIS**, son of Philip, appears to have inherited, with the name, the skill and dexterity of his ancestors, in performing the operation of lithotomy. He left a treatise on the operation, which was published in 1727, under the title of "Traite de l'Operation de la taille, avec des observations sur la Formation de la Pierre, et les Suppressions d'Urine," 12mo. Paris. In this work he gives a short history of the method of operating by the greater apparatus. It was invented, he says, by John de Romanis, a physician of Cremona, in Italy, in 1525, and by him communicated to Marianus Sanctus, who instructed Oétavian de Vila, a surgeon at Rome. Marianus published, in 1535, "Libellus Aureus, de lapide e Vesica per incisionem extrahendo," 8vo. Venet. Of Oétavian de Vila, who was several times called to France, to perform the operation, Laurence Colot is supposed to have obtained some valuable information on the subject, which contributed much to the celebrity he afterwards enjoyed. The method of operating by the greater apparatus has been long since abandoned for a more simple and easy operation, therefore called, by the lesser apparatus, first discovered, Mr. Sharp says, by Mr. Foubert, an ingenious French surgeon, but much improved by Mr. Cheselden, in which the urethra and neck of the bladder are avoided by the operator: with Francis Colot, the celebrity of the family, seems to have been extinguished. Eloy, Dict. Hist.

COLOUR, or **COLOR**, from the Latin, *color*, in *Philosophy*, means that property of bodies which affects the sight only; thus the grass in the fields has a green colour, blood has a red colour, the sky generally appears of a blue colour, and so forth; nor can those colours be distinguished by any of our other senses, besides the sight. The variety of colours, as they are presented to us by the substances that surround

surround us, is immense, and from them arises the admirable beauty of the works of nature in the animal, in the vegetable, and in the mineral kingdom, or, more properly speaking, in the universe. The science, which examines and explains the various properties of the colours of light and of natural bodies, and which forms a principal branch of optics, has been properly denominated *chromatics*, from the Greek word, *χρῆμα*, which signifies *colour*. We shall, however, state this theory in the present article, as being much more obviously recurred to by those persons who wish to be informed on the subject. A distinct idea of what is meant by the word *light*, may be easily formed by its contrast with darkness, which is a privation of light. With our eyes shut we have darkness; if we open our eyes, whatever we perceive through them is occasioned by the agency of light, and the various colours of bodies are parts of that light.—It has sometimes been pretended by certain ignorant persons, that they could distinguish colours by the touch; but the testimony of divers intelligent persons, who have had the misfortune of being blind, in consequence of which their touch has, from necessity, become very exquisite, has constantly contradicted those vain assertions. Besides, it will appear from the following theory of colours, that to discriminate colours by the touch is utterly impracticable. There are indeed certain pigments of common use in painting, which, either from their roughness, smoothness, unctuousity, or other quality, may affect the touch, and with a little practice a person may learn to distinguish the feel of vermilion which looks red from that of sap-green, which looks green, and so forth; but this is not the art of distinguishing colours by the touch. It is only the art of distinguishing certain peculiarities of surface. In fact if two pigments exactly of the same texture (and several such there are) but of different colour, be presented to the fingers of a man with his eyes shut, he will pronounce them to be exactly of the same colour.

The questions which naturally occur to the human mind in the contemplation of colours, are, whence do they derive their origin?—Are they produced by the coloured bodies themselves, or by something external?—Do they move from the coloured bodies to our eyes, and strike upon them, or enter them; or are they owing to some medium interposed between the various bodies of the universe?—Are they material or not?

The ideas entertained by the ancients concerning the nature of colours, were mostly wild and absurd; nor has the present theory, imperfect as it is, been formed without an innumerable variety of experiments, observations, and the concurring investigations of a great many ingenious persons. The followers of Pythagoras called colour the superficies of bodies; Plato considered it as a flame issuing from them; Zeno called it the first configuration of matter; and Aristotle said it was that which rendered bodies actually transparent. We need not add a formal refutation of those extravagant ideas, which were the mere offspring of the imagination, unsupported by experience and by reason. The philosophers of those times paid little or no regard to experiments; hence they made no discoveries or improvements worthy of being recorded. A long and unprofitable period of nearly 2000 years elapsed, from the commencement of philosophical studies in Greece, until about the time of Descartes, when the revival of learning in Europe renewed with additional vigour the enquiries concerning the nature of light and colours. And it is curious to observe by what small steps, and what circuitous ways, any useful discoveries were made. See Priestley's history of vision, light, and colours. Descartes considered colour as a modification of light, and he attributed the difference of colour to the prevalence of the

direct or rotatory direction of light. Grimaldi, Dechales, and others, supposed that a certain elastic medium of a peculiar kind filled the universe, and that the differences of colour depended upon the quick or slow vibrations of that medium. Rohault imagined that the different colours were produced by the rays of light entering the eye at different angles with respect to the optic axis. And Dr. Hook imagined that colour is caused by the sensation of the oblique or uneven pulse of light; which being capable of no more than two varieties, he concluded there could be no more than two primary colours. Such were the ideas of philosophers respecting the nature of colours, when Sir Isaac Newton began to examine the subject in his cautious experimental manner, by which means, about the year 1666, he discovered the foundation of a theory of colours, which has been justly adopted and admired by his contemporaries, as well as by the present succeeding generation.—Rays of light issuing from a luminous object, proceed in straight lines as long as they pass through a uniform medium. If they meet with a transparent medium of different density, they will also proceed through it in straight lines, provided they enter that medium in a direction perpendicular to its surface, otherwise they are caused to bend their course, so that beyond the abovementioned surface they proceed in straight lines also; but these straight lines form a certain angle with the straight lines of their direction before they entered the last medium. The bending of the rays is called the *refraction* of light, and the angle that has been just mentioned is called the angle of refraction. See REFRACTION. Newton, having presented a glass prism, or kind of wedge, to the light of the sun, which entered a dark room through a small hole, found not only that the rays were bent from their course, *viz.* refracted, but he likewise observed that the image of the sun was thereby considerably elongated; and this elongated image instead of appearing of a uniform bright white light, was resolved into a series of colours, which exactly resembled the colours of the rainbow. This elongation of the solar image thus formed, is called the dispersion of light. These colours pass from one to the other by very small, and altogether imperceptible gradations; so that it is impossible to say where one begins and the next ends. Various methods have been tried for the purpose of rendering the colours of this prismatic spectrum more limited and distinct; none, however, has been attended with complete effect. The following seems to be the best method. Let the light of the sun pass through a hole of about one-tenth of an inch in diameter, into a dark room. Place a screen at a little distance from the hole (for instance six or seven inches) within the room, and let the middlemost part of the light pass through a similar hole in the screen; the object of which is to prevent, in great measure, the scattered light or penumbra, on the sides of the spectrum. Let the light then fall perpendicularly upon a convex lens; at the distance of about 10 feet, by which means a defined image of the sun will be formed upon a screen placed at the focal distance of the lens. Now, if a prism be placed close to the lens, so that the light, after having passed through the lens, may pass through, and be refracted by, the prism; then a coloured spectrum will be formed upon the screen. The long sides of this spectrum are very well defined; but its narrow terminations are semicircular, and its whole length consists of circular coloured images of the sun intermixed with each other, especially about the middle or axis of the spectrum; yet the most predominant colours are more distinguishable from each other, especially towards the sides of the spectrum, so that their boundaries may be marked with tolerable accuracy. The glass prism fit for this experiment must be well formed,

COLOUR.

and free from veins, scratches, bubbles, &c. Those principal colours are seven in number, *viz.* red, orange, yellow, green, blue, indigo, and violet. They do not occupy equal spaces in the spectrum; but for the proportion of their breadths, and likewise for a more accurate description of the prismatic experiments on light, see the article REFRACTION.

The above described experiment with the glass prism gave Sir Isaac Newton reason to conclude that the white light of the sun consisted of seven colours, which had different powers of being refracted, so that the red rays were refracted less, the orange a little more, the yellow still more, and so on; hence the image of the sun was converted into an oblong variegated spectrum. In confirmation of this theory Newton instituted a variety of other experiments, which were attended with remarkable results, and the principal of them are as follows:

If the light which has been refracted and dispersed by a prism, be received again upon another prism which must be situated in a direction perpendicular to that of the former; the spectrum will by that means be removed from its original situation into a lateral one; but its breadth and its colours will remain unaltered. Now if the elongation of the beam of white solar light, and its resolution into different colours, were a modification of light produced by the prism only; then the second prism ought to expand the spectrum in breadth, so as to form a quadrilateral figure of equal sides; but instead of that we find that the colours and their breadths remain unaltered.

If the refracted and dispersed beam of solar light, be received upon a concave reflector, the different coloured rays will be reflected to a focus, where they will form a white or colourless image of the sun. But if any of the colours be stopped by the interposition of a wire, or other slender and opaque body between the prism and the reflector, then the image will become coloured with some mixture of colours. This proves that white light consists of coloured rays, intermixed in a certain proportion, and that by a mixture of the rays of the seven primary colours in that due proportion, white light is produced. Therefore, white arises from a certain mixture of colours, and blackness arises from a stoppage or absorption of all colours. This property of light and colours, may be familiarly illustrated by the following experiment: Divide the flat surface of a wheel, or the upper flat surface of a top, such as boys use, by means of lines going from the centre to the circumference, into seven parts, having the same proportion that the breadths of the colours have in the prismatic spectrum, and let those portions be pointed respectively with the seven colours. This done, if you spin the wheel or the top, so as to cause it to turn very fast, in the light of the sun; you will find that the painted surface will look white; for by the quick motion of the wheel, the impressions of the colours in the eye become mixed, and of course they form a white light. Stop the wheel, and the seven colours will appear very distinct.

If, when a spectrum is formed by the light which has passed through a prism upon a screen, a small hole be made through the screen, and the ray of one colour only be permitted to pass through it on the other side of the screen; then whatever is viewed in that homogeneous light, will appear of that particular colour. Thus, if the red light only has passed through the hole, then blood, or grass, or milk, &c. viewed in that light behind the screen, will all appear red; excepting that the blood will appear of a stronger red colour than the grass or the milk. If the blue light only has been transmitted through the hole; then the above-mentioned substances will all appear blue; and the like may

be understood of the other homogeneous colours. This proves that the colours, which seem to proceed from coloured bodies in general, do not belong to those bodies; but they are the component parts of the white light, in which those bodies are viewed, and that certain bodies have the property of absorbing some of those coloured rays of the white light which falls upon them, and of reflecting others. Thus, grass reflects the green rays and absorbs the rest, hence, the green rays coming to our eyes, render the appearance of grass green; thus blood absorbs every other coloured ray excepting the red, and so forth. Black bodies absorb all the seven coloured rays, and white bodies reflect them all.

If two holes, at about a foot distance from each other, be made in the shutter of a dark room, and two prisms be used, *viz.* a prism be placed to receive the light at each hole, two spectrums will thereby be formed upon the screen; and by turning the prisms gently round their axes, the spectrums may be caused to fall one upon the other. Let the yellow of one spectrum fall upon the blue of the other, and at that place the mixture of those two colours will appear green. Let a small hole be made exactly at that place, and that green light will pass through the hole behind the screen, and will form a green circular image upon another screen placed to receive it. Now, if exactly behind the perforation of the first screen, you fix the refracting angle of a prism, then the image upon the second screen will not only be moved from its place, but will appear oblong, with a yellow border at one extremity, and a blue border at the other extremity; for that spot or image of the sun consists of two primitive colours of different refrangibilities. The same thing must be understood of any other colour formed from a mixture of any two primitive prismatic colours; for any two of those colours will form, or rather will look like an intermediate colour; thus, red and yellow form an orange, blue and violet form an indigo, and so forth.

If the experiment be performed with one solar spectrum: *viz.* a single prismatic colour; for instance the green be permitted to pass through a hole in the screen, and be then received upon another screen, the image will be of the same colour as in the preceding experiment, *viz.* green, and circular. Now, by placing a prism behind the perforation of the first screen, the green image will be moved from its place, but it will not be elongated nor altered in colour, because this image consists of one uniform primitive colour. (Newton's Opt. b. i. p. ii. prop. iv.) This remarkable experiment shews, that though a green may be formed from a combination, or any other prismatic colour may be formed from a combination of the two adjacent colours; yet each of those colours in the prismatic spectrum, is a primitive uniform or homogeneous colour.

Notwithstanding the conviction which naturally attends the result of the above mentioned experiments, several persons have supposed that the primitive colours of light are not seven, but three only; namely, red, yellow, and blue; and they have been led to this supposition, by observing that the painters can produce all the other colours, by mixing either all those three colours together, or two of them, in due proportion.

A recent writer of eminence in the philosophical world, (M. C. A. PIERRE) has started another theory. He thinks that the primitive colours, (*viz.* the components of white light) are three in number; but he supposes them to be the red, the green, and the violet; and that the other colours of the spectrum are formed from a mixture of those; that is the yellow from the red and the green, the blue

from

from the green and the violet, &c. See *L'Annale de Chimie*, Sept. 1806.

Hitherto we have treated of the formation of colours by refraction; from which it appears that the white solar light consists of coloured rays; that whenever that light enters a transparent medium in an oblique direction, it is caused to deviate from its rectilinear course; and at the same time its component coloured rays, are separated in consequence of their different refrangibility. The next series of facts, upon which the theory of colours depends, relates to the *inflection* of light, it having been found, that the rays of light are bent in their course, and resolved into their component colours, not only by refraction, but likewise by merely passing by the surfaces of bodies. It seems that the rays of light are attracted by bodies, when they come within a certain distance of their surfaces, and that the coloured rays of white light being attracted more or less, are separated from each other. A great variety of experiments relating to this inflection of light, were originally made by Newton, and have, since his time, been instituted by other able philosophers. But, though several remarkable facts have been discovered; yet the present state of knowledge does not admit of their being reducible to a single principle, or to any general and comprehensive laws.

In order to give our readers some idea of this property of light, we shall now subjoin an experiment related by a recent anonymous writer; referring, then, the reader to the article *Inflection of Light*, for a full account of whatever belongs to it.

"Across a beam," says the above-mentioned author, "of solar light, admitted into a dark chamber, through a small hole in a thin piece of lead, nearly $\frac{1}{8}$ of an inch wide, I interposed a hair of a man's head, and receiving the beam on a screen, or sheet of white paper at a distance, and with an obliquity convenient for the purpose, I noted the following appearances.—At the termination of what may be considered as, and therefore may be called, a shadow, whose intensity or darkness was not considerable; the following orders and distinctions of colours appeared. First, and nearest to the dark or black parts of the shadow, might be seen a diluted blue, changing into a breadth of white light, followed by breadths of yellow and red. To these succeeded an interval of diluted shade, then breadths of diluted violet, blue, diluted green, yellow, red; then green diluted yellow, red; diluted green, red; white, diluted red; and finally white light. These are the more general orders of the colours. Of these orders, the three first were sufficiently obvious and distinct; the last evanesced and requiring accommodation of circumstances to produce, and attention to perceive them." Observations concerning the Inflection of Light, &c. London 1799.

The last set of facts that remains to be mentioned, as relating to colours, consists of the phenomena exhibited by thin transparent bodies, especially by those of variable thickness. Every person must recollect to have seen the bubbles of a solution of soap, or of other thickening substance, exhibit a variety of colours similar to those of the solar spectrum, or of the rainbow. These bubbles are nothing more than thin vesicles of the solution, whose thickness varies continually. But a variety of thin solid substances exhibit the like phenomenon, such as plates of muscovy glass, or of talc; thin plates of glass; metallic and glass plates moistened with a variety of fluids, &c. Newton took two object glasses of telescopes, one of which was a plane convex, and the other a double convex one. He laid the latter on the flat side of the other, and pressed them

point of contact, which increased and decreased both in number and in size, according as the lenses were more or less forcibly pressed against each other. The central spot was black, and circles of colours appeared round this spot, which were brighter near it than farther off. Their order, commencing from the black spot, was blue, white, yellow, red; violet, blue, green, yellow, red; purple, blue, green, yellow, red; green, red; greenish, blue, red; greenish, blue, pale red; greenish, blue, reddish, white. (Newton's Optics, b. ii. p. 1. Observ. iv.) Experiments similar to the above have also been performed with flat glasses, lenses of various curvatures, and other substances, by other philosophers, such as Moraldi, Grimaldi, Delisle, Mairan, Mazoes, Du Tour, Muschenbroeck, &c. See an account of their experiments in "Priestley's Hist. of Vision, Light, and Colours." p. 6. sect. 6. After the above succinct account of the principal experiments that have been instituted, and the various important discoveries that have been made, concerning the nature of light and colours; it is proper to observe, that the subject is not only very far from being exhausted; but that the theory arising from those experiments and discoveries is doubtful in almost all its parts. The number of primitive colours distinct from one another, if such do really exist, is not quite determinate; the attraction between the rays of light and other bodies is an hypothesis not clearly understood; for it is a prevailing opinion with several philosophers, that the rays of light are attracted within a certain distance, and repelled beyond that distance. The reflection of coloured rays from the surfaces of bodies is likewise involved in much uncertainty; it being unknown whether the reflection takes place at the very surface, or at a little distance beyond it by some power inherent in bodies, or, lastly, from some other surface a little within the bodies, which supposition is founded upon the hypothesis that all bodies are transparent, as far as a very small part of their bulk, which hypothesis is founded upon the observation that several dense and opaque bodies, when much attenuated, become, in some measure, transparent; and such is the case with gold leaf, which, when placed against the light, appears of a greenish cast.

Notwithstanding this uncertainty respecting the theory in general, the following particulars seem to be sufficiently established; namely, that by refraction and inflection the white light of the sun is resolved into coloured light. Here it may be naturally asked whether the light of other luminous objects is not resolved, by the like means, into the same colours? The observations made in relation to this particular are not so numerous, nor so exact as might be wished; it appears, however, that some luminous objects emit rays of particular colours more abundantly than of other colours. The abbé Rochon having placed a prism before an achromatic telescope, observed through it the light of the stars; and found that the white light of Sirius was resolved into an oblong spectrum, which consisted almost entirely of three colours, *viz.* red, green, and violet. An indication of yellow was barely discernible between the two first, and a slight degradation between the two last. Through Dr. Herschel's powerful telescopes most of the fixed stars seem tinged with peculiar colours, *viz.* some evidently incline to a green, others to a red, and so forth. The light yielded by particular combustibles is also tinged with peculiar colours, and the flame of spirit of wine is a strong instance of this nature; for if common salt be mixed with the spirit, the light of its flame seems to be entirely destitute of red, yellow, and violet, and it is owing to this peculiarity that children frequently play with it in order to give a ghastly appearance to the luminous

company. When baryt (ponderous earth) is mixed with spirit of wine, its flame is yellow; boracic acid renders it green, and strontian earth gives it a purple colour.

The phenomena of coloured bodies, as they occur to us, in general, may be distinguished into five classes, *viz.* 1st. The colours that arise from evident refraction, such as the colours of the rainbow, of the bubbles of a solution of soap, &c. 2^{ly}. Those of opaque bodies that are fixed. 3^{dly}. The colours of transparent bodies formed by the light passing through them. 4^{thly}. The colours that are changeable, according to the situation of the eye, like the colours of certain fisks, feathers, flowers, thin laminae, &c.; and 5^{thly}. Those which are changeable in consequence of a chemical alteration of the nature of the body. We shall now add a few observations respecting each of those five classes.

1. That in passing through a transparent medium, like the drops of rains, the thin pellicle of a bubble of soap, a thin lamina of talc, &c. the light should be decomposed or rather resolved into colours, is easily understood, after the above-mentioned properties of the prismatic spectrum; but the only circumstance which may require explanation is, that we perceive the colours, &c. not when the refracting body is between us and the luminous object, but when both our eyes and the luminous object are on the same side. With respect to this, it must be observed, that a transparent body, like a plate of glass, a drop of water, &c. reflects with both its surfaces at the same time that it lets part of the light pass quite through its substance. Direct your eyes to the surface of a common glass plate so as to see the reflection of an object, as in a looking glass, and if you observe attentively you will perceive two reflected images close to each other, *viz.* one from the anterior, and the other from the posterior, surface. In most looking glasses, if you place a lighted candle on one side, and view the reflected image of it from the other side, you will generally see a succession of images of the candle fainter and fainter, in proportion as they recede from the principal image. The reason of this appearance is, that since both surfaces reflect, the image formed by the reflection of the posterior surface is partly transmitted to the eye of the spectator, and partly reflected from the anterior surface to the posterior one, the latter of which is again reflected, and so on. Now, in the case of the drops of rain, when they form the rainbow, the light of the sun falling obliquely on the surface of the drop is refracted and resolved into colours, in which state it proceeds through the drop to its farther surface, from which it is partly reflected to the eyes of the spectator. The same explanation is evidently applicable to the colours of the bubbles of soap, thin transparent laminae, and the like. See RAINBOW.

2. The fixed colours of opaque bodies are in all probability owing to their absorbing some of the coloured parts of white light and reflecting others; their immense variety arising from a mixture of the reflected primitive colours in various number and proportion; but it is impossible to say at present whether that reflection is effected at the very surface, or at some distance from it, either within or without the body; also to what cause the disposition of reflecting certain colours in preference to others may depend upon. Mr. Delaval's experiments seem to indicate that the colour of opaque bodies arises from the light that has passed through a thin layer of transparent coloured particles, and is then reflected by the smooth surface immediately under them.

3. The greatest number of accurate experiments, concerning the colours of transparent bodies, was made by

Edward H. Delaval, esq. F.R.S. (See his Paper in the Memoirs of the Lit. and Philos. Society of Manchester, vol. ii.) His experiments were performed with an immense variety of liquors differently tinged by metallic solutions, decoctions, and infusions of flowers, resins, gums, woods, mineral and animal matters. Those liquors he placed in phials of first glass, of a parallelleiped form, with an oblong cylindrical neck. "I covered," he says, "the bottom, and three of the sides of each of these phials, with a black varnish; the cylindrical neck and the anterior side, except at its edges, were left uncovered."

In order to examine what colour those liquors would exhibit, either by transmitted or by reflected light, he viewed them through the neck of the phials, or looked into the phial through the side which had been left uncovered by the varnish. But with respect to this latter case, he says, "the uncovered side of the phial should not be placed opposite to the window, through which the light is admitted; because in that situation the light would be reflected from the farther side of the phial, and would be transmitted through the coloured liquor; and it is observable that smooth black surfaces reflect light very powerfully. Now, as it is a principal object in the experiment that no light be transmitted through the liquors, this will be accomplished by placing the uncovered side of the phial in such a direction that it may form a right angle with the window."

All the coloured liquors, which Mr. Delaval tried in the above-mentioned manner, appeared tinged with their peculiar colours, when viewed through the necks of the phials; but when he looked on that part of the liquor which filled the body of the phials, he perceived no colour whatever, the whole appearing black; which proves an important fact, namely, that transparent coloured liquors do not yield any colour by reflection, but by transmission only. "If these liquors," he observes, "are spread thin on any white ground, they appear of the same colours which they had exhibited when viewed in the necks of the phials; as the light reflected from the white ground is, in this case, transmitted through the coloured medium. But when they are spread upon a black ground they afford no colour. The black ground, however, should not be a polished body; as the light reflected thereby would be transmitted through the thin medium on its surface, and be tinged by passing through it."

Next to the above, Mr. Delaval relates various other experiments which he made with transparent solids, *viz.* with coloured glasses, which he made on purpose, by tinging the substance of the glass with metallic and other matters, in imitation of real gems. These coloured glasses exhibited phenomena similar to the coloured fluids. "Having," this author says, "formed pieces of such glasses, about two inches thick, I inclosed all their sides with black cloth, except at their farther and anterior surface. Each of these pieces of glass vividly exhibited its colour, when viewed by transmitted light; but when the transmitted light was intercepted, by covering the farther surface, the anterior surface afforded no colour, but appeared black. When plates of transparent coloured glass, somewhat thicker than window glass, are viewed by transmitted light, it is well known that they exhibit their several colours. I intercepted the light, which was transmitted through such coloured plates, by fixing a piece of black cloth contiguous to their farther surface. The plates, thus prepared, when placed in such a direction that they form a right angle with the window, appear perfectly black; which shews that the coloured particles do not reflect any light."

It is hardly necessary to observe that wherever light is transmitted through any coloured transparent body, a greater part of it is lost, than when that body is quite colourless; for by transmitting one sort of coloured rays more copiously, it stops a great part of the oppositely coloured rays.

Besides these transparent coloured bodies which have been just noticed, there is a vast gradation of others between them and those that are perfectly opaque. These, which are called semipellucid, or semitransparent, exhibit a vast variety of phenomena arising from the various proportion of the opaque and the transparent particles which enter in their composition. Thus some appear of the same colour, whether viewed by transmitted, or by reflected light, others exhibit one colour by transmitted and another by reflected light; others again appear of various colours, according to their thickness, &c. See Newton's Opt. l. i. p. ii. prop. x.

4. The last paragraph may, in some measure, tend to illustrate the nature of those coloured silks, feathers, &c. which change their colour according to the angle in which they are viewed, and in which the light falls upon them; other circumstances, however, are concerned in the phenomena of those bodies. Thus the surfaces of some of them are very irregular, in consequence of which they reflect with some of their particles, whilst they absorb most of the light with other particles; hence, when by a lateral view, the former or the latter are placed out of the direction of the eye, the colour of the whole appears different from what it does in another point of view. Certain bodies of this sort may likewise be transparent to a certain small depth, in which case they become visible partly by reflected and partly by refracted (consequently decomposed white) light; hence the eye of the spectator must, according to its situation, see some coloured rays in preference to others. The phenomena of those changeable bodies, meaning with respect to colour according to situation, are far from being clearly understood; it is most probable, however, that in them all, the three principal properties of light are concerned, namely, its reflection, refraction, and inflection.

5. In the practice of various arts, wherein colours are concerned, such as in dyeing, enamelling, painting in oil or water colours, &c. a change in colour of most of the materials is commonly observed, which is evidently produced by the action of the air, the fire, the oil, or other agent to which the colouring materials are exposed, and by which they undergo different degrees of chemical alteration in their nature. This observation, and a desire of investigating the nature of those changes, with a view of improving the practical arts dependent upon them, induced several persons to try a variety of experiments, and Mr. Delaval, the same above-mentioned gentleman, who investigated other branches of the present subject, became one of the greatest labourers in this field of inquiry. Were we acquainted with the nature of those particles in bodies which reflect or refract the coloured rays, and had we a sufficient knowledge of the alterations produced on those particles by the action of different agents or menstra, be they oils, acids, air, alkalis, &c. a just idea might perhaps be formed of the changes in colour, which must arise from certain combinations; but as the present state of knowledge does not admit the formation of such a theory, the whole must rest upon conjecture, and the practical part must depend upon the result of particular experiments.

Sir Isaac Newton thought, that bodies reflect and refract light, by the same power in different circumstances.

Also, that the forces of bodies to reflect and refract light, are very nearly proportional to the densities of the same bodies, excepting that unctuous and sulphureous bodies refract more than others of the same density. In support of this assertion he relates several experiments, the result of which he expresses in a table, wherein the proportion of the sines which measure the refractions of the several bodies, the densities of the bodies estimated by their specific gravity; and their refractive powers in respect of their densities are stated in separate columns. Mr. Delaval conceived that the denser substances ought, by their greater refractive powers, in like circumstances, to reflect the less refrangible rays; and that substances of less density, should reflect rays proportionably more refrangible, and thereby appear of several colours in the order of their density. Agreeably to this supposition he gives instances of natural bodies, which differ from each other in density, though circumstanced alike in other respects, excepting in their colour, which colour follows the order of their density; the densest being red, the next in density orange, the next to that yellow, then green, &c. In support of this hypothesis Mr. Delaval made several experiments with glass tinged by metallic particles, in which the colour of the glass, in a great measure, corresponded to the density, or to the specific gravity, of the metal concerned. But this series of experiments is not extended to that degree, nor is it conducted with that caution, which a confirmation of the hypothesis demanded. Mr. Delaval also instituted similar experiments with coloured liquors, in which he endeavoured to shew, that by an incrustation or an attenuation of their particles, their colours may be changed in one order or in the reverse. His mode of attenuating those liquors was accomplished, as he supposed, by the addition of acids, and that of incrustating, by the addition of alkalis. But however specious this hypothesis may at first sight appear, a strict examination of facts will easily shew the fallacy of it in almost all its parts, and several writers have pointed out some of its defects, but none better than Dr. Bancroft, F.R.S. in his "Experimental Researches, concerning the Philosophy of permanent Colours," vol. i. chap. i. In this excellent work, Dr. B. shews that Mr. Delaval has not noticed the change of nature, as well as of specific gravity, which the metals undergo by their being exposed to different degrees of heat, together with the glass. He also observes, that if, according to Mr. Delaval's hypothesis, the densest bodies are of a red colour, or approximating to it, platina, the heaviest of all known metals, ought to be red; whereas it is white, like tin, and the lightest metals. Also gold, the heaviest metal next to platina, is much farther removed from the red colour than copper, which is much lighter. With respect to Mr. Delaval's experiments on coloured liquors, Dr. Bancroft says, "instead of choosing and employing mechanical means, which alone are suited to produce those effects, and only those effects, he has recourse to mere chemical agents, whose actions in the ways which he supposes must have been almost doubtful, though their powers of producing other, and very different effects from what he supposes, is most certain. Mr. Delaval, however, adopting Sir Isaac Newton's supposition, that acids always attenuate, and alkalis always incrustate, prepared what he considered as a dissolving or attenuating liquor; which consisted of water with about $\frac{1}{10}$ part of aquafortis: and when he wanted to lessen the dissolving force of this liquor, instead of weakening it by the addition of water (which would certainly have been the most obvious and unexceptionable expedient), he chose to do it, as he says, by adding a small quantity of a solution of pot-

ash, or some other alkaline liquor, and thereby produced a new composition, the effects of which mult, in many cases, prove different from those of a mere diminution of the supposed dissolving power of the former liquor. And on the other hand, when he wanted to increase the force of his acid liquor, instead of doing it by a farther addition of aquafortis (obviously the most proper expedient), he recurs to an addition of oil of vitriol, an acid possessing very different properties, and producing very different effects, on a great variety of substances, and particularly on colouring matters; of which we could easily allege hundreds of instances, but shall content ourselves with only mentioning what is well known, that even the strongest and most concentrated oil of vitriol (used to dissolve indigo for dyeing the Saxon blue, &c.) does not destroy, or even weaken, its blue colour, though a very weak nitrous acid, or aquafortis, will wholly destroy it, and convert the indigo to a dirty brown mass, of no use whatever." For farther observations of Dr. Bancroft on Mr. Delaval's Theory of Colours, we refer our readers to his above-mentioned work. But with respect to the practical part of the subject, viz. the art of colouring glass, porcelain, &c. or the methods of forming pigments, they are requested to consult the articles, PAINTING, ENAMELLING, DYEING, STAINING, CRAYONS, and PIGMENTS.

COLOUR of the clouds, is thus accounted for by Sir Isaac Newton. Concluding from a series of experiments, that the transparent parts of bodies, according to their several sizes, reflect rays of one colour, and transmit those of another, he hence observes, that when vapours are first raised, they are divided into parts, too small to cause any reflection at their surfaces, and therefore do not hinder the transparency of the air; but when they begin to coalesce, in order to form drops of rain, and constitute globules of all intermediate sizes, these globules are capable of reflecting some colours, and transmitting others, and thus form clouds of various colours, according to their sizes. Mr. Melville controverts this doctrine, in its application to the red colour of the morning and evening clouds. "Why," he says, "should the particles of the clouds become at that particular time, and never at any other, of such a magnitude as to separate these colours? And why are they rarely, if ever, seen tinged with blue and green, as well as red, orange, or yellow? Is it not more credible, that the separation of rays is made in passing through the horizontal atmosphere, and that the clouds only reflect and transmit the sun's light, as any half-transparent colourless body would do? For since the atmosphere reflects a greater quantity of blue and violet rays than of the rest, the sun's light transmitted through it ought to incline towards yellow, orange, or red; especially when it passes through a long tract of air: and thus it is found, that the sun's horizontal light is tinged with a deep orange, and even red; and the colour becomes still deeper after sun set." Hence he concludes, that the clouds, according to their different altitudes, may assume all the variety of colours at sun-rising and setting, by barely reflecting the sun's incident light as they receive it. Edinb. Ess. vol. ii. p. 75. Priestley's Hist. of Vision, p. 446, &c.

For the distinct properties, &c. of the several colours, see BLACK, WHITE, BLUE, &c. See also RAINBOW, &c.

COLOUR, and COLOUR Making, in Calico-Printing. The preparation of colours for calico-printing, constitutes one great branch of that beautiful art, and involves in it a series of interesting and important processes. As an art, its operations are more dependent than almost any other, on those minute differences and changes in the constitution of bodies, which it is the business of chemistry to investigate. Hence

that liability to error and uncertainty which, in the hands of the ignorant, pervades many of its processes, though conducted according to long established and approved formulae. Our present volume would scarce suffice for the various receipts in which the art abounds; yet, in the following article, we shall endeavour to lay down general principles, rather than more practical directions; convinced, that by presenting our readers with a clear and concise theory, deduced from such practical illustrations, as may be necessary for this purpose, we shall render them a more acceptable service.

The term *cola*, in calico printing, is applied not only to those vegetable, animal, and mineral solutions, which impart their own colour to the cloth on which they are applied, but also improperly to those earthy or metallic solutions, which, possessing little or no tingent properties themselves, yet retain or fix the colours of other substances, when afterwards applied to the cloth. Thus the acetite of alumine, or printers' red liquor, when pure, is almost colourless, and only becomes red by the process of dyeing, as will be explained hereafter. The acetite of iron, or iron liquor, in like manner, when used of a determinate strength, is called *black colour*, and when weaker *purple colour*, though the cloth impregnated with these solutions becomes black or purple, only as being raised, like the other, in the dye-copper.

1. The colours produced by means of these earthy or metallic solutions (which, in the language of science, are called *mordants*), form the most valuable and important series, whether considered with regard to the almost infinite variety of shades, or to their solidity and durability. These colours, from the mode in which they are produced, (the mordant being first applied to the cloth, and the colour afterwards raised by dyeing), are called *dye colours*.

2. Sometimes the mordant is previously mixed with a solution of colouring matter, and in that state applied to the cloth, so as to paint or stain it, at one operation, and without the process of dyeing. Thus, another class of colours is produced, many of them possessing great brilliancy indeed, but much inferior to the former in durability. The colours called chemical, by calico printers, belong chiefly to this class.

3. In the third and last class, we may place all those where the colouring matter is simply held in solution by an acid or alkali, and in this state applied to the cloth, without the intervention of any mordant. To one or other of the foregoing classes, may be referred all the colours used in calico printing; with the exception, however, of those systems of colours which have been produced by calico printers in this country, within a short period, by processes, and upon principles which have hitherto not been made known.

Class I.

The colours of this, as has been already observed, are produced, by first impregnating the cloth with an earthy or metallic solution, or mordant, and raising the colour afterwards by dyeing. In this article we shall confine ourselves to the preparation of the different mordants, and the enumeration of colours they afford, with different colouring substances. The operations of the dye-house, and the mode of raising the colours in the dye-copper, will be detailed hereafter.

The two great and most important mordants used in calico printing, are those that we have a ready noticed, viz. the solution of iron in acetic acid or vinegar, called iron liquor, and the acetic solution of alumine, or the earth of alum, called red liquor, or red colour, and sometimes yellow liquor.

With these two solutions, either separately applied, and

of various strengths, or mixed together, and in various proportions, an infinite variety of shades of colour are produced. Almost all the hues in nature may be obtained by raising them, and their various combinations with different colouring substances. From madder, with the acetite of alumine, or red liquor, we obtain various shades of red, from the darkest blood colour to a pink. From weld and quercitron bark, yellows, varying in intensity from a deep orange to a pale straw colour, according to the strength of the mordant employed. From logwood, various shades of violet; from cochineal, Brazil, and Hicaragua wood, pink and crimsons of different hues; and, in short, from almost every different colouring substance, a different shade of colour. With the acetate of iron, or iron liquor, of different strengths, we obtain from madder all the intermediate hues between black and pale purple, or lilac. From weld and bark, olives, browns, and drabs, of various hues; from sumac, logwood, galls, and other astringent substances, all the varieties of grey, from the palest shades to the deepest, in which all the minute differences of hue are lost till they approach to black. These various shades are further modified by applying two or more colouring substances to the same mordant, as madder and weld, for example, to the acetite of alumine, which produces orange, light cinnamon, nankeen, &c.; and again still further, by mixing the mordants themselves in various proportions, and raising them with either one or more of the different colouring matters. By these means shades, and varieties of colour, may be produced from a few substances only, which baffle description, and for which language has no precise or definite terms.

The acetite of iron, or iron liquor, is variously prepared. In this country it is chiefly made with the pyrologneous acid, which Fourcroy has proved to be identical with the aceticus. Malt acid is preferred by many on account of its being free from volatile oil and resinous matter, with which the other abounds; but the great difference in price, and the facility with which it is obtained, has brought the acid of wood almost into general use. A series of casks filled with scraps and turnings of iron upon which the acid is poured, is almost the only apparatus necessary for making iron-liquor; yet when the consumption is great, or when it is prepared for sale, vats capable of holding several hundred gallons are substituted for casks, and the acid is kept in a state of circulation through the iron by means of pumps. The saturation is much accelerated by this motion, which prevents any deposition on the surface of the iron which might defend it from the action of the acid, and also brings fresh portions of unsaturated acid more frequently in contact with the metal. In a few weeks, sooner or later in proportion to the strength of the acid, the saturation is completed, and the liquor is then removed from the vat into casks for use, and fresh acid poured upon the iron as before. This is an easy and simple mode of making iron liquor, and as it requires but little trouble and attention, is the one most generally in use. The precautions necessary to be observed are, that the acid, if it be the pyrologneous, should not be used too soon after its preparation. It holds much essential oil and resin in solution, part of which separates on being kept a few weeks, and the clear acid may then be drawn off. It may be still further freed from resin by boiling; a portion of essential oil is thus thrown off, and the resin, if held suspended, is precipitated after standing some time. We shall have occasion to recur to this subject again, when we come to treat of the pyrologneous acid, and its formation, under the article *Dissillation of Wood*. It is necessary also, that the iron should be perfectly clean and all of it malleable. Cast iron is not soluble in aceticus acid. Hoop iron

cut into lengths of from eight to ten inches is preferable to any other. It is readily cleaned and more easily taken out of the vat, and returned into it again than misshapen masses fold under the name of old iron. When malt acid is employed, simple heating and washing is sufficient to free it from any foulness it may have contracted in the vat; but when the pyrologneous acid has been used, it becomes so coated with resin on its upper surface after a second or third solution, as to prolong the period of saturation to twice or thrice its usual length. In this state it must be removed from the vat and heated to redness in oven, through which there is a current of air. The resin is consumed, and the iron by heating is freed from any remains of carbonaceous matter that may adhere to it, and is again ready for the vat.

The only objection to this mode of making iron liquor is the time required to saturate the acid, which to those, whose consumption is very great, or who manufacture it for sale, is oftentimes of importance. Different processes have therefore been devised to remedy this inconvenience, in many of which the saturation is accelerated by means of heat which is applied in various ways, as best suits the convenience of the manufacturer; but the most expeditious mode is that of presenting the iron to the acid in a state of oxydation, by which means the solution is effected immediately. Calico printers have long been in the habit of using an extemporaneous acetite of iron, formed by mixing together solutions of acetite of lead and sulphate of iron. A very pure acetite of iron may be obtained by this means, but the price of acetite of lead renders this mode too expensive for general use. By forming a solution of lead, however, in pyrologneous acid and decomposing it with sulphate of iron or copperas, an iron liquor may be obtained sufficiently cheap to render this process advantageous in many cases, though still more expensive than the ordinary mode. A patent was lately taken out for making iron liquor by a process somewhat similar to this, which, however, we understand has not answered the expectation formed of it. A solution of lead in pyrologneous acid is digested on clear metallic iron. The iron becomes oxydated at the expense of the lead and is dissolved, whilst the lead is precipitated in the metallic state, and may again be used for a fresh solution. All these modes are evidently more expensive than the ordinary one of simple solution of metallic iron in pyrologneous acid, and the only consideration with the manufacturer is, whether this extra expense is counterbalanced by the economy of time or not.

The process adopted some years ago by Mr. Thomson, is perhaps the most expeditious, and next to the common mode, the most economical of any yet in use. It consists in saturating the pyrologneous acid with quicklime, and pouring the clear boiling solution on as much sulphate of iron or copperas as will precipitate the whole of the lime. A cask of iron liquor may be made by this mode in a few hours, and when care has been taken rightly to proportion the ingredients so as to produce complete decomposition, it is inferior to no solution whatever in any of its properties.

The properties of the aceticus solution of iron fit it eminently above all others for the purpose of the calico printer, and having detailed its preparation we shall endeavour to point out in what this superiority consists.

The acetite of iron exists in two states, dependent on the quantity of oxygen combined with the iron. When pure, and recently prepared, it is of a pale greenish hue, but by exposure to air soon becomes tinged with brown. In this state the iron is at its lowest point of oxydation, strongly attractive of oxygen, and if precipitated by an alkali, of a deep green colour. By exposure to the atmosphere, and conse-

quent absorption of air, the solution passes to a deep red brown, and, if concentrated, deposits orange oxyd of iron, and becomes strongly acidulous. With this excess of acid, the solution now becomes permanent; the iron is almost wholly at the maximum of oxydation; and, when precipitated, of a dark red colour.

The same takes place only in a less degree, and more slowly with the sulphuric and muriatic solutions of iron. Of a pale greenish hue in their recent state, they gradually attract oxygen from the atmosphere, and become slightly red, deposit red oxyd of iron and pass to a state of acidity, at which the solution becomes permanent, and the oxydation of the iron proceeds no further.

If the solutions, properly thickened with gum or flour, are applied to cloth, the same change takes place, but with more rapidity, from their diffusion over a thin surface, and more complete exposure to the air. The aqueous and volatile part of the solution speedily evaporates, and as the oxydation goes on, the oxyd of iron is deposited on the cloth, and a portion of acid set free. When this acid is volatile, as is the case with the acetous, and also in a great degree with the muriatic, it is dissipated. The oxydation of the iron then goes on, fresh portions of acid are again liberated and drawn off till the whole of the solution is decomposed, and the oxyd of iron deposited in the cloth. When the acid is not volatile, however, as is the case with the sulphuric, the slight portions of acid that are liberated not being drawn off, the oxydation proceeds more slowly till the excess of acid becomes so great as wholly to interrupt it, and great part of the iron in the operation of rinsing is again carried off the cloth. Another and more serious inconvenience attending the use of the sulphuric solution is its action on the cloth itself. The disengaged acid being in a state of great concentration acts upon its fibres, weakens, and at last destroys them. The same takes place with the muriatic solution also, for though the excess of acid is slowly dissipated, yet it has sufficient time and concentration to act very powerfully, and is, if possible, still more destructive than the sulphuric, since its action is not confined to the part on which it is applied, but from its volatility extends over the whole surface of the cloth.

It is necessary, therefore, that the acid should be not only volatile, but harmless in its action on the vegetable fibre, which conditions are more completely fulfilled by the acetous than by any other solution whatever. From the preceding observations on the properties of the acetite of iron, and the changes it undergoes on the surface of the cloth, may readily be deduced the reasons for that exposure to heat and air which calico printers have, from long experience, found necessary to goods printed with this solution. By exposure to air the iron becomes oxygenated and deposited on the cloth, whilst the heat favours the liberation of the acid, and accelerates the process. From what has gone before it may also be inferred, that the acetite of iron should be used in its recent or green state, since in that state the acetous acid is capable of holding a greater quantity of oxyd of iron in solution, and that consequently after its saturation and removal from the iron, it should not be too much exposed or agitated in contact with the air. On this account, also, it is wrong to pump the liquor in the vats too much when it approaches the point of saturation, since the oxygenated iron is almost all precipitated, and fresh portions immediately dissolved, so that the liquor might in time be rendered quite thick with precipitated oxyd of iron.

The preceding ideas are at variance with the general opinion respecting the state in which the acetite of iron should be employed. All the speculative writers, and even

many well acquainted with the processes of calico printing, recommend the oxygenation of the solution by exposure to air and removal from the iron, as essential to the goodness of the iron liquor. Even Berthollet, in the last edition of his "Elements of the Art of Dyeing," has fallen into the same mistake, the source of which, and the facts which seem to countenance it, we shall point out in a future article.

It is an object of importance to the calico printer to know the precise strength of his iron liquor, and to be able to ascertain this at all times, with little trouble or chance of error. Great mischief and inconvenience often arises from uncertainty in this respect, especially in the pale shades of purple, which are obtained from madder, with diluted acetite of iron. The hydrometer has been objected to, as indicating not merely the quantity of iron in a solution, but also the essential oil, resin, and mucilage which these impure solutions often contain. This objection, however, only applies where the same instrument and graduation is employed to ascertain the relative strengths of iron liquors, prepared with different acids, as the pyroigneous which contains much essential oil and resin, and malt acid which abounds in mucilage. In this case the hydrometer may indicate great differences in solutions containing equal quantities of acid and iron, but varying in the quantities of mucilage, oil, or resin. Iron liquor, however, prepared constantly by the same process, and from the same acid, varies so little in the relative proportion of its ingredients, that the hydrometer may be used to ascertain its strength in preference to any other mode whatever; provided the necessary precautions are used to correct any error arising from variation of temperature.

In a work of this kind, not illustrated by actual specimens, and without reference to some particular kind of iron liquor, it is impossible to point out the specific gravities of the different solutions required for producing the various shades, we have enumerated. An acetite of iron, of specific gravity 1.047, with madder or logwood, will produce a black, and with weld or sumac an olive, and diluted with six, eight, or ten times its bulk of water, various shades of purple, drabs, or olives, according to the colouring matter employed. A standard solution of iron once obtained, the necessary strength for producing the different varieties of colour is easily ascertained by actual experiment, and to this we must refer our readers.

When thickened with flour or gum, and tinged with a decoction of logwood or Brazil, the better to enable the workman to observe the progress and state of his work, it forms, as we have before observed, the printers black colour, a purple colour, &c. according to the strength of the solution and the purpose it is intended for. Various ingredients were formerly added to iron liquor, to improve its quality, or vary the hue of colour it produced. Verdigris and coppers were added to the solution intended for black; and sal ammoniac or nitre to the diluted solutions for purple. These are, however, now almost universally laid aside, as being for the most part useless, and often hurtful: the simple acetite of iron being found to answer every purpose of the more complicated and heterogeneous solutions.

The acetite of alumine, or red liquor, is always prepared by the decomposition of alum, by an earthy or metallic salt, since the aluminous earth is not soluble in acetous acid, except in its newly precipitated and minutely divided state. The purest solution, and that which is generally used for the finest and most delicate colours, is produced by decomposing alum with Dutch sugar of lead, generally in the proportion of two parts by weight of the former, to one of the latter. The proportion of the two salts, and also the quantities of each gallon, as used by different calico printers, vary yet

with little difference in effect. The alum in general predominates so far as completely to saturate the liquor. The printers' aluminous mordant therefore is a compound solution. It is an aceto-sulphate of alumine, consisting of a saturated solution of common alum, and more or less acetite of alumine, according to the quantity of sugar of lead employed. In the neighbourhood of London, the proportions are 6lb. of alum, and 3lb. of sugar of lead to a gallon of water: when these are completely dissolved, one ounce of Spanish white is added, and the whole briskly stirred till the effervescence has in great measure subsided. In a few hours the solution becomes clear, and forms a standard liquor from which, by greater or less dilution, may be obtained all the various shades of red, yellow, &c. already enumerated. In the above formula the proportion of alum is somewhat too great, a part of it remains undissolved, or immediately recrystallizes, and falls to the bottom along with the precipitated lead. This excess of alum is however strongly insisted on by many calico printers, as essential to the purity of the mordant, from an idea that the *purcell* part of the alum only is taken up in the solution. This fact however may be readily disproved by employing this undissolved or recrystallized alum in the formation of fresh solutions, whose purity will be found in no respect inferior to the former. The purity of the alum and sugar of lead, and especially their being free from iron, is of great importance in the preparation of this mordant, and on this account the Dutch sugar of lead is preferred; but its high price renders it too expensive except for the pale reds of light chintz, and other kinds of work, whose great delicacy in the red tints is required. A substitute for it has been found in the solution of litharge in vinegar, or pyroigneous acid, which is afterwards decomposed by the addition of alum, and the excess of acid neutralized by Spanish white as in the former case. Great part of the acetite of alumine manufactured and sold under the name of red liquor is prepared in this manner. It is in general used for yellows, dark shades of red, and for those compound mordants into which the acetite of iron enters, and when its purity is of course of little consequence. The acetite of lime has long been substituted with great advantage by the writer of this article for the solution of lead, and its use is becoming daily more known and extended. When carefully prepared, it is scarce inferior to the best sugar of lead, and the impure solutions answer equally with the best, for the compound mordants before mentioned. The theory of these processes is the same in all. The object being to obtain a solution of alumine or earth of alum in acetic acid. On mixing acetite of lead, and sulphate of alumine together, a change of base takes place; the sulphuric acid unites with the lead, and falls down in the form of a white heavy precipitate, whilst the earth of alum combines with the acetic acid, and remains in solution. The same takes place with the solution of litharge in pyroigneous acid, which is indeed an impure acetite of lead, and when the acetite of lime is employed instead of lead, the sulphuric acid and lime unite and form an insoluble powder, which subsides, though less quickly than the other, whilst the acetite of alumine remains in solution above; the addition of the Spanish white is necessary to saturate a small excess of acid which exists in the solution. This excess is taken up by the lime, and immediately converted into acetite of alumine, by the decomposition of a fresh portion of alum.

The acetite of alumine when pure, is almost colourless. It has a slight acetic smell, and when boiling throws off acetic acid in great abundance, and deposits a portion of alumine. When evaporated it acquires a thick gummy con-

sistence, but does not crystallize a property which gives it a decided advantage over common alum as a mordant. It unites readily with gum, but when concentrated and holding much alum in solution, forms with flour a watery pulpy kind of paste, which has little adhesion, and from which the fluid soon separates. The sulphuric salts have indeed all a disposition to injure the thickening quality of flour.

The affinity of cotton for the earth of alum, is so strong as to separate it from its combinations even with the mineral acids. When a solution of common alum properly thickened is applied to cloth, a portion of alumine unites with it, and the acid, which held it in solution, is set free. When this is accumulated to a certain degree, it prevents any further decomposition, and in rinsing carries off the greater part of the earth again. When the acid however is volatile, like the acetous, and is dissipated as soon as disengaged, there being no longer any obstacle, the decomposition goes on till the whole of the acid is driven off, and the alumine combined with the cloth. In the infancy of calico printing, and before the theory and constitution of the different mordants was properly understood, a variety of substances were added to the solution, some of which are retained to this day. Verdigrise in the proportion of two ounces to a gallon, is recommended by many as tending to exalt the hue of yellows, and may in some cases be useful. Corrosive sublimate has been but lately laid aside, and the nitro-muriate of tin was long thought to give fixity and brilliancy to reds, when used in a small proportion with the aluminous mordant. In general, however, the aceto-sulphate of alumine is found adequate to every purpose of the calico printer; we shall not, therefore, perpetuate error by detailing any of those unmeaning mixtures which are still retained by the ignorant and prejudiced. These two mordants, the acetites of iron and alumine, and their various combinations, are those only in general use in calico-printing, for producing colour of the first class. This application is so extensive, and at the same time so simple, as to supersede the necessity of any other. The solutions of copper are sometimes used as mordants, but they afford colours of little solidity. The solutions of tin have also been employed, but we shall speak of these and other earthy and metallic solutions which have been used with partial success, when we come to treat of mordants in general.

Class II.

In this class the colours are produced by combining a solution of colouring matter with some earthy or metallic salt, capable of giving it fixity when applied to the cloth. The mordant and colouring matter are here applied at once, and the cloth is painted, as it were, or stained, with the colour it is intended to retain, and requires, in general, no farther operation than that of rinsing, to free it from the paste or gum with which it was thickened.

The colour of this class possesses, as we have before observed, in general great brilliancy, but wants that solidity and fixity which characterize the colours of the former class. The union of the mordant with the cloth is weakened by its previous combination with the colouring matter, and not being favoured by heat, as in the former case; the triple combination of vegetable fibre, mordant, and colouring matter, wants that solidity which is so necessary to constitute what is called a fast colour.

Many of these, however, are sufficiently durable to be partially introduced, and intermixed with other colours of greater durability, and some are indispensably necessary, as no better mode has yet been devised of producing them. When the

chemist's art shall have discovered means of giving fixity to colours thus typically applied, the art of calico printing will have arrived at perfection. Systems of colours may then be combined, which are at present incompatible, and the tedious operation of dyeing and bleaching, with their attendant difficulties, be banished from the art. Nor is the hope so chimerical as might at first be imagined; several of the most useful and permanent colours are of this description, as will be shewn hereafter.

We shall content ourselves with describing the leading and most useful colours of this class, giving, at the same time, the theory of their constitution. The mere enumeration of all the varieties that have or may be formed, would be endless, and foreign to our purpose.

Chemical Black.

This is the most useful colour of the class, and one of indispensable necessity in certain combinations of colours, where, for instance, it is mixed with drab, olive, and yellow, raised in the dye-copper with weld-quercitron bark, or any similar colouring matter, and where the presence of any substance, such as logwood or madder, capable of producing a full black, would be ruinous to the other colours. A deep olive, approaching to black, might, indeed, be produced, by employing a strong iron liquor, as mordant, and using sumac in the dye-copper; yet as this would bear no comparison in point of intensity with the madder or logwood black, and as the force of the colouring in such course of work greatly depends on contrast, the topical or chemical black, which has all the intensity required, is almost constantly employed. The constitution of this black is pretty nearly the same in all the different formulæ in use. It consists always of a solution of iron combined with a solution of colouring matter generally of an astringent nature. On the right proportion of these two solutions, and on their due specific gravity or strength depends, in a great measure, the goodness of the black.

1. If to a decoction of Aleppo galls, in five times their weight of water, made into a paste with flour, a solution of iron in nitrous acid of specific gravity 1.25 be added, in the proportion of one measure of nitrate of iron to eighteen or twenty of the former, a black will be formed fit for almost all the purposes of calico printing, and possessing the chief requisites of this colour, namely, tolerable fixity, and a disposition to work well with the black.

2. In lieu of nitrate of iron, some calico printers employ copperas, in the proportion of one pound to a gallon of the decoction of galls. Half the copperas is directed to be dissolved in the gall-liquor before it is thickened with flour; the remaining half, dissolved by heat in as much aquafortis as will cover it, is added afterwards. This black has tolerable fixity, but does not work so well as the preceding.

3. Copperas dissolved in various proportions of from four to twelve ounces per gallon, will form, with decoction of galls or logwood, blacks of less solidity indeed than the former, yet applicable, nevertheless, in many cases where the others are not.

The constitution of the two last-mentioned blacks differs somewhat from the first. We shall point out this difference, and explain, as concisely as possible, the rationale of the foregoing processes.

When a solution of iron in nitrous acid is added to a decoction of galls, as in the first example, the solution is decomposed, the iron unites with the gallic acid and tanning principle, whilst the nitrous acid is disengaged. This is proved by the blackness which the solutions assume immediately on

being mixed. The disengaged acid, however, shortly re-acts on the new compound, the blackness gradually disappears, and in a few days, if the nitrate of iron has been added in proper quantity, the paste, instead of black, is of a dirty olive green. If the proportion of nitrate of iron be greater than $\frac{1}{7}$, this change will be effected sooner; and if to 10 lb as $\frac{1}{15}$, the paste, when applied to the cloth, will be a bright orange, like the acetite of iron. By exposure to heat and air, this colour generally deepens, becomes grey, and at last a full black. In this state it is permanent, and adheres powerfully to the cloth. These changes of colour depend on the solution of the tannate and gallate of iron in the disengaged nitrous acid, and the evaporation of the acid when exposed to heat and air on the cloth. This solution of the tannate and gallate of iron is indeed an essential requisite in the goodness of the chemical black. If the disengaged acid is not sufficient to effect this, or if it is in too great a state of dilution, the colour has but a feeble adherence to the cloth; it is not presented in a state favourable to its union with it, since the combination into which the iron has entered is insoluble in water. It lies merely on the surface, but does not penetrate its fibres, and yields readily in the various operations to which it is subjected. The chemical black, therefore, of the first example is a solution of the tannate and gallate of iron in nitrous acid.

The black of the second, but more particularly of the third example, differs from the preceding in the circumstance of the iron in the solution being in a less oxygenated state. We may consider this black in its recent state as a mixed solution of green sulphate of iron, and gallic acid, and tanning principle; for the decomposition of the sulphate is not complete till by exposure to air on the cloth the iron becomes fully oxygenated. When this black is recently applied to the cloth, it is of a pale greyish colour, has little fixity, simple rinsing in cold water being sufficient to fetch nearly the whole away. By gradually absorbing oxygen, it becomes deeper, and at last black. The sulphuric acid has no longer any action on it, and is removed in the first operation in which it is immersed in water.

The decoction of galls used for chemical black is variously prepared. Many calico printers infuse the galls cold in casks of vinegar, or pyroligneous acid, suffering them to remain several months, occasionally drawing off the lower part, and returning it on the galls. Others steep them in wine. Both these modes are vicious, particularly the last. Simple boiling in water, till all the soluble matter is extracted is sufficient, taking care to inclose the galls in a sack, that when lost they may not render the decoction thick.

Grey.

By diluting the chemical black of the first example with once, twice, thrice, &c. its bulk of water, and thickening the solution with gum, various shades of grey are obtained, which require rinsing off in water only, and the deeper shades of which have tolerable permanence.

The theory of these mixtures is the same as of the black, from whence they are deriv'd. On the addition of water to the olive-green solution, mentioned in the preceding article, the colour instantly becomes deep purple, approaching to black. This is occasioned by the dilution of the free acid, which being no longer able to hold the tannate and gallate of iron in solution, sets part of it at liberty, which instantly regains its colour. For the reason already assign'd, this has less adherence to cloth than that in which the solution is more perfect. The addition of a small quantity of nitrous acid effects this. The olive-green colour of the solution is restored,

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which, by exposure to the air, and consequent evaporation of the acid, disappears, and leaves the tannate and gallate of iron more firmly fixed on the cloth. The complete precipitation of the combination is afterwards effected in the operation of rinsing off in water.

Yellow.

The false or chemical yellows are generally prepared with decoctions of French or Turkey berries, and sometimes with quercitron bark. The latter substance produces pale yellows or straw colour, but does not afford the deep bright orange yellow of the berries. Dr. Bancroft, to whom the public is indebted for the introduction and knowledge of this most useful dyeing drug; and indeed, asserts the contrary in his work on "Permanent Colours;" and has given a receipt for the bark-yellow, which has, however, never succeeded in our hands.

Berry-yellow. Boil two pounds of good berries, slightly bruised, in a gallon of water during three hours, taking care to replace, from time to time, the evaporated water with liquor obtained from the second boiling of a former quantity of berries. When the liquor is cool, add to it eight ounces of alum, and if it is intended for the block thicken it with flour. If it is meant for those small objects in printed goods, which are generally touched with the pencil, two ounces of sugar of lead should be added with the alum, and the colour thickened with gum dragon. This yellow is generally passed through lime water as the first part of the operation of rinsing; by this means the greater part of the earth of alum, which would otherwise have been carried off in the operation, is precipitated on the cloth, and the colour considerably heightened.

When this operation of liming cannot be performed without injury to some other colour, a greater proportion of sugar of lead should be added. This decomposes the alum, and forms an acetite of alumine, which being more readily decomposed by the colouring matter and the cotton than sulphate of alumine, does not require the assistance of an alkaline solution to precipitate it on the cloth.

The proportion of berries above directed is for a full yellow; one fourth or one-third less will form, with the same quantities of salts, yellows of great brightness. Some calico printers add a small quantity of nitrate of copper to the yellows intended to be simply rinsed off without liming. This heightens the colour, but what is gained in intensity is lost in brightness; for if the solution of copper be added in sufficient quantity to produce any very perceptible effect, it imparts a dulness to the hue which is very detrimental. This is the invariable effect of copper in any shape, whether the acetite, sulphate, or nitrate of copper be employed.

Bark yellow. For a lemon or straw colour, it will be sufficient to make a decoction of bark by boiling from four to six pounds in as much water as is necessary during two hours, and after evaporating down the decoction to one gallon, add to it two ounces of sugar of lead, and eight ounces of alum. If not limed, the proportion of sugar of lead should be doubled. For strong yellows, Dr. Bancroft directs the addition of both nitrate of copper and nitrate of lime in quantities so great, as near seven ounces of the former to a gallon of colour. Experience, however, though it has done justice to the merits of Dr. Bancroft's discovery of the use of quercitron bark, has not verified the expectations he had formed of it as a substitute for the Turkey berries in the topical or chemical yellow.

The constitution of these colours, whether formed with

the sulphate and acetite of alumine, or with the solutions of copper is the same. Alumine, or the earth of alum, and the oxyd of copper, have an affinity both for colouring matter and vegetable fibre. They form the connecting link between these substances, which would otherwise counteract a feeble union. When a solution of alum is added to a decoction of berries or of bark, a slight precipitation takes place by the union of a portion of colouring matter with the earth; the greater part however remains suspended or held in solution by the acid of the alum. When applied to the cloth the farther decomposition of the salt is aided by the affinity of this substance for alumine, and, when the acid is volatile, as the acetous for example, by its consequent evaporation. The same takes place with the solutions of copper. The operation of rinsing farther aids the precipitation of the colouring matter and alumine, by thus largely diluting with water; and lastly, when the goods are previously passed through the lime tube, the decomposition is complete, the salt portions of earth or oxyd are precipitated, and the colour thereby considerably exalted.

The solutions of tin are capable of forming very bright and beautiful yellows, with decoctions of different yellow colouring substances; but the excess of acid which these solutions necessarily contain, and their powerful action on the cloth, renders their application less general than the preceding. The solution of tin most proper for yellows is the mumatic, and is formed by digesting, in a low heat for several days, the common muriatic acid, or spirits of salt, on fine grain tin. This solution forms, with bark, a pale and lively yellow, and with berries a yellow bordering more on orange. The spirit yellows, however, as they are improperly called, are seldom used except upon dyed grounds, and of this preparation for such purposes we shall treat at large under the head of *Discharged Work*.

Blue.

The only blue belonging to this class is that produced by combining the colouring matter of logwood with the oxyd of copper. It is but seldom used since the mode of dipping China blue has become generally known; and indeed its want of durability renders it of little value. It may be produced by combining almost any of the solutions of copper with a decoction of logwood.

1. Boil two pounds of logwood in a gallon of water, and to the decoction, thickened with gum, add eight ounces of sulphate of copper.

2. To a decoction of logwood as above, add two ounces of sulphate of copper, and two ounces of verdigrise.

Their colours may either be rinsed off or limed, as best suits the style of work. The theory of these combinations is the same as the preceding.

Green.

The chemical or false green is a compound colour, and consists of a mixed decoction of logwood and berries, or bark, and a solution of copper. Though fugitive, its use is in some degree authorized by the impossibility of obtaining a green of greater durability that can be applied in figures with the block. The fast green of the calico printers is the product of two operations, and is of course limited in its application, and tedious in its use. The production of a fast green at one operation, or rather by one application to the cloth, either with the pencil, block, or press, is one of the great desiderata of calico printing.

1. One pound of logwood and two pound of berries boiled together during two hours, and strained whilst hot

upon two ounces of sulphate of copper, and two ounces of verdigris, and thickened with gum, form a good and lively green, the hue of which may be varied at pleasure by the increase or diminution of the proportion of logwood. To this some calico printers add two ounces of common salt, and two ounces of sal enixion or acidulous sulphate of potash.

2. To one measure of blue of the first example in the preceding article, add two, three, four, &c. measures of a decoction of bark, made by boiling six pounds as before directed for the yellow, and to which, when reduced to one gallon, two ounces of sulphate of copper, and two ounces of verdigris have been added. The tone of the green depending on the relative proportions of blue and yellow, it is, in general, best to keep the two decoctions separate, to be mixed, when wanted, in such proportions as may best suit the purpose required. The theory of these mixtures is the same as of the blue and yellow already described. To the eye of the mere speculative chemist, the addition of common salt and acidulous sulphate of potash in the first example, may appear unnecessary and unmeaning. They indeed affect little, either the hue or fixity of the colour, but experience has proved that this addition facilitates its working with the block, more especially when thickened with gum dragon. The cause of this, in the particular instance before us, is perhaps not very clear. The sulphuric salts in general, such as the sulphates of alumine, iron, and copper, are all unfavourable to working, as their solutions, especially when concentrated, neither thicken well with flour nor gum. A saturated solution of copperas cannot be thickened with flour, nor can a strong solution of the aceto-sulphate of alumine, in which the alum is in great excess; even with gum it unites with difficulty. But if to a solution of copperas, which refuses to form a paste with flour, a small portion of nitrate of iron be added, the whole forms a good and substantial paste that works admirably with the block; and half a pound of common salt added to the aceto-sulphate of alumine has a similar effect. In the instance more particularly before us, the addition of common salt forms a muriate of copper by the decomposition of the sulphate; but this last is in too small a quantity to affect the working of the colour very sensibly. The cause of these effects is to be sought for in the very complicated play of affinities, which exist in such compounds, and which future investigation and discovery may perhaps unfold. The speculative philosopher, who is ignorant of the minute details of an art, that involves in it consideration and difficulties, unsuspected in the laboratory, will hence learn to suspend his judgment in deciding on the merits of a formula, till experience shall have proved the inutility of those ingredients which theory would reject as absurd.

But to return to our subject, there is a wide field open for experiment and discovery in the production of greens, into which logwood does not enter. A calico printer near London, celebrated for his ingenuity and invention in colours of this class, has long employed a green which, from its beauty and durability, when compared with the foregoing colours, indicate the presence of indigo as a constituent part. Prussian blue in a minutely divided state, and mixed with bark or berry-yellow has been employed; but the blue in this case has so little adherence to the cloth, that mere mechanical force, the operation of rinsing and washing is sufficient to disengage it. With one or other of these substances, however, it is likely that greens much superior in beauty, and probably also in durability to those ge-

nerally in use, might, by a series of patient and well conducted experiments, be readily obtained.

Pink.

The pale, and more delicate shades of red, belonging to this class, are chiefly sought after in calico printing. They are employed in giving relief or effect to other admixtures of a more sober cast, and all the skill of the colour-maker is exerted in giving them brilliancy and richness of tint. They are chiefly produced from decoctions of Brazil, Nicaragua, or peachwood, and cochineal, red and fixed on the cloth with solutions of tin, rarely with the aluminous mordants, though delicate and lively colours may be produced this way.

The nitro-muriate of tin is chiefly employed, though the relative proportion of the two acids, and their degree of saturation with tin, varies almost with every calico printer. The solution itself, made according to established rules, and with the same properties, varies so considerably at different times, as wholly to alter the nature of its compounds, without any apparent cause of failure. The source of this discordance is to be sought for in the constitution of the solution itself, which, from causes that we shall endeavour to explain, is subject to considerable variation.

First, from the strength or concentration of the acids employed, which are seldom uniform or constant; muriatic acid from the same manufacturer varying often in specific gravity from 1.12 to 1.18, and nitrous acid not less than from 1.15 to 1.23, without reference to the common distinction of single and double aquafortis.

When the specific gravity of the acids is neglected, as is but too generally the case, these differences occasion serious inconveniences in the use of solutions, whose properties often depend on the accuracy of their proportions, and on determinate degrees of saturation.

Secondly, from the impurity of the acids. The muriatic acid of commerce always contains iron and sulphuric acid; if the former exist in any notable proportion, it is unfit for the solution of tin; the presence of the latter is of less importance, though, on the whole, unfavourable to delicate colours. The nitrous acid varies considerably in its purity, being subject to greater or less admixture with the muriatic; the more it is made from being seldom free from marine salt. The aquafortis of commerce is, in fact, an aqua regia. This variation of the proportion of muriatic acid in the nitrous, is of the utmost importance, since the properties of the solution eminently depend upon this. With muriatic acid only, tin forms a colourless and permanent solution, one of whose distinguishing properties is, its strong affinity or attraction for oxygen. With decoction of cochineal, it forms a deep and dull purple-coloured precipitate, which, however, gradually absorbs oxygen, and becomes crimson, especially when exposed on the filtre. With decoctions of Brazil and peachwood, it affords crimson precipitates, varying in intensity with their saturation with tin. It decomposes all the combinations of iron with colouring matter, deoxygenating the iron which it carries off, leaving the tin in combination with the colouring matter. Thus a madder black becomes a red on the application of muriate of tin. On this property is founded the art of printing on dyed grounds, of which we shall treat hereafter. With nitrous acid, unless very dilute, tin contracts a very feeble union, and is generally precipitated as soon as dissolved, in a state fully saturated with oxygen. The addition of a small quantity of muriatic acid renders this solution more permanent, provided it be not fully saturated with tin, and the addition

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of larger portions approximates the solution still more to the nature of the former, and renders it capable of supporting a greater degree of saturation. The properties of the solution depend greatly on the proportion of muriatic acid, and consequently of muriate of tin contained in it. When small, the precipitate with cochineal is bright carmine scarlet. It does not decompose the combinations of iron with colouring matter, unless the solution be far from saturation, and this effect is then due to the disengaged acid only.

The purity of the tin is another requisite which should be carefully attended to. The fine tin of Cornwall, commonly called grain tin, should be employed. If alloyed with lead, it is wholly unfit for these purposes.

In lieu of muriatic acid, sal ammoniac and common salt are sometimes employed to form an aqua regia with nitrous acid. The solution differs little from that formed by a mixture of the two acids, the allowance being made by the portion neutralized by the alkali of the neutral salt.

From this short outline of the history of the substances employed in the formation of the solutions of tin, and of the properties of the solutions themselves, may be deduced such general ideas as will elucidate and explain many anomalous effects in their combinations with different colouring matters, and seem to direct future experiment in the discovery of those minute, but often important, conditions necessary to the formation of particular shades of colour.

The following examples of spirit tints, as they are improperly called by calico printers, will illustrate some of the preceding observations, and may be considered as specimens of the most beautiful and brilliant colours it is possible to form upon cotton.

1. Prepare an aqua regia by dissolving two oz. of sal ammoniac in one pound of nitrous acid of specific gravity 1.25. To this add two ounces of fine grain tin; decant it carefully off the sediment, and dilute it with $\frac{1}{4}$ its weight of pure or distilled water.

To one gallon of water add one pound of cochineal, ground as fine as flour; boil half an hour; then add two ounces of finely pulverized gum dragon, and two ounces of cream of tartar, and stir till the whole is dissolved. When the liquor is cool, add one measure of the preceding solution of tin, to two of the cochineal liquor, and incorporate well by stirring. Apply this with the pencil or block, suffer it to remain in the cloth six or eight hours, then rinse off in spring water. This colour will be a bright and beautiful scarlet.

2. Boil 12 pounds of Brazil chips during an hour in as much water as will cover them. Draw off the decoction, and pour on fresh water, and boil as before. Add the two liquors together, and evaporate slowly down to one gallon. To the decoction whilst warm add four ounces of sal ammoniac, and as much gum dragon or senegal as will thicken it for the work required. When cool, add one of the solution of tin before described, to four, six, or eight of the Brazil liquor, according to the colour wanted. Suffer it to remain from 18 to 24 hours on the cloth, then rinse off in spring water as before. The colour will be a pale and delicate pink. If it is required deeper, the decoction must be made stronger, and used in the proportion of three or four to one of the solution of tin. Nicaragua or peachwood, though not so rich in colouring matter as Brazil, yields a colour, however, which is, if possible, more delicate and beautiful. The fine pinks produced by certain hoeses, which have for years been the envy and admiration of the trade, are afforded by this fine dye-wood.

These colours require no lining, simple affusion with water being sufficient to precipitate the colouring matter in combination with the tin. The theory of these mixtures is the same as the preceding. They require, however, a greater excess of acid to hold the colouring matter in solution. A decoction of cochineal poured into a saturated solution of tin, occasions an instant precipitate which is not redissolved, and the greater part of which, if applied to cloth, would come off in the operation of rinsing. It is sometimes necessary to add a small quantity of muriatic acid to prevent this precipitation, or to correct it when it happens, and sal ammoniac is supposed to have the same effect, probably by engaging the water of the solution.

With the aluminous salts, the decoction of cochineal and Brazil forms colours less brilliant than those we have just described, but which are applicable in cases where the excess of acid in the solutions of tin is attended with inconvenience.

1. To one gallon of water, add eight ounces of finely ground cochineal, and two ounces of bruised galls; boil half an hour, strain the liquor whilst hot through a fine cloth, upon four ounces of cream of tartar and four ounces of gum, and thicken with gum dragon. This colour requires lining.

2. Upon Oils. of Brazil and 2 oz. of galls, pour one gallon of water, let them soak some time, then boil two hours, replacing the evaporated liquor with fresh water. Strain through a fine cloth upon 4lb. of gum senegal, and add one pint of the acetite of alumine, described in a former part of this article.

The addition of galls in the two preceding formulæ is supposed to impart solidity to the colours in some way analogous to the operation of galling in silk and cotton dyeing, of which we shall have occasion to speak hereafter. Their constitution is otherwise the same as the berry and bark yellows, and most others of this class of colours.

Purple.

1. If the solution of tin directed for the pink in the last article be mixed with six times its bulk of a decoction of logwood poured whilst hot upon four ounces of sal ammoniac, and 2½ lbs. gum senegal, a bright and lively purple will be obtained, the hue of which varies with the strength of the decoction and the proportion of solution of tin employed.

2. If instead of the solution of tin, the acetite of alumine before alluded to, be used in various proportions of one sixth, eighth, &c. purple's differing in shade and intensity will be formed, applicable in some cases, but possessing less solidity than most of the colours already described.

The constitution of these compounds is the same as the preceding.

Olive.

Olives are variously compounded, according to the colour required.

1. By mixing chemical black in various proportions with berry or bark yellow. The depth and fulness of the olive depends on the quantity of black.

2. By a decoction of logwood added in greater or less quantity to the bark or berry yellow.

3. By the addition of coppers or nitrate of iron to decoctions of yellow or altringer colouring matters, such as bark, sumac berries, weld, &c. each of these produces a different hue, varying from the green olive to a drab or cloth colour. By mixing these decoctions in different proportions, and by varying their strength, and the quantities of coppers

nitrate of iron added to each, a multiplicity of shades may be produced, of which it is impossible to convey any precise or definite ideas.

These colours may be indifferently thickened with flour or gum, as best suits the work required, but when nitrate of iron is added to solutions containing gum, the instant coagulation that takes place must be counteracted by the addition of a portion of free nitrous acid. This effect arises from the strong action exerted by metallic oxids, at the maximum of oxydation, on mucilage or gum. When the decoction is very concentrated, and contains sufficient colouring matter to engage the whole of the iron, this effect takes place in a less degree, but with solutions adapted to the production of the foregoing colours, a coagulation invariably takes place, unless counteracted by the presence of a portion of free acid. Of this action of metallic oxys on the solution of gum we shall further treat under the article Gum.

Class III.

In this class, the colouring matter is simply held in solutions, by an acid or alkali, and in that state applied to the cloth without the intervention of any mordant.

The most important of these colours, is the alkaline solution of indigo which forms the topical or.

Pencil Blue.

1. Prepared solution of pot-ash, by boiling together 7½ lbs. of quick lime, and 1½ lbs. of pot-ash, in 10 gallons of water. Decant off the clear liquor, and separate the remainder from the lime by means of the filter. To one gallon of this solution, add 1 lb. of red arsenic, or orpiment, and 1 lb. of fine indigo, both previously ground together in a mill with sufficient water to form a thick paste. Bring them up gradually to a boil, stirring carefully all the time, and then withdraw the fire. Thicken the solution with the best gum fucagel, and for the pale shades of blue, dilute with one, two, &c. measures of gum-water.

The quantities and relative proportions of pot-ash, orpiment, and indigo in a gallon of pencil blue vary considerably with different calico printers, and within certain limits, it appears, that the accuracy of these proportions is not of great importance. Hansman, an intelligent French printer, employs 1½ lbs. of pot-ash, 6 lbs. of orpiment, and 8 lbs. of indigo, to 12 gallons of water; and Oberkampff, proprietor of the celebrated manufactory of Tony, a still greater proportion of indigo. Some printers add brown sugar, and Baneroff has proposed to substitute this for the orpiment, but without success.

The solution, when recently made, is a yellowish green, but by exposure to air, becomes gradually deeper, and at last blue. In this state, it is wholly unfit for use, it contracts no union with the cloth, and is detached from it in the first operation of rinsing.

Of the peculiar nature and properties of indigo, we shall have occasion to treat hereafter, under its proper head, at present it will suffice to observe, that it owes its colour and insolubility in alkalies, to a portion of oxygen intimately combined with it. To render it soluble, therefore, it must be deprived of this oxygen, by the action of a substance having a more powerful affinity for it, and the sulphuret of arsenic, or orpiment, is used for this purpose. Sulphate of iron, has a strong affinity for oxygen, and is employed in de-oxygenating indigo for certain purposes; but the oxyd of iron not being soluble in alkalies, the solutions of indigo, formed by it, become quickly regenerated by the absorption of oxygen, and cannot even be transferred from one vessel

to another. The sulphuret of arsenic, on the contrary being very soluble in alkalies, presents the double advantage of de-oxygenating the indigo, and of retaining it a while in that state, till on its application to cloth, it becomes exposed to completely to the action of atmospheric air, as to regain its oxygen, colour, and insolubility; and becomes fixed in its original or blue state.

The copper coloured pellicles, which forms on the surface of pencil blue, and is renewed immediately on its removal, arises from the absorption of oxygen, which, in spite of the action of the orpiment, is continually taking place. Hence arises that disposition to unevenness, which is the great disadvantage of this blue; the unavoidable exposure to air of small portions of the colour during its application with the pencil, receiving greater or less portions of indigo, and considerably reducing its strength.

Most calico printers boil up the quicklime with the other ingredients, thinking its presence not less necessary than the pot-ash and orpiment; by this means a considerable portion of the solution of indigo is taken up by the sediment, which careful washing does not wholly separate. As the action of the lime is confined merely to the alkali, which it renders caustic, and capable of acting with greater force on the other ingredients; it is certainly much more economical to render the pot-ash caustic before its addition to the indigo. A considerable waste of colour is by this means prevented, and the solution may be thickened the moment the ebullition has ceased without waiting for the deposition, which in the old mode takes place.

Orange.

The oxyd of iron, when dissolved in acetous acid, forms one of the most useful and important mordants, as we have already shewn in the former part of this article. It is also capable of imparting a very pleasing and permanent colour itself to cotton, when applied in solutions of tolerable strength and purity, and forms the orange, buff, and gold colour of the calico printers.

1. The solutions of iron in vinegar, strengthened by the addition of coppers may be used, but the purest and brightest gold colours are obtained from coppers and sugar of lead, in the proportion of 5 lbs. of the former, and 1 lb. of the latter, to a gallon of water. When thickened with gum, and employed undiluted, it affords, when limed, a full strong gold colour, and with two, four, six, &c. times its bulk of water, various shades of orange and buff, which resist the action of air, alkalis, and soap; and are rather exalted than impaired by frequent washing. The addition of sugar of lead, is to increase the strength of the solution. A gallon of water dissolves about 4 lbs. of coppers. The addition of a pound of sugar of lead, enables it to take up another pound nearly, and the strength of the solution may be still further increased by equal additions of the two salts. The operation of liming is a simple precipitation of the oxyd of iron on the cloth, and in cases when this cannot be performed, the proportion of sugar of lead must be increased to nearly that of the coppers. It is only the paler shades of orange, however, which are to be obtained this way. The deep gold colour before named, is not to be procured without the aid of a precipitant. Spanish brown is sometimes added to a solution of iron, and employed in such a case, but it contracts no union with the cloth, and is readily removed by simple washing and beating. When the orange, or gold colour, is thickened with flour, a small portion of nitrate of iron must be added to the paste, for reasons we have assigned on a former occasion.

2. A beautiful, but fugitive orange, is obtained by boil-

ing half a pound of annotta with 1lb. of caustic pot-ash in a gallon of water, and thickening the liquor with gum. This colour acts powerfully on the sieves and blocks, which it very soon destroys, and on this account, and also from its want of permanence is seldom used. It may either be simply rinsed off, or first passed through water rendered slightly acidulous with sulphuric acid, or what is still better through alum-water. This operation is the very reverse of liming, for here the colouring matter to be precipitated, being held in solution by an alkali, an acid must be employed for that purpose. The colour by this means is considerably heightened, and when applied with the pencil, is useful in some cases where the other colours will support the action of alum-water without injury.

Borax, and even spirits of wine, are sometimes added to the alkaline solution of annotta, and are supposed to contribute to its strength and fixity, though on what principle it is not easy to discover.

Green.

The oxyd of copper, dissolved in volatile alkali, affords a pale and delicate green, which is sometimes employed intermixed with other colours. Turnings of copper, or verdigrise, which is more generally used, may be digested in a low heat with spirits of sal ammoniac. Care must be taken that the heat be very moderate, and the vessel in which the solution is made, well stopp'd, the ammoniac will otherwise be driven off, and lost. When the alkali has taken up as much copper as it can dissolve, the solution must be thickened with gum, and applied with the block or pencil. In a few days the ammoniac evaporates and leaves the oxyd of copper on the cloth, which must be rinsed to free it from the gum and superfluous colour.

The blues produced by alternate immersion in coppers and lime, and also in the solution of indigo, by the same substances, properly come under this class of colour, as they are solutions of colouring matter in lime and alkalis. As the processes by which they are applied, differ however very materially from all those that we have been treating of, they claim a separate and distinct notice. For the details of these operations, and the mode of preparing the pallets for bark and pale blue dipping, and the colours for China blue, we must therefore refer our readers to the article *Dipping BLUE*.

COLOURS, in Dyeing.—There are five simple, primary, or mother colours, used by the dyers: from the mixture whereof all the other colours are formed; these are blue, red, yellow, black, and brown colour; each of which fee under their proper head, *BLUE, RED, &c.*

Of these colours, mixed and combined, other colours are formed, which are infinitely various, according to the proportion of the different ingredients that are employed, or the processes by which they are blended. Thus a mixture of *blue and yellow* forms *green*, which is distinguished by dyers into a variety of shades, according to the depth of the shade, or the prevalence of either of the component parts. Hence we have *sea-green, grass-green, pea green, &c. &c.* *Blue and red* form different shades of *violet, purple, and lilac*. A mixture of *yellow and red* produces *orange*. Mixtures of *black* with other colours constitute *greys, drabs, and browns*. For a more particular account of these and other colours; and the method of procuring and applying them; see the article *DYEING*. See also the preceding article.

The greatest perfection in the art of colours would be to find the means of preparing the finest colours without the use either of acid or alkaline salts, which usually subject the colours to change, or else are apt to prey upon the

cloth, canvas, &c. as we see in verdigrise, the blue and green crystals of copper, &c. It appears highly probable, that the Indians, for making the fine bright and durable colours, wherewith their chintzes and callicos are stained, make use of metalline solutions; for some stained callicos, brought from thence, having been kept 40 or 50 years, the bright colours have been observed to eat out the cloth, exactly in the same manner as acid spirits, which dissolve metals, are found to do.

Since these, then, are the inconveniences attending such colours, we ought to search for menstrums with which to extract colours, which are neither acid nor alkaline; and for such metalline oxyds, precipitates, or powders, as will not lose their colours, by being well washed to get out their salts; to prepare certain metalline matters, by mere calcination, or the bare assistance of fire; and lastly, to look out for native colours, wherein no saline matter abounds.

Mr. Geoffroy has given a very curious process for making two clear, spirituous, inflammable liquors, which differ very little in taste and smell, and being mixt together give a fine carnation colour, without any sensible fermentation.

To make the first of these liquors, put a small handful of dried red roses into a glass bottle; pour on them rectified spirit of wine, till it covers them an inch; let this stand in a cold infusion four or five hours; then pour off the liquor, which will be clear and colourless, as when put on. The second liquor is made by dropping into rectified spirit of wine, so much oil of sulphur, by the bell, or spirit of vitriol, as will be borne in it without giving it any very sensible acidity when tasted. When these liquors are thus prepared, let a small quantity of the latter be dropped into some of the former, and the whole will become of a fine carnation colour, though there is no fermentation, nor any other change perceived in it, but barely that of colour. If instead of this last liquor, there be added to the first a few drops of the spirit of sal ammoniac, the whole will become green.

Make a slight infusion of galls in water, so as not to colour the water; make also a weak solution of green vitriol in water, so that it may appear colourless; mix these two colourless liquors together, and an inky blackness is immediately produced; add to this black liquor a little oil of vitriol, and the liquor becomes pellucid and colourless again; then add to this a little salt of tartar, and the whole is black again.

Put a little bruised camphor into rectified clear oil of vitriol; shake the mixture, and it will become black, and the camphor will be dissolved; add to this a little water, and the liquor becomes clear, and the camphor is found separated at top, in its own form, and native whiteness.

Infuse liqum nephriticum in cold water, and pour off the clear liquor. This held up against the light, appears of a fine yellow, but viewed from the light, of a beautiful blue; a little spirit of nitre put to this liquor makes it lose the power of reflecting the blue rays, and a little oil of tartar, afterwards added, recovers that power again.

Logwood, infused in water, gives a red colour. Put to this a little spirit of urine, and it becomes of a fine purple; and drop in afterwards a little spirit of salt, and it becomes of a pale red.

A beautiful blue tincture may be made from filings of copper, by digesting them in spirit of urine, hartshorn, or the like. The addition of oil of vitriol destroys the blue colour; and a little spirit of salt turns it green.

Pellucid oil of vitriol, mixed with pellucid oil of turpentine, produces a thick red balsam. And common oil, mixed with fair water, by means of a little wax, and continued rubbing,

rubbing, turns into a thick white balsam, called cold cream.

Oil of vitriol, distilled from quicksilver, leaves a white powder behind, which, if water be poured on it, becomes yellow.

Dissolve quicksilver in spirit of nitre, and to part of it add spirit of urine, and a white powder is precipitated; to another part of the solution add oil of tartar, and a yellow powder falls to the bottom.

Drop a new pen in spirit of vitriol, and write with it on common blue paper, and the letters will appear red.

A pelucid solution of saccharum saturni being written with on paper, becomes invisible when dried; but the base fumes of an infusion of quick lime, and opiment, in water, will render the invisible writing black and legible.

Volatile salt of sal ammoniac, which is white, mixed with crystals of copper, which are green, produce a fine purple.

The original and simple, as well as the mixt. colours are producible by mixture. Thus, if the sun's rays pass through two pieces of glass, the one blue, and the other yellow, and be afterwards received upon a white paper, the colour there seen is green. The dyers make cloth blue with woad, and then turn it green by the yellow herb called isoteola, or dyers' weed. To a yellow solution of gold in aqua regia add a blue one of copper in spirit of urine, and the mixture becomes green. The painters every day practise this art of producing new colours by mixture.

Metallic and mineral matters are reducible to a considerable degree of subtlety, or smallness of parts by fire, or dry calcination, so as to leave them durably possessed of their native or adventitious colours. Thus lapis lazuli, by being calcined, becomes the fine rich blue called ultramarine; light ochre, by the same treatment, becomes a light red, or flesh colour, the most useful flesh-colour in painting. Lead, by calcination, becomes durably red, and iron durably brown; but a proper method seems wanting for the dry calcinations of the nobler metals, gold and silver; though, for the uses of gilding, these are easily prepared by dipping linen rags in their respective solutions, and then drying, and burning them to ashes, whereby a dry and fine metallic powder is procured.

COLOUR, in *Heraldry*, the heraldic colours are nine, and were anciently expressed by the word *insigne*, viz. or, argent, azure, gules, sable, vert, purpure, tenney, and sanguine, and also by precious stones and planets; the a-morial colours are blazoned in different terms, according to the rank and dignity of the person whose arms are described, as follows:

Colours.	For Commoners by Tinctures.	For Peers by Precious Stones.	For Emperors, Kings, and Princes, by Planets.
Yellow,	Or,	Topaz,	Sol.
White,	Argent,	Pearl,	Luna.
Blue,	Azure,	Sapphire,	Jupiter.
Red,	Gules,	Ruby,	Mars.
Black,	Sable,	Diamond,	Saturn.
Green,	Vert,	Emerald,	Venus.
Purple,	Purpure,	Amethyst,	Mercury.
Orange,	Tenney,	Jacinth,	Dragon's head.
Dark red,	Sanguine,	Sardonix,	Dragon's tail.

For a fuller account of each, see under the respective heads.

Or, and argent are metals, and it is an invariable rule in heraldry not to put colour upon colour, or metal on metal;

that is if the field be of a colour, the charge or bearing must be of a metal.

C O U R S E, in *Law*, is a probable or plausible plea; though in reality false at bottom; and only calculated to draw the trial of the cause from the jury to the judge; and, therefore colour ought to be matter of law, or doubtful to the jury.

In pleading it is a rule, that no man be allowed to plead, especially, such a plea as amounts only to the general issue; but in such case he shall be driven to plead the general issue in terms, by which the whole question is referred to a jury. But if a defendant in an assise or action of trespass, be desirous to refer the validity of his title to the court rather than to the jury, he may state his title specially, and at the same time give colour to the plaintiff, or suppose him to have an appearance or colour of title, had indeed in point of law, but of which the jury are not competent judges. As if his own true title be that he claims by feoffment, with livery from A. by force of which he entered on the lands in question, he cannot plead this by itself, as this plea amounts to no more than the general issue. But, he may allege this specially, provided he goes farther and says, that the plaintiff claiming by colour of a prior deed of feoffment, without livery, entered, upon whom he entered; and may then refer himself to the judgment of the court, which of the two titles is the best in point of law. (Doctour and Student. 2. c. 53.) Every colour ought to have the following qualities.

1. It is to be doubtful to the *Jury-gens*, as in case of a deed of feoffment pleaded, and it is a doubt whether the land passeth by the feoffment, without livery or not. 2. Colour ought to have continuance though it wants effect. 3. It should be such colour, that, if it were effectual, would maintain the nature of the action, as in assise, to find colour of freehold, &c. (10 Rep. 83, 90, and 91.) Colour must be such a thing, which is a good colour of title, and yet it is not any title. (Cro. Jac. 122.) If a man justifies his entry for such a cause as binds the plaintiff or his heirs forever, he shall not give any colour; but if he pleads a defect in bar, he must give colour, because this binds the possession, and not the right; so that when the matter of the plea bars the plaintiff of his right, no colour must be given. When the defendant entitles himself by the plaintiff; where a person pleads to the writ or to the action of the trial; he who justifies for titles; or where the defendant justifies as servant; in all these cases no colour ought to be given. (10 Rep. 91. Lutw. 1343) Where the defendant doth not make a special title to himself or any other, he ought to give colour to the plaintiff. (Cro. Eliz. 76.) In trespass for taking and carrying away twenty loads of wood, &c. the defendant says, that A. B. was possessed of them, *ut de bonis propriis*, and that the plaintiff claiming them by colour of a deed after made, took them, and the defendant took them; and adjudged that the colour given to the plaintiff makes a good title to him, and consecuteth the interest in him. (1 Lil. Abr. 275.)

Thus, e. gr. in an action of trespass for taking away the plaintiffs heath, the defendant urges, that before the plaintiff had any interest in them, he himself was possessed of them, as his proper goods; and delivered them to A. B. to deliver to him again, when, &c. and A. B. gave them to the plaintiff; and the plaintiff, supposing the property to be in A. B. at the time of the gift, took them, and the defendant took them again from the plaintiff; whereupon the plaintiff brings his action.—This is a good colour, and even a good plea. Dict. and Stud.

COLOUR of office, is when some unjust action is done under countenance of office or authority. See BRIBERY and EXTORTION.

To COLOUR *strangers goods*, is when a free man allows a foreigner to enter goods at the custom house in his name.

COLOURS, *camp*, are a sort of small colours planted on the right and left of the parade of a regiment when in the field. They are about 18 inches square, and of the colour of the facing of the regiment, with the number of the regiment marked on them. The poles, to which they are fixed, should be about 7 feet 6 inch long; except those of the quarter and rear guards, which ought to be about 9 feet long.

COLOURS, *field*. See FIELD.

COLOURS, *guard*. See GUARD.

COLOURS used in the drawings of fortifications and military works, are chiefly Indian ink, carmine, verdigrise, sap green, gum bouché, Prussian blue, Indigo, smalt, ultramarine, amber, gum water, which articles see separately, as well as the article FORTIFICATION.

COLOURS, *Colores*, in the Ancient Music, was used to signify the musical species belonging to a genus.

In this sense the chromatic genus was said to have three colours; and the diatonic two. The enharmonic, having no subordinate species, had but one colour. Hence the ancients reckoned three genera, and six colours, in music; that is, in many different divisions of the diatessaron, or fourth.

COLOURS, *diatonic, or musical scale of*.—In the course of Sir Isaac Newton's experiments on the properties of light, (Optics, book i. part ii. prop. 3.) he discovered the remarkable fact, that the spectrum of the sun's image, formed by refracted light, let into a darkened room, is longitudinally divided by the points separating the different colours, viz. violet, indigo, blue, green, yellow, orange, and red, into spaces which are respectively equal to $\frac{1}{10}$, $\frac{1}{10}$, and $\frac{1}{10}$ parts of the double length of the spectrum, as, suppose the spectrum to be 360 parts in length, then $\frac{360}{10}$, $\frac{360}{10}$, and $\frac{360}{10}$, will represent the length of each colour respectively, and adding these successively in the reverse order, to $\frac{360}{10}$, we have $\frac{492}{10}$, $\frac{648}{10}$, $\frac{816}{10}$, $\frac{984}{10}$, $\frac{1152}{10}$, $\frac{1320}{10}$, which, in their lowest terms, are $\frac{123}{25}$, $\frac{162}{25}$, $\frac{204}{25}$, $\frac{246}{25}$, $\frac{288}{25}$, and 1, and appear to be the diatonic ratios answering to the octave, minor seventh, major sixth, fifth, minor fourth, minor third, major second, and E note; or, to VIII, 7th, VI, V, 4th, 3d, II, and key, represented in the gamut by c, bB, A, G, F, bE, D and C.

From the experiments of Henry Brougham, jun. esq. Philosophical Transactions, 1796, it appears, that not only by refraction, but by inflection, deflection, and reflection, the rays of light may be separated on a chart or screen: and he mentions numerous experiments, wherein the limits of the several colours on the spectrum were carefully marked with the point of a needle, after which the papers thus marked were put away, and a fresh paper substituted for other experiments: the measurement or comparison of the lengths of the intervals occupied by each colour on the different papers, being purposely deferred, until the whole course of experiments was completed, in order to prevent any preconceived opinions from operating, in making the experiments: the results are represented as agreeing, in the spaces $\frac{1}{10}$, $\frac{1}{10}$, occupied by the violet, indigo, blue, green, yellow, orange, and red colours, being the very same, as to arrangement, as those by refraction above-mentioned.

It is observable, that the notes composing the octave thus produced, do not answer to the major-key of bB as it might seem to do, although some writers on musical intervals have asserted, that nature produces only the major-key or division of the octave, and that the minor third bE or $\frac{3}{2}$ is

nowhere to be found in nature. If we were to consider the *colorific ratios* $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, and 1, found above as a minor octave, and to belong to the notes in the gamut a, G, F, E, D, C, B and A; and find the ratios answering to the octaves of C and B, viz. $\frac{1}{2}$, and $\frac{2}{3}$, or c and b; then, if from each of the above ratios we deduct the ratio $\frac{1}{2}$ (or multiply by $\frac{1}{2}$), we obtain, $\frac{1}{20}$, $\frac{1}{20}$, $\frac{1}{20}$, $\frac{1}{20}$, $\frac{1}{20}$, $\frac{1}{20}$, $\frac{1}{20}$, and 1, for the notes in the octave c, b, a, G, F, E, D, and C, but which is not a major diatonic octave, because those principal notes, the V and 4th, or G and F, have not the ratio of $\frac{3}{2}$ and $\frac{4}{3}$ as they ought to have. Thus we see, that the eight notes answering to a colorific minor-key, do not hold the proper relation between themselves, for forming a major-key, by merely assuming the third of the first key, as the new key-note: and strictly speaking, the same may be observed of any other transposition or modulation whatever, upon eight diatonic notes, or even upon any 12 notes composing an octave, taking all the concord into account; although most of the keyed instruments, as organs, harpsichords, &c. in use, are made and played upon, and the notation or writing of music itself is founded upon this supposition, which is far from being correct.

COLOUR, in *Painting*, is applied both to the drugs, and to the tints produced by those drugs, variously mixed and applied.

The principal colours used by painters, are red and white lead or cerul; yellow and red ochres; several kinds of earth, as amber, &c. besides orpiment, black lead, emmabar, gamboge, lake, bice, verditer, indigo, vermilion, verdgris, ivory black, billre, lamp black, smalt, ultramarine, and carmine; each of which, with the manner of preparing them, their uses, &c. see under their respective heads.

Of these colours, some are used pure and in oil, others only in fresco, others in water, and others only for miniature.

COLOURS, in an *Ecclesiastical Sense*, are used both in the Latin and Greek churches, to distinguish several mysteries and feasts celebrated therein.

In the Latin church are only regularly admitted five colours, viz. white, red, green, violet, and black: the white is for the mysteries of our Saviour, the feasts of the Virgin, those of the angels, saints, and confessors: the red for the mysteries and solemnities of the holy sacrament, the feasts of the apostles and martyrs; the green for the time between Pentecost and Advent, and from Epiphany to Septuagesima; violet in Advent, Christmas, in vigils, rogations, and in votive masses in time of war: lastly, black for the dead, and the ceremonies thereto belonging. Cloths of gold and silver, and embroidery, serve indifferently for all solemnities.

In the Greek church the use of colours is almost obliterated, as well as among us: red, among them, was the colour for Christmas, and the dead, as black is still for the last among us.

COLOURS, *Accidental*. See ACCIDENTAL.

COLOURS, *Local*. See LOCAL.

COLOUR, *rings of*. See RINGS.

COLOURS, *center*. See WATER.

COLOURABLE *title*. See TITLE.

COLOURING, in *Painting*, one of the great component and essential parts of painting, is the art of giving to every object in a picture its true and proper hue, as it appears under all the various circumstances or combinations of light, middle-tint, and shadow; and of so blending and contrasting the colours, as to make each appear with the greatest advantage and beauty, at the same time that it contributes to the richness, the brilliancy, and the harmony of the whole.

It likewise possesses powers which, when judiciously applied, render it highly conducive to the character and expression of the subject represented.

A noble author, lord Lansdown, "says, that verification is in poetry, what colouring is in painting, beautiful ornament;" but the comparison is ill-founded. Verification is, indeed, an ornament, and so is colouring; but the former is merely an ornament, whereas the latter is necessary to the painter to enable him to make his imitation or representation complete. "Should the most able master in design," says Mr. Webb, "attempt by that alone a rose or grape, we should have but a faint and imperfect image; let him add to each its proper colours, we no longer doubt, we shall the rose, we touch the grape."

Colouring, like chiaro-scuro, may therefore be divided into kinds; that which is necessary for rendering the imitation just and intelligible, and that which is *expedient or ornamental*, as contributing to make the work at once more impressive to the imagination, and more harmonious and delightful to the eye. Truth in the local tints is alone required in the first kind; the second demands choice in their selection and distribution. For illustration, let us suppose the principal figure in a piece to be dressed in sky-blue, and another figure near it, of less consequence in the story, to be represented in scarlet, with an under-vestment of bright yellow, and let the light be made to strike equally on both: in such a case, it would be utterly impossible to give an effect agreeable or harmonious to the picture; although each of these objects should be painted with the utmost exactness and truth; nay, the combination, though found in nature itself, would excite feelings of disgust and aversion; whereas, if the principal figure were dressed in scarlet and white draperies, and the figure next to it in blue of not too light or bold a tint, the effect would be harmonious and pleasing; and another point of great importance would be gained, as the eye would then be attracted by the principal figure, which could not have been the case in the former instance, where the gaudy combination of yellow and red met intolably, as is natural with all warm colours, have first obtruded itself into notice. However, as the eye has the same intuitive abhorrence of unharmonious combinations of colours, that the ear has of discordant sounds: it is, therefore, not surprising if we so seldom meet with enormities like the one above supposed, even in the works of those artists who least of all can lay claim to the scientific arrangement of colours: to produce effects not unharmonious, or disagreeable requires no great exertion of talent; but to perform all that can be done by the most skilful application of the various powers of the art is the lot of few.

In treating of chiaro-scuro, we have observed, that the part of it to which we have given the appellation of necessary or natural chiaro-scuro, was in a greater or less degree understood and practised from the earliest period of the restoration of painting: the same was the case with respect to what we have termed necessary colouring, or truth in the local tints.

The oldest painters of Florence, Giotto, Buffalmacco, and others; and still more so, Simone Memmi, Ambrogio Lorenzetti, and the rest of Senechal's school of the same period, made frequently not unsuccessful attempts at truth and even beauty in the tints of the flesh and other parts of their pictures; and sometimes produced a distribution of colours by no means ungracious in the whole; though the prodigal use of gold grounds and gold ornaments bid defiance to an effect truly harmonious. Malpino da Panicale, Maffaccio, Domenico Ghirlandajo, and Pietro Perugino, went much further, and we rarely find a want of delicacy of colouring

in the parts of their pictures, or of harmony in the general effect. But still this was the result of a happy natural feeling for what was beautiful rather than of an approved and well-founded theory. It was not till the period when Leonardo da Vinci laid the foundation of an improved system of chiaro-scuro, that the Bellini's of Venice began to discover the beautiful effects resulting from a skilful combination or opposition of colours, at the same time that they attained a richness and truth in their local tints, far exceeding any thing hitherto practised. In both these qualities, however, they were soon far surpassed by their scholars, Giorgione da Castel Franco, and Titiano Vecelli, who, superadding to the most astonishing richness of colour, the powerful light and shade of da Vinci, produced works which, in their way, have baffled all future attempts at improvement. The tone of colour of their pictures is not that of nature in her every day garb; it is ideal, like the chiaro-scuro of Coreggio or Rubens; that which may be supposed, but which, perhaps, is seldom or ever found in nature: the depth and mellowness of their tints can scarcely be accounted for but by the supposition of a tranquil but vigorous light shining through the heated atmosphere of a summers evening. The world was astonished at this new style, and it is no wise surprising that Tintoretto, Paolo Veronese, and others who followed, being unable to do better, should attempt something different; the manly, the sober senatorial dignity of Giorgione and Titian, was changed for magnificence, for show, for glitter, and for ornament; invention, composition, design, and expression, were all made subservient to the inordinate desire of effect of colour; the subject of the work could in many instances with difficulty be discovered, and their pictures may, in most cases, be compared to bewitching nonsense uttered by the silver tongue of the woman we love; to the sweet but fatal song of the Syren. There seems to be nothing in the colouring of Giorgione and Titian, incompatible with the greatest purity of design, sublimity of composition, or propriety of expression; but the splendid extravagances, the caded fluffs, the gaudy trappings of the more modern Venetians, are wholly inconsistent with true grandeur, and too frequently seem to resemble the wretched effort of poverty to personate opulence, or the despicable attempt of the lacquey or courtizan to outvie by their tinsel apparel the dignity of the nobleman, or the simple elegance of the woman of distinction.

Whilst the two great founders of the Venetian school enraptured the sight by their transcendent and novel effects of colour, the Roman and Florentine painter, though principally applying their talents to the attainment of still higher objects, were not wholly unmindful of this part of the art. Many of the frescos of Raphael in the stanzas of the Vatican, and in particular the dispute of the sacrament, the St. Peter delivered out of prison, the maids of Boffena, and the Hierodorus, are severally coloured with the richness of Venetian tint, or with the pearly hue of Parma. However, from the latter works of this great master, it should appear that he did not at all times consider this branch of painting as worthy his attentive regard. Fra Bartolommeo di San Marco, in his madonnas and apostolic figures, united grandeur of design and breadth of chiaro-scuro to a tone of colour at once dignified, tranquil, and harmonious; and Andrea del Sarto, except in some of his last works, where he in some degree adopted the gay and frivolous style then beginning to be in vogue, painted with a strength and sobriety of tint every way adapted to give increased interest and expression to the devotional or sacred subjects which he generally treated.

At this period, as if nature then made holiday, and was prodigally lavish of her gifts, the great Coreggio appeared, and by his astonishing frescos in the cupolas, and other works at Parma, seemed to cast a new radiance on the world of art. In him the very soul of harmony resided, and the magic of his pictures so irresistibly intrances the sight, as to render us almost incapable of discriminating, whether the astonishing effect is most the result of the breadth and softness of his chiaro-scuro, or the beautiful combinations and transitions of his colours. However, delicacy of tint seems to have been the aim of Coreggio; richness and luxuriance of colour that of the Venetians. And it has been observed of the great artist of Parma, that the flesh in his pictures seems generally of too firm a texture, and to want that humid appearance, the result of insensible transpiration, which forms one of the particular characteristics of human bodies, and which Titian and Giorgione succeeded so admirably in representing.

These are the great masters of colouring amongst the Italians. After this period a corrupt and frivolous style for some time predominated, and more particularly in the Roman and Florentine schools of painting. With them it was not uncommon to see yellow draperies shaded with purple, red ones with blue, or green with some other tint; as if it had been the intention to represent changeable fluids; and the eye seemed gradually to have become accustomed to the most unharmonious, the most gaudy and absurd combinations. Baroccio indeed made an effort to stem the torrent of this dastard taste. After having assiduously studied the works of Coreggio, he attempted to adopt his principle, and so far succeeded, that he deservedly had, and still has his admirers. But in the works of Baroccio, the red, the blue, and the yellow are too ostentatiously displayed, and want blending; which seems to justify the same critique on them that was made upon the works of Parrhasius, that his figures looked as if they had fed on roses.

The Venetian painters it is true, never entirely lost sight of the genuine principles of colouring; but even in this respect they fell far short of the great founders of their school above-mentioned, and the general frivolity of their taste, too frequently occasions even their merits to be passed by unregarded.

Coreggio had few followers; his divine spirit found not, like that of Donatello, a kindred place of abode amongst his successors; nevertheless, the Lombards preserved a certain richness and harmony of tint, which still, in this particular, entitled them to a higher rank than their contemporaries of lower Italy. The Carracci, towards the latter part of the 16th century, rescued the art from the degeneracy into which it had fallen; and by uniting, as far as they were able, the different beauties of the Roman, Florentine, Lombard, and Venetian schools, produced a new style, and gave their name to an academy eminent for the various talents which it called forth. Their colouring, however, is not so rich as the Venetian, nor so harmonious as that of Coreggio; but it is exempt from glaring defect, simple and tranquil, and well suited to the sobriety and dignity of history painting.

Of Caravaggio, their rival at Rome, it was hyperbolically said, that he dipt his pencil in flesh itself: but we have to regret that the black and opaque shadows which pervade his pictures, probably occasioned in some degree by the perishable nature of some colours which he used, destroy much of that truth of effect, which, from the praises bestowed on him in his life-time, we have grounds for supposing they originally possessed.

The pencil of Guercino is broad, and his tints fresh and vigorous, but his effect is generally more the result of

chiaro-scuro than of any remarkably skillful arrangement of his colours.

The pictures of Guido, in his first manner, possess considerable force of tint; but he afterwards abandoned this style for a mode of colouring weak and insipid: nevertheless, his grace, his knowledge of expression, and his unparalleled freedom of pencilling, gained him innumerable followers; till at length, that which ought to have been considered one of his greatest faults, was numbered amongst his beauties. It is true, that shortly after this period, landscape was carried to the highest pitch of perfection by the Poussins, Salvator Rosa, and Claude Lorraine; the former giving to their pictures a style of colouring at once solemn and impressive, the latter a truth of aerial tint, never before or since attained. Nevertheless, a slight and flimsy manner of colouring became one of the characteristics of the Italian schools, and the deserted daughter of Iris sought an asylum in the less congenial climes of Flanders and Holland.

Amongst the Flemish painters, Rubens undoubtedly holds the first place; and his works, as sir Joshua Reynolds observes, "have that peculiar property always attendant on genius, to attract attention, and enforce admiration, in spite of all their faults." This, however, is not the place for a general inquiry into his merits. With respect to his colouring, we have to observe, that it evinces that exuberance and boldness of genius, which in every other part of the art peculiarly characterises him. It possesses neither the sober richness of Titian, nor the delicate harmony of Coreggio, but seems frequently, by the gorgeous assemblage of tints, to vie with the gaudy of the chaplet or nosegay. It is perhaps, however, a matter worthy of investigation, whether the great variety of colours, introduced by Rubens in the draperies and other parts of his pictures, has not, by the too great equality of their distribution, upon some occasions proved detrimental, rather than advantageous, to the richness and splendour of effect, which at all times seems to have been his principal object; and whether that object would not have been more effectually attained, had he followed the practice of the early Venetians, in giving to two or three colours a more decided pre-eminence.

The style of Vandyke is more pure and chaste. The modest tenderness of his tints gently but irresistibly persuade; and his numerous portraits, by their delicacy and truth of expression, still captivate and interest the beholder, even where the personages they represent have been long buried in oblivion.

Rembrandt is, as Mr. Fuseli observes, a genius of the first class in every thing which relates not to form; but though as a colourist he certainly holds a pre-eminent rank, the effect of his pictures is, perhaps, as we have said of Guercino, more the consequence of his astonishing chiaro-scuro, than of the freshness and vigour of his tints. His works present not the gorgeous combinations of colour found in those of Rubens, or that humid mellowness of tint in the flesh, so much admired in the pictures of Titian and Giorgione; nevertheless, they evince a most powerful conception of harmony, a beautiful gradation of tint, and great solemnity of tone. His lights have a brilliancy peculiarly his own; scarcely more owing to the powerful opposition of his chiaro-scuro, than to the extraordinary method which he used of painting the luminous parts of his pictures with a very great body of colour in almost a dry state; whilst his broad masses of shadow possess a magic transparency, making as it were darkness visible.

It would be endless to enumerate the many admirable colourists of Flanders and Holland, who successively trod the

footsteps of the great artists above-mentioned: indeed, there are few painters of those schools whose works may not be studied with advantage as to this part of the art; the richness and harmony of their tints, the beauty and strength of their chiaro-scuro, and the delicacy of their penciling, comprising their chief excellence. Sir Joshua Reynolds, the great colourist of the last century, fully appreciated their merits: and by combining somewhat of their principle with the different styles of Titian and Coreggio, has succeeded in producing, in not a few instances, a richness and brilliancy of colour, inferior, perhaps, to neither, and, at the same time, different from all. Happy for his reputation, if from an insatiable desire of surpassing, he had not, in so many of his pictures, indulged himself in the use of colours and varnishes, which, like the more delicate blossoms of nature, are the earliest subject to decay.

We have been the more diffuse in our attempt to characterize the principal masters eminent for colouring, as we are aware that so little can be said upon the preceptive part of this branch of art, which, more peculiarly than any other, seems to depend upon the delicacy and perfection of the organs of vision, and the nice discriminations of feeling and judgment. The great artist last-mentioned was perhaps the only colourist who ever wrote upon colouring, and we shall therefore have recourse to the assistance of his admirable discourses, in our attempt to give some idea of the leading principles of this part of the art.

It has already been observed, that chiaro-scuro may exist in the greatest perfection, independently of colours; but colouring, without the aid of lights and shadows, would present us nothing more than the geographical chart or the harlequin's coat; and the study of it must therefore necessarily imply some previous knowledge of chiaro-scuro.

In the commencement of this article we have, for the sake of distinction, divided colouring into two kinds; the *necessary*, and the *expedient or ornamental*: the *necessary* that which denotes truth in the local tints of the objects represented; the *expedient or ornamental*, that upon which the distribution of the parts, and the harmony of the whole, depends. Although it might, upon first consideration, appear difficult to say, which of these two kinds or divisions of colouring requires the greatest exertion of talent; yet there seems little doubt but that examples of a very high degree of truth in the local tints in pictures, are more rarely met with than an equal measure of beauty in the general arrangement of the colours. To this truth of local tint, therefore, the utmost effort of the artist should be directed: nature will be his best guide, and next to her the works of Giorgione, Titian, and Giacomo Bassano in figures, and those of Claude and some of the Dutch school in landscape, and the other inferior departments of painting.

That species or division of colouring, which we have termed the *expedient or ornamental*, is of a very extended range, and may be compared to rhetoric which gives additional lustre to truth, and enables the orator, even where proof is wanting, to support his argument upon specious though fallacious grounds. By a judicious opposition of one colour to another, the skillful painter is enabled to give to each an increased delicacy or an additional splendour; and by the same means a colour may be made to appear different from that which it really is; and thus a semblance of truth in the local tint may be frequently attained, even where that truth is in reality very far from existing. If the tint of the flesh be of too warm a hue, a yellow drapery placed next it, restores it to harmony; if too red, a crimson or a scarlet mantle takes away or diminishes the imper-

fection; if it appear cold, blue or purple opposed to it gives it a proportionable degree of warmth: and thus by contrasting one colour with another, the painter is enabled to give to each the degree of value he desires, according as his subject and the general effect of his work requires. It was the custom of Rubens, when he wished to give brilliancy to the principal figures in his picture, to oppose to the flesh, a map of scarlet drapery, and another of pure white; by these means the tints of the naked parts acquired wonderful air of truth, at the same time that a splendid and harmonious effect was produced.

The balance of cold and warm colours in a picture seems to bear a strong affinity to the gradation or contrast of the chiaro-scuro, and demands equal attention. "A certain quantity of cold colours," says Sir Joshua Reynolds, "is necessary to give value and lustre to the warm colours;" he adds, "that the masses of light in a picture be always of a warm mellow colour, yellow, red, or a yellowish-white; and that the blue, the grey, or the green colours be kept almost entirely out of these masses, and be used only to support and set off these warm colours; and for this purpose a small proportion of cold colours will be sufficient." "Let this conduct be reversed;" continues this excellent writer, "let the light be cold, and the surrounding colours warm, as we often see in the works of the Roman and Florentine painters, and it will be out of the power of art, even in the hands of Rubens or Titian to make a picture splendid and harmonious. The illuminated parts of objects are in nature of a warmer tint than those that are in the shade: what I have recommended therefore is no more than that the same conduct be observed in the whole, which is acknowledged to be necessary in every individual part. It is presenting to the eye the same effect as that which it has been accustomed to feel, which in this case, as in every other, will always produce beauty; no principle therefore in our art can be more certain, or is derived from a higher source."

We have treated of the doctrine of reflections in our observations on chiaro-scuro; (see *CLAIR, Obscure*) it is proper, however, in this place to observe, that the body which receives a reflected light, receives, together with that light, somewhat of the colour of the object which gives the reflection; and this, in proportion to the strength of light on the body reflecting, and the vicinity of such body to that receiving the reflection. The skillful management of reflections is so indispensable a part of colouring, that it cannot employ too great a share of the student's attention: an excellent insight into the principles of it will be afforded him by the works of Rubens and Jordans; not perhaps the less so from these masters having marked the reflections in their pictures with a precision and distinctness, perhaps even beyond what is warranted by the appearances of nature herself.

With respect to the application of colouring, it should always be remembered, that like the other parts of the art, it is of a nature powerfully to contribute to the sentiment and expression of a picture; when the style adopted is in strict conformity with the character of the subject represented. This conformity is therefore the first thing to be considered. If the subject is awful or melancholy, a grave sombre tone of colour will be appropriate; if gay or magnificent, the most brilliant and gorgeous tints may be freely used. The dark hue given by Michelagnolo Buonarroti to his celebrated group in the boat, in the last judgment, with the cold light behind it, renders it perhaps not less a masterpiece of colour, than the Venus and Adonis of Titian, or the sleeping Nymphs of Rubens.

The following remarks of the author before cited seem highly applicable to the present purpose. "To give a general air of grandeur at first view, all trifling or artful play of little lights, or an attention to a variety of tints is to be avoided; a quietness and simplicity must reign over the whole work; to which a breadth of uniform and simple colour will very much contribute. Grandeur of effect is produced by two different ways, which seem entirely opposed to each other. One is, by reducing the colours to little more than chiaro-scuro, which was often the practice of the Bolognian schools; and the other, by making the colours very distinct and forcible, such as we see in those of Rome and Florence; but still the prevailing principle of both those manners is simplicity. Certainly nothing can be more simple than monotony; and the distinct blue, red, and yellow colours which are seen in the draperies of the Roman and Florentine schools, though they have not that kind of harmony which is produced by a variety of broken and transparent colours, have that effect of grandeur which was intended. Perhaps these distinct colours strike the mind more forcibly, from their not being any great union between them; as martial music, which is intended to rouse the nobler passions, has its effect from the sudden and strongly marked transitions from one note to another, which that style of music requires; whilst in that which is intended to move the softer passions, the notes imperceptibly melt into one another."

It is not our intention here to detail the various modes adopted by artists in mixing their colours and varnishes, or the modes of preparing the different kinds of grounds used for painting on. Every school, and, more or less, every individual differs in his practice from another; and works of so high a class have been produced by each of these different methods, that we must conclude them all to be right, when rightly applied. However, in one point, the best colourists seem to agree, that the light parts of a picture should be painted with a strong body of colour, and the shadows with as much transparency as possible; and this is the more natural as well the easiest mode of procedure, as all the light colours, and particularly white, are opaque; whereas all the dark colours are in a greater or less degree transparent.

COLOURING of Glass. See GLASS.

COLOURING of Earthenware. See GLAZING.

COLOURING Matter. For a general account of the nature of colouring matter, see DYING, *the art of*; for the principal colouring materials, such as cochineal, indigo, madder, &c. see these articles respectively.

COLOURING of Porcelain. See PORCELAIN.

COLOURING of Spirits. See SPIRITS.

COLPE, in *Ancient Geography*, a town of Asia Minor, built, according to Pliny, in the place of *Archeopolis*.

COLPEDI, or **COLPIDICI,** a people of Thrace, who inhabited the environs of *Aenos*. Steph. Byz.

COLPISCIS, a name given by some to the *felix Venetorum*, or sickle-fish, commonly called the marmot fish by the people of Venice. See FALX.

COLPODA, in *Zoology*, a genus of animalcules (*vermes infusoria*) distinguished by being of a simple form, pellucid, flat, and sinuate.

These worms are invisible to the naked eye. They have been discovered and examined, chiefly by Müller, Adams, Joblot, and other curious writers, whose attention has been particularly devoted to microscopical investigations. Of the genus *colpoda*, seven species only appear to be described.

LAMELLA. Elongated, membranaceous, and bent on the anterior part.

This resembles a long, narrow, pellucid membrane, which is narrower and obtuse behind, curved towards the upper part, and has a ridge or fold passing through the middle. It is found in water, and when it moves is observed to proceed on the edge instead of flat surface. Found in common water.

ROSTRUM. Oblong, and hooked on the anterior part.

Discovered in water more pure than the former. The posterior part of this species is obtuse, and one of the edges from the top to the middle is dilated, thick, and apparently triangular.

MELLAGRIS. Changeable, with the anterior part hooked, and the posterior folded up.

Lives in water impregnated with vegetables, and is of a variable form, the anterior part clear, the posterior full of molecules, with the margin sinuous.

CUCULLUS. Ovate, ventricose, with an incision beneath the tip.

Generally oval, and containing from eight to twenty-four bright molecules, the margin irregular. Common in a variety of vegetable infusions.

REN. Thick, and sinuate in the middle.

Described by Joblot, who discovered it in the infusions of hay. The form is slightly kidney-shaped, of a yellow colour, opaque, and filled with molecules.

PYRUM. Convex, oval, the tip produced into a beak.

The body is transparent, of a pale colour, and filled with molecules.

HIPPOCREPIS. Thick, narrow in the middle, semilunar, and greenish. Found in stagnant meadow water.

COLPUSA, in *Ancient Geography*, one of the ancient names of *Chalcedon*, according to Pliny.

COLSA, a town of Asia, placed by Ptolemy in Armenia.

COLSIR, in *Geography*, a town of Asia, in the country of Thibet; 50 miles N.E. of Harachar-Hun.

COLT, in *Zoology*, See FOAL and HORSE.

COLT'S foot, in *Botany*. See *Tussilago Farfara*.

COLT'S foot, alpine. See *CACALIA Petajites*.

COLTHENA, in *Ancient Geography*, placed by Ptolemy near the Araxes, and N. of Saducena.

COLTIE, among the *Timber Merchants*, a word used to express a tree which has a defect in some one of its annual circles, which renders it unfit for many of the uses it might have been otherwise fit for. In this case some one of the annual circles near the centre is perceived by the eye to be thicker than the rest, and its sap vessels larger. It has an appearance much different from that of the others, and is so loosely connected both to its investient, and investient circles, that, on sawing a transverse piece of the trunk off, it will slip out from the others, and so leave the heart loose, and the rest hollow, seeming to have been only fitted, not connected, to the others. In splitting the wood for other uses, it yet more readily drops out, and the timber of such a tree is therefore much less fit for general use than that of others.

It is not easy to say to what accident, in the growth of the tree, this is owing, but it seems probable that it exposes the tree to other accidents; in particular Bobart seems to think, that among the trees which were split by the hard frost, in the year 1683, while other trees of the like sizes and kinds escaped, this *coltiness* might be the occasion of the mischief, as well as of their being wind-shaken, or lagged. Philol. Trans. N^o 165.

COLUBÆ, in *Ancient Geography*, a people of India, placed by Ptolemy on the other side of the Ganges, and near to it.

COLUBER, in *Zoology*, a genus of serpents distinguished

griffed by having plates on the belly, and scales on the under parts of the tail.

The species of this genus are numerous. Linnæus describes, upon the testimony of various writers, above ninety; and that number even has been considerably augmented by naturalists since his time. The species differ greatly in size and habit; some, as the vipers having the head large, flat-tail, and semi-concated, with the body and tail of a moderate length, or rather short; while others, as the greater part of the harmless serpents, have small heads, with the body and tail much longer in proportion. In some, exclusive of the nital scales under the tail, are a few scuta or undivided lamellæ, either at the beginning or towards the tip of the tail. The best works on this tribe of reptiles are "Synopsis methodica animalium Quadrupedum et Serpentinæ generis," of Ray. "Synopsis Reptilium," &c. of Laurenti; and those of Seba and Catesby. The observations of Boddaert, "Specimen novæ methodi distinguendi Serpentina." Nov. Act. Acad. Nat. Cur.; and "Bechereibungereiner Schlange," &c. of Siegel. The papers of Mr. Ellis, and another by Dr. Gray in the Philosophical Transactions, relative to venomous serpents, are also interesting. Several of those described by count La Cèpede deserve particular attention. Professor Pallas mentions some new kinds observed in Russia and Siberia; others are mentioned by Sparman, and a number of the viper tribe occur in the "History of the Indian Serpents," published by the late Dr. Ruffell.

Linnæus considered the number of abdominal plates and scales under the tail as a characteristic distinction of the different species of this genus; such, however, is the inconsistency of this criterion that, in describing the same species, scarcely two writers agree. Characters taken from the number of those plates and scales in the serpent tribe, like those from the number of rays in the fins of fishes, are not to be relied upon. The colours are liable to some variation; but the peculiar form and disposition of the spots, lines, and other markings, afford, in general, a character by which the different species may be distinguished.

Species.

VIPERA. Somewhat ferruginous, spotted with brown; beneath whitish; tail short and mucronated.

Abdominal scuta 118, subcaudal scales 22. Linn. Haffselg. Aët. Upf. 1750. *Apis Cleopatrac*, Laurenti.

This is the common viper of Egypt. Hasselquist, who appears to have first described the species with accuracy, informs us, that it is imported in considerable quantities every year to Venice for the use of the apothecaries. Its size is somewhat smaller than that of the common viper; the head not so flat on the top, but very protuberant on each side; snout very obtuse. The body is thick towards the middle, and somewhat quadrangular, but thin, and cylindrical towards the head and tail, which last is short, slender, conical, and terminated by a slightly incurved horny point or tip. The scales on the upper parts are oval and carinated. Hasselquist describes this species as being about two spans in length, exclusive of the tail, which measures only an inch. This is supposed by some to be the asp, by the bite of which the celebrated Cleopatra is supposed rather to die than submit to be carried captive to Rome, to grace the triumph of Augustus. Mr. Bruce, on the contrary, considers the Cerastes to be the species employed on that momentous occasion. Schneider is of opinion, that the Egyptian viper (*C. vipera*) must be the true *aspis* of the ancients, a reptile which was popularly reported to kill by occasioning the most excessive thirst.

VARIEGATUS. Above chestnut, variegated with grey and white; beneath, and on the sides, pale yellow. *Apis variegata*, Laur. Amph. Seba, &c.

Considered as a native of America, and resembles the last.

VENOSUS. Reddish ash, with white transverse veins; head long. *Apis vesella*, Laur. Amph. Seba.

A native of America, and is probably only a variety of *C. vipera*.

INTESTINALIS. Body equal, slender, with a lateral and longitudinal dorsal line, the last furcated near the eyes. Laur. Amph. Seba.

Inhabits Africa, and like the former is perhaps merely a variety of *C. vipera*.

LEBUS. On the head a bilobate spot; body above cinereous (or reddish) with a black flexuous zig-zag stripe down the back, and belly purplish. *Calyx lebus*, abdominal scuta 146, subcaudal scales 72. Linn. Fu. Succ. Amoen. Acad. 148—42. We gel Abh. der Halb. 177—86. Scop. *Vipera*. Gæfner Aldr.

This is the common English viper, and which is not only frequent in this country, but appears to be generally diffused over the rest of Europe, and some parts of Asia. If the varieties, described by Gmelin, are of the same species, it extends also as far as India. The var. β of this author has the spots on the top of the head roundish, and somewhat confluent or running into a stripe; the sc on near the tail transverse. This inhabits India. 1. Reddish with the head variegated; neck slender. A native of St. Eustace. 2. The arch of the hind head intercepting a white spot. Inhabits India. 3. Spot on the head multipartite. Inhabits the Celebes. The whole of those varieties are described and figured in the works of Seba.

Though the viper varies considerably in colour from a pale cinereous or yellowish ferruginous to deep or dull brown, the varieties agree in being marked with a continued series of confluent rhomboid blackish spots, extending from the head to the tail. The head is broad, and somewhat flattened, and is more or less protuberant on each side at the back part; the front of the head is blackish, and on the upper part is a large divided and somewhat heart-shaped spot, the obtuse divisions of which are directed backwards; the lips are somewhat barred or variegated with black and light grey, and along each side of the body runs a row of roundish subtriangular dusky spots, continuing to the end of the tail. The scales on the upper part of the body are carinated, the under parts of a blackish colour, with a blueish gloss somewhat resembling that of polished steel. The general length of the viper is from eighteen inches to two feet, and it is affirmed by some writers to grow even to the length of three feet. The fangs of the viper, like those of other poisonous serpents, are situated on each side the fore part of the upper jaw, and are generally two in number, with a few smaller ones situated behind. The poison, as usual, lies in a receptacle at the base of the fangs, and being perforated, when the animal bites, the compression of those receptacles forces out a drop of the poisonous fluid, which passing through the aperture of the fangs is immediately injected into the wound. The tongue is forked, and being soft and flexible is susceptible of great extension: it may be perhaps superfluous to add that this tongue is altogether incapable of inflicting any wound, or injecting poison, as some ancient writers credulously affirm; it may assist the animal in the capture of its insect prey. The French naturalists are inclined to believe it is intended by nature to supply some defect of transpiration in the skin.

Hitherto the viper has been considered the most poisonous of

of the European serpents, and many instances are recorded of the fatal effects resulting from its bite. That the bite of this serpent is always productive of pain and temporary inflammation in the parts bitten is very evident; sometimes also the symptoms may become alarming, or, in a few instances, through neglect or injudicious treatment of the wound, may even prove fatal; but upon the whole the bite of this creature does not appear pregnant with all those dangers which the terrors and prejudices of the vulgar lead them to suppose. In England the bite of the viper is rarely attended with fatal consequences. Fontana seems to doubt whether any well attested instance can be adduced of the viper having killed any person by its bite, even in the warm climate of Italy. The testimonies of authors, both as to the nature of the poison itself, and its effects on the animal frame are, however, confessedly at variance. According to Dr. Mead, and his associates in the experiment, the poison of the viper, diluted with a little warm water, proved sharp and fiery when tasted with the tip of the tongue, as if the tongue had been struck through with something scalding or burning. This sensation went off in two or three hours; but one gentleman, who would not be satisfied without trying a large drop undiluted, found his tongue swelled with a little inflammation; and the forelegs lasted two days. On the contrary, abbé Fontana and some others describe it as of no particular acrimony of taste, but rather resembling oil or gum, and Dr. Russell, in his work on Indian serpents, affirms the same even of the poison of the cobra de capello. Boerhaave is of opinion that the poison of the viper may be taken into the stomach without danger, and quotes the case of Jacob Sozzi, who, at the court of the duke of Tuscany, is said to have swallowed three drams of this poison without experiencing any ill effects. This poison, says Boerhaave, is rendered inactive by digestion in the stomach and bowels, so that it will not afterwards exert its sad effects upon the blood; for a whole ounce of the venom taken by the mouth will not kill an animal, when, at the same time, a small needle only, dipped in the same fluid, taking up perhaps no more than a hundredth part of a drop, and then thrust into the blood of the living animal, almost infallibly kills. Fontana, on the contrary, affirms, that though the poison of the viper administered internally may not produce the same violent symptoms as the bite, that it cannot be taken with impunity. The opinion, pretty generally entertained among the ancients, seems to be in favour of the assertions of Boerhaave.

The symptoms which follow the bite of the viper (according to Dr. Mead) when it falls either one or both its greater teeth or fangs in any part of the body, is an acute pain in the part wounded, with a swelling at first red, but afterwards livid, which, by degrees, spreads further to the neighbouring parts, and occasions great faintness, and a quick, though low and sometimes interrupted pulse; great sickness at the stomach, with bilious, convulsive vomitings, cold sweats, and sometimes pain about the navel; and if the cure be not speedy, death itself, unless the strength of nature prove sufficient to overcome those disorders: and though it does, the swelling still continues inflamed for some time; nay, in some cases, more considerably upon the abating of the other symptoms than at the beginning; and often from the small wound runs a sanious liquor, and little pustules are raised about it: the colour of the whole skin, in less than an hour, is changed yellow, as if the patient had the jaundice. These mischiefs (although different climates, seasons of the year more or less hot, the greater or less rage of the viper, the animal itself being of a larger or smaller size, and consequently able to communicate more or less

venom, the wound made deeper, in a part more nervous or tendinous, and therefore receiving more of the poisonous liquor, and the like circumstances may variously heighten or abate them,) yet usually discover themselves much after the same manner in all; unless the bite happen not to be accompanied with the effusion of this liquor, which is the main instrument and cause of this violent and shocking disturbance." Dr. Mead caused several animals, as dogs, cats, and pigeons to be bitten by an enraged viper, which animals generally died, some in a longer and others in a shorter space of time; but it was observed that, immediately after being bitten, they all exhibited signs of acute pain as if affected with sickness, faintings, and convulsions. The venomous properties of the poisonous fluid of the viper is not destroyed even by the death of the animal, as was proved by Dr. Mead; he took the head of a large viper that lay three hours after it was cut off, and was perfectly flaccid and without motion, and wounded a pigeon on the thigh by the fangs of the head; the bird presently became convulsed, and died seven hours after. The Scythians, as Pliny relates, must have been aware that the poison of the viper would retain its venomous properties after being taken from the animal and dried, for they were accustomed to dip their arrows into its poison; this they previously prepared by mixing it with human blood.

From the following experiment it would seem that no very material difference takes place in the appearance of an animal killed by the bite of the viper, than if its death were occasioned by any other cause. To ascertain this fact, a viper, being enraged by the members of the Tuscan academy, and then suffered to bite the nose of a strong bull, the animal expired in a short time, and being opened by the most expert anatomists, no uncommon alteration could be perceived either in the solid or fluid parts of the beast.

The viper, though so much dreaded on account of its bite has been very highly esteemed both by the ancients and moderns as a restorative and strengthening diet. The ancients used the flesh of this snake in leprosy and other cases. The Greek physician Craterus, cured, as Porphyrus relates, a miserable slave, whose skin, in a strange manner, fell off from his bones, by advising him to feed on viper's flesh in the manner of fish. Galen says, that those afflicted with elephantiasis are wonderfully relieved by eating viper's flesh dressed like eels, and relates very remarkable cures of this disease performed by means of viper wine. In France and Italy, the broth, jelly, and flesh of vipers is in much esteem as a restorative medicine. In England we have to instance the well known circumstance of sir Kenelm Digby, who caused his wife lady Veneta to feed on capons fattened with vipers to recover her from a consumption. According to Dr. Lewis, the dried flesh of the vipers possesses none of the nutritious properties of the recent animal, and is totally insignificant. A volatile salt was formerly drawn from vipers and sold at a great price as a sovereign remedy against the bites of vipers, and other poisonous animals, but it is now found not to be materially different from the volatile alkaline salts procured by distilling other animal substances.

The viper abounds most in dry, stony, and chalky countries, or in the low herbage or underwood in thickets. It casts its skin twice in the year, namely, in spring and autumn, and is said to attain its full size at the age of six or seven years, but are capable of engendering when two or three years old. They copulate in May, and go about three months with young. "The viper (says Mr. White) is viviparous, producing its young towards the close of summer. On the 4th of Aug. 1755, we surprized
a large

a large female viper, which seemed very heavy and bloated as it lay on the grass, basking in the sun. When we came to cut it up, we found that the abdomen was crammed with young, fifteen in number; the shortest of which measured full seven inches, and were about the size of full grown earth worms. This little fry shewed into the world with the true viper spirit about them, showing great artfulness as soon as disseparated from the belly of the dam: they twisted and wriggled about, and set themselves up, and upon very wide, when touched with a stick, showing a marked degree of menace and defiance, though as yet they had no manner of fangs that we could find, even with the help of our glasses." In the month of May a female viper was opened, which had in it a chain of eleven eggs, about the size of those of a black bird, but not so far advanced as to show the rudiments of the young. Several intelligent folks (adds Mr. White) assure me that they have seen the viper open her mouth, and admit her helpless young down her throat on sudden surprizes, just as the opossum does her brood into the pouch under her belly upon the like emergencies; and yet the London viper catches itself on it to Mr. Burington that no such thing ever happens.

Sir Thomas Brown seems inclined to believe this circumstance: the young, he observes, supposed to break through the belly of the dam, will, upon any fright, for protection, run into it; for then the old one receives them into her mouth, which way, the fright being past, they will return again, which is a peculiar way of refuge, and although it seems strange is avowed by frequent experience and undeniable testimony. The same is asserted by some other writers of no mean respectability.

The enemies of the viper are numerous, the herons in particular destroy vast numbers. Their prey consists of frogs, toads, lizards, mice, and various small quadrupeds. The viper is capable of supporting a very long abstinence; it being known that some have been kept in a box without food for six months, and yet did not abate of their vivacity. They feed only for a short period annually, and as a viper has been known to be a whole month devouring and digesting a frog or toad, two such meals would be sufficient to support it for a twelve month. It is remarked, that they never eat during confinement, for if mice, their favourite food be thrown into their box, though they will kill they never eat them. The violence of their passion decreases in proportion to the length of their confinement. Vipers, when at liberty, remain torpid throughout the winter, but when confined have never been known to take their annual repose. The best method of catching them is by putting a cleft stick on or near the head, then seizing them by the tail, and instantly dropping them into a bag. The viper catchers are frequently bit, but it is seldom the wound proves fatal: oil of olive, or fluid oil, is said to be the most effectual remedy. M. Sonnini seems fully satisfied of the efficacy of *eau de luce* as an antidote to the poison of vipers as well as other venomous serpents, the good effects of which he tells us he has experienced on several occasions, and particularly at Guiana, where snakes are equally numerous and formidable. In his travels through Greece and Turkey, M. Sonnini mentions an instance of a child he saw at Sifour, three or four hours after it had been bitten by a viper or venomous snake, in the small of the leg. Both the leg and foot were much swelled, very hard, and of a bluish colour: the child suffered great pain, the wound no longer appeared, and the place was not distinguished but by a larger swelling, and by pains more acute, which were occasioned by touching it. He made the child swallow a few drops of *eau de luce* in half a glass of wine, and after

some scarifications on the part bitten applied to it, a compress, steeped in this same water, which is known to be composed of volatile alkali and oil of amber. The result of this treatment was, that four hours after, the swelling was considerably diminished; the child no longer felt any pain, and became tranquil; the compress of *eau de luce* was renewed, and the child left in a fair state for recovery. The same application is recommended by Sonnini in all snake bites; he observes, that the swelling of the wounded part is speedily diminished, and the pain entirely removed by the means; but the *eau de luce* must be taken internally, according to this writer, as well as applied to the wound externally, in order to produce the desired effect. The remedies which the Greeks commonly employ for curing the bite of snakes, as Sonnini affirms, consist in cauterizations of excellent plants, calculated to promote suppuration. Sore throats is reckoned among them to possess, particularly, a specific virtue against this sort of venom. But this treatment, he adds, is very long; it frequently lasts two months, and never less than one; neither is it always successful, and does not very frequently carries off the patient from the torments which this mode of treatment causes him to suffer.

PREFTER. Black, with deep black, dentated, dorsal line. *Coluber prester*, abdominal teata 152, subcaudal scales 32. *Linn. Fa. Suec.* 287. *Lapech Icon. Colubr. viperæ anglicanæ*, Laur. *Viperæ anglicæ nigricanæ*, Petiv. Mus.

This is the black viper of English authors, and which so completely resembles the common viper in every particular, except the colour, that we are strongly inclined to admit it as a mere variety of that species. The black viper of Austria appears from a series of experiments made by Laurenti to be innocuous, since pigeons and chickens exposed to its bite were no otherwise injured than by mere puncture without suffering any symptoms of poison, but it is not entirely certain that the kind described by Laurenti is of the same species as the black viper generally found in Europe, and which is almost universally allowed to be as poisonous as the common viper.

Prestor inhabits the northern parts of Asia as well as Europe.

CAECOPHON. Deep black; head broad and tumid; body thick. *Black viper*. Catby, Car 1.

This kind is about the size of the common viper, but of a much thicker form, and entirely of a rusty black colour; it is slow in its motions, and, when irritated, quarts the head, which is naturally large, to a surprising width, and threatening at the same time with a horrid hiss; the fangs are large, and the animal is said to be as dangerous as the rattlesnake.

It is a native of Carolina, inhabiting chiefly the higher grounds.

CHERSEA. Dusky-bay, with black flexuous dorsal band, and the head oval, and whitish beneath. *Coluber chersæa*, abdominal teata 150, subcaudal scales 34. *Linn.*

Inhabits the woody parts of Sweden, and is said to be most frequent in the province of Smoland, where it is greatly dreaded by the inhabitants, who consider its bite as mortal, unless the part bitten be immediately cut out. In the "Memoirs of the Swedish Academy" is an account of a young man, a labourer, bit by this animal on the toe of the left foot. In the space of six hours, the whole leg and thigh were red and swelled; the pulse intermitted, and the patient was oppressed with pains in the head and bowels. The first day the patient drank a glass of the juice expressed from ash-leaves mixed with wine every half hour, and had besides a cataplasm of the bruised leaves applied

to the wound; in the evening also, he took a glass of warm olive oil. By these means the patient was greatly relieved, slept well during the night, and found the swelling much reduced by the next morning; but neglecting to repeat the remedies the first symptoms returned, and were again dissipated by the same applications, and in two or three days the patient recovered. Linnæus attempted to cure a woman wounded by the bite of a viper of this kind by means of olive oil, but his endeavours were unsuccessful, and his patient died.

The *Coluber chersæa* resembles the common viper, but still more the common asp, though inferior in size, not often exceeding a span in length. The colour is a dusky rufous brown, with a fuscous dorsal band of a deeper colour; the head ovate, of a pale colour, and marked with a heart-shaped dusky spot, the divisions of which are directed backwards, and the body is round.

SCYTHA. Deep black above, beneath milk white, and polished. *Coluber scythæ*, abdominal scuta 153, subcaudal squamæ 31. Pallas It.

Inhabits woods in the mountainous parts of Siberia, where it was observed by Dr. Pallas. This species is not esteemed very poisonous, and is of a small size, seldom exceeding nine inches in length, or the thickness of a finger; the head is somewhat heart-shaped.

REDI. Head imbricated with very minute scales; body ferruginous, with a quadruple transverse dorsal series of short brown streaks. *Coluber redi*, abdominal scuta 152, subcaudal squamæ 33. Cmel. *Vipera francisci redi*, Laur. Oter, Meyer Thiere.

Allied to the common viper, but esteemed more poisonous; it differs in being marked throughout the whole length of the upper parts, with a quadruple series of short, transverse, alternate streaks, of which the intermediate ones are often confluent. The colour of the underparts is rufous, especially towards the head and tail. This kind is found in Austria and Italy near the sea.

CERASTES. Sub-ferruginous, with brown transverse spots, and horned eye-lids. *Coluber cerastes*, abdominal scuta 150, subcaudal scales 25. Hasselq. Act. Ups. 1750. Linn. *Cerastes ex hybia*, Aldr. *Cerastes*, Bellon, Ellis Puil. Transf. *Cerastes*, Bruce's Travels Append. *La vipère céreste*, La Cépède.

The cerastes viper grows to the length of eighteen inches or two feet, and is distinguished by a pair of horns, or curved processes situated above the eyes and pointing forwards; these horns have nothing analogous in their structure to those of quadrupeds, neither are they to be considered as weapons either offensive or defensive, but they contribute to give the animal an appearance of more than ordinary malignity. The cerastes is a native of many parts of Africa, and is found principally in sandy deserts and dry places. In Syria and Arabia it is particularly frequent, and is also found in many parts of Egypt.

The general colour of this snake is a pale yellowish or reddish brown, with darker spots disposed at a distance from each other, and in a somewhat transverse direction along the back, and near the sides, the belly is blueish, or of a pale lead colour, and some writers say occasionally almost white. In its manners the cerastes bears a very great affinity to the common viper, but is still more to be dreaded than that species, as its bite is very dangerous, and the animal is said to spring suddenly to a considerable distance, and assail without provocation those who happen to approach it.

According to Mr. Bruce, the cerastes inhabits the greatest part of the eastern continent, especially the desert sandy part of it. It abounds in the three Arabias, and in Africa,

I never saw (says Mr. Bruce) so many of them as in the Cyrenaicum, where the jerboa is frequent in proportion. He is a great lover of heat; for though the sun was burning hot all day, when we made a fire at night, by digging a hole and burning wood to charcoal in it for dressing our victuals, it was seldom we had fewer than half a dozen of these vipers, who burnt themselves to death by approaching the embers. The general size of the cerastes from the extremity of its snout to the end of the tail, Mr. Bruce tells us, is from thirteen to fourteen inches; in the British Museum, however, is a specimen measuring rather more than two feet, and in that of Paris another still larger. The head is triangular, very flat, but higher near where it joins the neck than towards the nose. The length of its head, from the point of the nose to the joining of the neck, is ten-twelfths of an inch, and the breadth nine-twelfths of an inch; between its horns is three-twelfths. The opening of its mouth, or rictus oris, is eight-twelfths; its horns in length three-twelfths; its large canine teeth summing more than three-twelfths and a half; its neck at the joining of the head four-twelfths; the body, where thickest, ten-twelfths; its tail, at the joining of the body, two-twelfths and a half; the tip of the tail one-twelfth; the length of the tail an inch and three-twelfths; the aperture of the eye two-twelfths, but this varies according to the impression of light. The cerastes has sixteen small immovable teeth, hollow, crooked, inwards, and of a remarkably fine polish, white in colour, inclining to blueish; nearly one-fourth of the bottom are strongly fixed in the upper jaw, and folds back like a clasp knife, the point inclining inwards, and the greatest part of the tooth is covered with a green soft membrane, not drawn tight, but, as it were wrinkled, over it, immediately above this, is a slit along the back of the tooth, which ends nearly in the middle of it, where the tooth curves inwardly. From this aperture, Mr. Bruce imagines, and not without reason, that the cerastes sheds its poison, instead of from the point, where, with the best glasses he could never perceive an aperture; so that the tooth is not a tube, but hollow only half way; the point being calculated for making the incision, and by its pressure occasioning the venom in the bag at the bottom of the fang to rise in the tooth, and spill itself through the slit into the wound. By this flat position of the tooth along the jaw, and its being defended by the membrane, it eats in perfect safety; for the tooth cannot press the bag of poison at the root, while it lies in this position, nor can it rise in the tube to spill itself, nor can the tooth make any wound so as to receive it; but the animal is supposed to eat but seldom or only when it is with young. This viper has only one row of teeth. The poison is very copious for so small a creature, being fully as much as a drop of laudanum dropped from a phial by a careful hand; it is of a yellow colour, and viewed through a glass is not perfectly transparent or pellucid.

During the day time the cerastes hides itself in the sand, where it lives in dens similar to those inhabited by the jerboa. Mr. Bruce kept two of the cerastes in a glass jar, such as is used for keeping sweetmeats in, for the space of two years, without having given them any food; they did not sleep that he observed in winter, but call their skins the last days of April. The cerastes moves with great rapidity, and in all directions, forward, backward, and sideways. When he inclines to surprize any one, who is too far from him, he creeps with his side towards the person, and his head averted, till judging his distance, he turns round, springs upon him, and fastens upon the part next to him. Mr. Bruce saw one of them in a house at Cairo crawl up the side of a box in which there were many, and there lie still as if hiding nim-

self; till one of the people who brought them to us, came near him, and though in a very disadvantageous posture, kicking, as it were, perpendicular to the side of the box, he leaped near the distance of three feet, and fastened between the man's fore-finger and thumb, so as to bring the blood. The man shewed no sign of either pain or fear, and Mr. Bruce and his party kept him with them full four hours without his applying any sort of remedy, or seeming inclined so to do. To make himself assured that the animal was in its perfect state, Mr. Bruce made the man hold the cerastes by the neck, so as to force him to open his mouth, and lacerate the thigh of a pelican, a bird he had tamed as large as a swan. The bird died in about thirteen minutes, though it was apparently affected in about fifty seconds, and this even can scarce be considered as a fair trial, because a few minutes before it had bit the man, and so discharged part of its virus, and it was made to scratch the pelican by force, without any irritation or action of its own.

It appears not only on the testimony of the above circumstance, but on the relations of travellers in general of the greatest respectability, that the natives of the countries infested by the cerastes, have a method of charming, or rather stupefying these and other serpents to prevent their biting, or to render their bite innocuous, however irritated the animal may be. Some pretend to possess preternatural powers over those reptiles, while others say, they have certain preparations with which they anoint themselves to obviate the fatal consequences of their bite, and which is never ineffectually employed. Mr. Bruce speaks at some length on this interesting topic (a long dissertation (says this writer,) would remain on the incantation of serpents. There is no doubt of its reality, the scriptures are full of it, all that have been in Egypt have seen as many different instances as they chose. Some have doubted that it was a trick, and that the animals so handled, had been first trained and then disarmed of their power of hurting; and, fond of their discovery, they have rested themselves upon it without experiment, in the face of all antiquity. But I will not hesitate to aver that I have seen at Cairo, (and this may be seen daily without trouble or expence) a man who came from above the catacombs, where the pits of the mummy birds are kept, who has taken a cerastes with his naked hand, from a tumber of others lying at the bottom of the tub, has put it upon his bare head, covered it with the common red cap he wears, then taken it out, put it in his breast and tied it about his neck like a neck-lace; after which it has been applied to a hen and bit it, which has died in a few minutes; and, to complete the experiment the man has taken it by the neck, and beginning at the tail has ate it as one would do a carrot, or stock of celery, without any seeming repugnance."

"We know from history, that where any country has been remarkably infested with serpents, there the people have been secured by this secret. The Pfylli and Marmarides of old, undoubtedly were defended in this manner."

"Ad quorum cantus mites jacuere carastæ."

Sil. Ital. lib. iii.

"To leave ancient history, I can myself avouch, that all the black people in the kingdom of Senaar, whether Fungee, or Nuba, are perfectly armed against the bite of either scorpion or viper. They take the cerastes in their hands at all times, put them in their bosoms, and throw them at one another, as children do apples or balls, without having irritated them by this usage so much as to bite. The Arabs have this secret naturally, but from their infancy they acquire an exemption from the mortal consequences attending

the bite of these animals, by chewing a certain root and washing themselves, (it is not anointing) with an infusion of certain plants, in water. One day when I was sitting with the brother of Shekh Adelan, prime-minister of Senaar, a slave of his brought in a cerastes, which he had just taken out of a hole, and was using with every sort of familiarity; I told him my suspicion that the teeth had been drawn, but he assured me they were not, as did his master, Kitton, who took it from him, wound it round his arm, and, at my desire, ordered the servant to carry it home with me. I took a chicken by the neck and made it flutter before him, his seeming indifference left him, and he bit it with signs of anger, the chicken died almost immediately;—I say his seeming indifference, for I constantly observed that however lively the viper was before, yet, upon being seized by any of these barbarians, he seemed as if taken with sickness and feebleness, frequently shut his eyes, and never turned his mouth towards the arm of the person who held him. I asked Kitton how they came to be exempted from this mischief? He said they were born so, and so said the grave and respectable men among them. Many of the lighter and lower sort talked of enchantments by words and by writing, but they all knew how to prepare any person by medicines, which were decoctions of herbs and roots. I have seen many thus armed for a season, do pretty much the same feats as those who possessed the exemption naturally; the drugs were given me, and I several times armed myself, as I thought, resolved to try the experiment; but my heart always failed me when I came to the trial; because, among those wretched people, it was a pretence that they might very probably have sheltered themselves under that I was a Christian, and that it had no effect upon me. I have still remaining by me a small quantity of this root, but never had an opportunity of trying the experiment."

Among the writers of antiquity we find abundant mention of the Pfylli, or serpent-eaters; men who pretended to possess the inherent power of charming serpents, and of devouring them without danger. Lucan speaks of the practice of the Pfylli, or African tribes, and informs us they were employed by Cato to attend his expedition through the Lybian deserts, for the recovery of his soldiers bitten by serpents. Strabo tells us the Pfylli, or men of Crene, possessed a secret antidote against the poison of those reptiles. It appears equally certain that there are tribes of men in the East, who, to this day practise the same arts. Savary relates that when at Rosetta, he was present at the festival of Sidi Ibrahim, in which the rear of a procession composed of the different trades, and chiefs, or priests of the country, bearing the standard of Mahomet, was brought up by a troop of these modern Pfylli. Those men, says Savary appeared frantic, with naked arms, their eyes wild, and enormous serpents in their hands, which twined round their bodies and endeavoured to escape. They seized the serpents forcibly by the neck, avoided their bite, and, regardless of their hisses, tore them with their teeth and eat them alive, while the blood streamed from their defiled mouths; other Pfylli struggled with them to free away their prey, for the contention was who should devour a living serpent!—The astonished populace followed, and cried—a miracle!

The remarks of Sonnini, one of the latest writers on this subject, may not prove uninteresting in conclusion. "The East, says he, was at all times the country of magicians: men boasting to have the power of charming serpents, of braving their bite, and their venom, of rendering them docile to their voice; they formerly existed there under the name of Pfylli, and there are still to be found, people who pretend

pretend to have inherited their secrets. I knew one of those versed in this kind of fascination; he was certainly the most ignorant, and most foolish of the Greeks: his secret consisted chiefly in thirteen words, which it was necessary to pronounce in sight of the serpents. He told me also, that, in order to guard against the bite of these reptiles, it was necessary to try to take one alive with the precaution of seizing it strongly by the neck so as to prevent it from biting, and not to concern myself about the body and tail, the twistings of which lightly squeeze the arm. You must then slip round its neck a running knot made with coarse thread, and draw it tight by degrees till the animal is strangled. When it is on the point of dying, you open it and take out its fat, with which you rub your hands; then said my modern Pylus to me, you have nothing more to fear from the bite of every species of serpent."

The figure of cerastes, occurs frequently among the hieroglyphic characters inscribed upon remains of Egyptian antiquity.

NASICORNIS. Somewhat olivaceous yellowish, variegated with black; flexuous, lateral band pale, and two horns on the snout. *Coluber nasicornis*, horn-nose snake. Shaw Gen. Zool.

This remarkable snake was first described by Dr. Shaw in the *Naturalist's Miscellany*. The most striking peculiarity of his species are the two large sharp pointed horns, situated on the top of the nose, or anterior part of the upper jaw. These horns stand nearly upright, but incline slightly backwards, and a little outwards on each side, and are of a substance somewhat flexible; their shape is rather triangular. The length of these horns is about half an inch, and at the base of each stands an upright strong scale, of nearly the same shape with the horn itself, and thus giving the appearance of a much smaller pair of horns. The mouth is furnished with extremely large and long fangs, or poisonous teeth, two of which appear on each side of the mouth; the hinder pair being smaller. The length of this animal is about thirty-five inches. Its colour is yellowish, olive-brown, very thickly sprinkled all over with minute blackish specks. Along the whole length of the back, extends a series of yellowish-brown oblong spots, or marks, each of which is imbedded in a patch of black; and on each side of the body from head to tail runs an acutely flexuous, or zig-zag line, or narrow band of an ochre colour, which is bounded beneath by a much deeper or blacker shade, than on the rest of the body. The belly is a dull ochre colour or cinereous yellow, freckled with blackish spots and markings, and besides these a number of black spots of various sizes are sparingly dispersed over the whole animal; the tail is somewhat thin and short in proportion to the body. The scales are hard, stiff and strongly carinated, the head is covered with small scales, and is marked on the upper-part by a longitudinal patch of brown, running out into pointed processes at the sides, and bounded by a space of dull lead colour or cinereous. The shape of the head is broad and flattened, the cheeks varied with black and yellow marks. The horned snake is supposed to be a native of the interior parts of Africa. The specimen above described, was obtained from the master of a Guinea vessel by the Rev. Edward Charles Jenkins of Charlestown in South Carolina.

ASPIS. Nose terminated by an erect wart; body rufous, with alternate, roundish, dusky, distinct, and confluent spots; beneath steel blue dotted with yellow. *Coluber aspis*, abdominal scuta 146, subcaudal scales 46. Gmel. 146—34,

Strom. Sondm. Col.—*Vipera mofis charas*. Laur. Amph. p. 100. n. 219.

Considered by some as a variety of coluber vers: it is a native of Dauphiny, Lyons, and Poitiers. Ceppe describes a snake that inhabits the northern parts of France under the name of L'Alpic, but which, according to Latreille, is not the true coluber aspis of Linnæus, as its name may imply. This kind, Ceppe informs us, is about three feet in length, of which the tail measures three inches and eight lines. The head is rather large, and covered with small carinated scales, the body larger, of similar structure, the colour, pale rufous grey, and along the upper parts are three longitudinal ranges, of roundish dark rufous spots, bordered with black, and which unite or become confluent near the tail, and thus exhibits the appearance of a zig-zag band, similar to that of the common viper. The under-parts of this snake, are of a dusky colour, marbled with dull yellow; its fangs resemble those of the common viper, and it is reputed equally poisonous with that species. We introduce this snake under the species aspis, conceiving it may be hereafter ascertained to be of the same individual species, although writers are not agreed on this point at present.

AMMODYTES. Brown or pale bluish, with a dentated black dorsal band: nose terminated by an erect wart. *Coluber ammodytes* abdominal scuta 142, subcaudal scales 32. Linn. Amoen. Ac. Weigel Abh. *Vipera illyrica*, Laur. Amph. *Drinnus*, Bell. *Ammodytes*, Aldr.

Inhabits the East, and mountainous parts of Illyria. This species is greatly allied to the viper, from which it is distinguished principally by the erect process at the tip of the snout. The colour is usually bluish grey or brown, with a continued black dorsal band, resembling that of the viper. This is considered as an extremely poisonous species, and according to Matthioli, proves fatal in the space of three hours. The flesh is used medicinally for the same purposes, as that of the common viper.

LACHESIS. Yellowish-grey, variegated with brown; a black transverse band above the eyes.—*Cobra lachesis*, Laur. Amph. *Serpens ceylonica*, Bitin. *Diâa*, Seba.

Described and figured by Seba, from whom it appears this species is a native of Ceylon, and is known by the name of bitin. Its colour is a rich and somewhat irregular variation of deep and light brown, disposed in streaks and patches, on a yellowish grey ground. The scales, which in many parts are tipped with white, are large, strongly carinated, and fixed only at the base, while the remainder is loose or free. This singular disposition of the scales, affords the animal an opportunity of elevating or depressing them at pleasure, and in moving, is said to occasion a kind of rustling noise.

* This is a poisonous species, being armed with large fangs, and from its general form, appears to be an animal of considerable strength. The head is indistinct, or not distinguished from the rest, by any contraction, or appearance at the neck. The male is deeper coloured than the female, and seems to have the body larger, and the tail more slender. The general length of this snake, seems to be about four or five feet, and the tail short in proportion to the body.

СЛОТНО. Greyish-orange; variegated with numerous waved black bands; keel of the scales on the chin with a white spot; tail very slender.—*Cobra clotbo*, Laur. Amph. *Vipera*, Bitin. *Ceylonica elegantissima*.

Inhabits Ceylon and Cuba, and is supposed to be a poisonous species. This appears to be from the work of Seba to be a large snake, measuring more than six feet in length,

and being thick in proportion; the head large, covered with minute scales, and as in the coluber lachetis, scarce distinguished from the body, by any perceptible contraction at the neck. The colour of the upper parts is greyish orange freckled with black specks, and marked with transverse undulated, or somewhat zig-zag bars of black. The under parts are circereous, variegated with a few black bars, and transverse stripes.

ATROPOS. Hoary, with a quadruple series of large brown ocellar spots, with white margins. *Coluber atropos*, abdominal scuta 131, subcaudal squamæ 22. Linn. *Cobra atropos*, Laur.

The length of this species is about sixteen inches; the head large, marked with four or five dusky spots, and covered with small scales; the body rather bulky; the tail is short, measuring about a ninth part of the whole length. It is a native of America, and is considered as an extremely poisonous animal.

TRISPHONE. Body thick, brown, and without variegations, *Coluber trisphone*. Shaw. Gen. Zool. *Black viper*, Catfby.

This, according to Catfby, is the size of the black American viper, measuring about two feet in length, and being large in proportion; he tells us it is a sluggish reptile, advancing deliberately even to escape danger, but will yet defend itself when attacked with much fierceness, and its bite is said to be very venomous. It is found in Virginia, and Carolina, in the last of which it is called the truceon snake. This species preys on lizards, and other animals.

MEGARA. Brown, varied with yellow: head flat and heart-shaped, and a large orifice between the eyes and nostrils on each side. *La Vipere Fer de lance*, Cæpede.

This is a large species measuring five or six feet in length. It inhabits the island of Martinico, and some of the neighbouring islands, and is considered one of the most formidable of the serpent tribe. A specimen of this snake, preserved in the British Museum, is a rich deep brown, with yellow variegations, the back being marked throughout the whole length, by pretty numerous equidistant, broken, and slightly alternating bars of dull yellow, which, descending and joining at intervals with the neighbouring ones, form obscurely annular and somewhat irregular markings of similar colour along the sides, with still more obscure crossings on the part nearest the scuta, intermixed with smaller patches and spots: the abdomen is dull yellow, clouded and speckled on the sides with pale brown. The head is large, flat, heart-shaped, and covered with very small carinated scales; but the terminal scale of the nose, and those at the sides of the mouth, are very large, and above each eye is also a very large scale. The nostrils are small, and between them and the eyes on each side is a large orifice, which has been regarded as a passage to the organ of hearing; the scales on the whole upper parts of the body are moderately large, ovate, and carinated, the back slightly elevated, the sides rather sloping, and the abdomen flattish.

The fangs of this serpent are of a large size, about three quarters of an inch in length, and curved. The poison is said to resemble that of most serpents, being a clear yellowish fluid, like olive oil. The symptoms are such as follow from that of the viper, but in a much stronger degree. When preparing to bite, it is said to throw itself into a spiral form, and to spring with great rapidity on its prey, but at other times to be rather slow in its motions, and of a torpid nature, concealing itself beneath the herbage, or within the hollows of trees. It frequents sugar plantations, for the sake of the rats, which abound in such situations, and also preys on birds. The female goes six months with young,

and produces the new brood perfectly formed, and amounting to forty, fifty, or even sixty: they are observed to vary in colour when young, some being yellow, others grey, and others intermixed, yellow, grey, and brown.

COBELLA. Brown, kneated with white: head broad with a lead coloured stripe behind each eye. *Coluber cobella*, abdominal scuta 150, subcaudal scales 54. Linn. Amoen. Acad. *Coluber ater, lineolis albis*, Boddaert. *Cerastes cobella*, Laur. Amph.

Grows to the length of two feet nine inches, and varies much in the disposition of its colours, and the number of its abdominal scuta, and subcaudal scales. Gmelin enumerates no less than fourteen variations of this kind. It is a very common snake in America.

COBRA. Entirely brown, compressed: back carinated, scales of the ridge largest; head elongated and rounded. Gmel. Laur. Amph. Allied to the coluber redi.

CORONATUS. Deep black, with white unequal spots and dots. Gmel. *Cerastes coronatus*. Laur. Amph. Inhabits New Spain.

NOVE HISPANIE. Above black, beneath white; back with oblique streaks, posterior parts with oblique bands. Gmel. *Cerastes mexicanus*, Laur. Amph.

Resembles *C. coronatus*, and like that species, inhabits New Spain.

NATRIX. Brown, with a black and yellow patch on each side the neck, and a row of black spots down each side; abdomen dusky. *Coluber natrix*, abdominal scuta 170, subcaudal scales 60. Linn. Fn. Succ. *Natrix vulgaris*, Laur. Amph. *Natrix torquata*, Raj. *Gemine seblange*, Meyer. Thiere. *Common ringed snake*, Penn.

Inhabits moist parts of Europe, where it frequents woods, moist hedges, and shady places. Many varieties of this snake are described by writers, but the colour is in general either a bluish grey, or pale olive above, the sides variegated with black, and the under parts a mixture of black and white. The head is rather small comparatively, and is covered with large scaly plates; the tail is of moderate length, and gradually tapers to the extremity.

This snake preys on frogs, mice, and small birds, insects, and worms, and occasionally frequents the water in search of the first; it is capable of swimming, but not well. It deposits its eggs in any warm and moist situation in the form of a continued chain or necklace of ova, to the number of twelve, fourteen, sixteen, or even twenty, of the size of those of a blackbird, and of a whitish colour, and it appears are hatched in the spring following. During the winter the snake conceals itself and becomes nearly torpid, and re-appears in the spring, at which season it is said to cast its skin; we suspect that it casts its skin twice every year. This is not a poisonous species.

ATROVIRENS. Black green speckled with yellow; abdomen yellow, with a row of black specks down each side. *Anguis asculapii niger*, Aldr. Serp. *La coluvre verte et jaune*, La Cæpede.

A species oftentimes confounded with the preceding: it is described with accuracy by La Cæpede, who informs us it is frequent in some provinces in France. Its haunts are woods, and moist shady places; in size and general appearance it resembles the ringed snake, coluber natrix, but differs in colour, being of an extremely dark or blackish green, appearing at the first view entirely black: the sides are marked with numerous rays of yellow specks, of different forms, some oblong, and some square: the eyes and edges of the mouth are bordered with yellow scales; the abdomen is also yellow, every plate being marked on each side with a black

a black speck. This snake is perfectly harmless. La Cèpede relates from M. Bromare an anecdote relative to a snake, which he supposes to have been of this species, and which had been so completely tamed by a lady as to come to her whenever she called it; follow her in her walks, wreath itself round her arms, and sleep in her bosom. One day, when this lady went in a boat to some distance up a large river, she threw the snake into the water; imagining that it would readily recover the boat by swimming; but the current proving unusually strong at that juncture owing to the advance of the tide, the poor animal in spite of all his efforts to reach the vessel was unfortunately drowned.

GRONOVIANUS. Bluish-ash, beneath blackish; a white arched spot each side the hind head, and one black: back-arched with black. Gmel. Laur. Amph.

Bears a near affinity to the preceding, and is perhaps a variety only of the former, coluber natrix. Number of plates and scales not ascertained.

HUMANUS. Black spotted with white; tail alternately striped with black and white. *Coluber humanus*, Gmel. *Natrix humana*, Laur. Amph.

A snake very commonly domesticated in New Spain; and also said to inhabit Amboyna.

PUNCTULATUS. Fulvous, with very minute spots of white. Gmel. *Natrix punctata*, Laur. Amph. Native country unknown.

TYROLENSIS. Abdominal scuta 178, subcaudal scales 60. Gmel.

Described after Scopoli, who informs us it inhabits the Tyrolean country, and deposits its eggs among stones, these are white and leathery, with a lateral yolk and turbid watery white, and are found sticking together in clusters of about fourteen in number.

BIPES. Abdominal scuta 116, subcaudal scales 58. Gmel. Scop, ann. hist.

Mentioned by Scopoli as an inhabitant of the Tyrolean waters. This kind preys on fish and frogs; and is said to be furnished with two short processes or feet; the eyes are red or tawny, lower jaw whitish, dorsal scales elliptic and margined; sides spotted with white: plates of the belly whitish, with a brown spot in the middle.

AUSTRIACUS. Bluish-grey, with a double dorsal row of rufous spots, and reddish sides and abdomen. *Coronella austriaca*, Laurenti. *La Liffa*, Cèpede.

This bears a general resemblance to the common snake, coluber natrix, and seems to have been first described by Laurenti, who speaks of its being common round Vienna: it occurs also in France, and several other parts of Europe. The principal distinction between this species and the coluber natrix consists in the perfect smoothness of its scales, those of the natrix being somewhat carinated. This animal inhabits moist meadows, hedges, and swampy places, and bites with much eagerness, but is incapable of doing any injury, as nature has not provided it with poisonous fangs. It is said to be easily tamed, in which state it shows a considerable degree of attachment.

ÆSCULAPII. Whitish, with double black transverse zones; abdomen whitish, variegated with black. *Coluber æsculapii*, abdominal scuta 180, subcaudal scales 43. Linn. *Natrix æsculapii*, Laur. *Coluber albus annulis nigris*, Boddaert.

Length from eighteen inches to two feet; the colour pale whitish with a more obscure cast on the back, and is marked throughout with nearly equidistant black bands, each surrounding the body, and divided half way up from the abdomen by a line or narrow stripe of the ground colour; thus giving a banded appearance to the lower part of

each band. The head is covered with large scales, and marked on the fore part by a transverse black bar running across the eyes. This is a native of South America, and is said also to inhabit some parts of Asia.

NAJA. Yellowish brown; on the back of the neck a large spectacle shaped spot. *Coluber naja*, plates of the belly 193; scales of the tail 10. Linn. *Naja luteifens*, Laur. Amph. p. 91. *Serpens Malabarica cobra de capello dicta*. Seb. *Spectacle snake, nagoos*, Russell. Ind. Serp. Shaw Gen. Zool.

The coluber naja is a native of India and the Ternate islands, where it appears to be one of the most common, as well as most noxious, of the serpent tribe; very frequently proving fatal in the space of a few minutes to those who unfortunately experience its bite. The form of this species is very remarkable: its general length seems to be three or four feet, and the diameter of the body about an inch and a quarter. The head is comparatively rather small, and is covered on the fore part with large smooth scales, as in the greater number of innocuous serpents; the scales on the back part and sides of the head, and also on the neck are smaller and ovate: those on the remainder of the animal, on the upper part oblong oval, not ill resembling the general form of a grain of rice. At a small distance beyond the head is a lateral swelling or dilation of the skin, which is continued to the distance of about four inches downwards, where the outline gradually sinks into the cylindrical form of the rest of the body. This part is extensible at the pleasure of the animal; and when viewed from above, while in its most extended state, is of a somewhat cordated form, or wider at the upper than the lower part, and is marked with a singular spectacle-formed spot of black and white, the mark itself being white, and the edges black, and the middle of each of the rounded parts black. This mark is more or less distinct in different individuals, and also varies occasionally in size and form, or in some instances is altogether wanting. The usual colour of the animal is a pale ferruginous brown above; the under parts bluish-white, sometimes slightly tinged with pale brown, or yellow; the tail, which is of a moderate length, tapers gradually and terminates in a slender, sharp pointed extremity. The title of *cobra de capello*, or hooded snake, has been given to this formidable reptile by the Portuguese, from the appearance which it presents when viewed in front in an irritated state, or when preparing to bite, at which time it bends the head rather downwards, and seems hooded, as it were, in some degree by the expanded skin of the neck.

Laurenti enumerates four varieties of this hooded snake, *Naja luteifens*, the common kind; *β Naja fasciata fasciis peritolum corpus ex fusco rubris*, having fulvous red bands over the whole body; *γ Naja flavensis*, ex cinereo grisea, summo dorso rufa. Cinnereous, with the back rufous; and *δ Naja maculata*, ex luteo rufa, squamis singulis alba macula notatis; of a tawny yellow colour, and having every scale marked with a single white spot. But it appears from the work of Dr. Russell "On the Serpents of India," that there are many other varieties of this extraordinary snake. He describes no less than ten different kinds that are found in India alone, and seems to intimate that those are not the whole of the Nagoos tribe which inhabit that part of the world. It is possible, on further investigation, some of those described by Dr. Russell as varieties may prove to be specifically distinct: according to the character laid down by Linnaeus, taken from the number of the abdominal plates and scales on the belly, they are clearly so; but it is not on this criterion, the fallacy of which is too apparent, that we hazard an opinion; we conclude to the different conformation of the spectacle-like mark.

mark on the back of the neck, and still more to the dissimilarity observable in the figure of the scuta; and laminae; the variations in colour are but secondary particulars in consideration. Dr. Russell enumerates the varieties above-mentioned in the following order.

1. *Aege nagoo*. With a pale central spot in the middle of each of the black spots of the spectacle-shaped mark. Abdominal scuta 189, subcaudal scales 60.

2. *Coodum nagoo*. This variety is darker than the other; and the skin is of a yellow cast; but the principal distinction is in the spectacle-mark, which consists of an oblong curved frame without the usual black eyes or centre-spots of the others. Abdominal scuta 187, subcaudal scales 57.

3. *Sunkoo nagoo*. The chief distinction of this is a plain hood, without any mark. This variety is supposed by Seba to be the female of the species; but Dr. Russell informs us that one which he brought home from India, and presented to Mr. John Hunter was a male, and that the usual spectacle-shaped mark is found indifferently both on the males and females. This variety is more rare than the rest. Abdominal scuta 183, subcaudal scales 56.

4. *Mogla nagoo*. The cervical scuta in this variety are spotted here and there with faint greyish spots, and four of the middle ones are entirely of a blueish-grey. Abdominal scuta 192, subcaudal scales 65.

5. *Malle nagoo*. The colour of this variety is of a lighter brown than the rest, and the scuta whiter; and less spotted, but seven of the pectoral ones are completely dark. Abdominal scuta 191, subcaudal scales 62.

6. *Cunkoo nagoo*. In this some deviations were observable in the laminae: all the cervical scuta were dusky, and the trunk had a strong blueish cast. Abdominal scuta 186, subcaudal squamæ 60.

7. *Jenna nagoo*. The skin of the hood in this is tinged with orange colour; the scuta of the neck spotted with grey, and six of the lower ones wholly of a blue grey. Abdominal scuta 189, subcaudal squamæ 57.

8. *Nella tog pam*. With the black on the hood unusually deep, and all the jugular scuta remarkably dusky. Abdominal scuta 186, subcaudal squamæ 62.

9. *Kistna nagoo*. The middle lamina of the three between the eyes remarkably broad, and the posterior part subovate instead of semi-ovate; five of the jugular scuta dusky, and six of the pectoral almost black. Abdominal scuta 186, subcaudal squamæ 63.

10. *Korie nagoo*. The three laminae between the eyes remarkably narrow; the large posterior pair oval; colour of the trunk, and still more of the scuta unusually blueish. Abdominal scuta 184, subcaudal squamæ 57.

The cobra de capello, it is observed, is every where exhibited publicly as a show in India; and is of course more universally known in that country than almost any other race of reptiles. It is carried about in a covered basket, and so managed by its proprietors as to assume, when exhibited, a kind of dancing motion; raising itself upon its lower part, and alternately moving its head and body from side to side for some minutes, to the sound of some musical instrument which is played during the time. The Indian jugglers, who thus exhibit the animal, first deprive it of its fangs, which renders it incapable of inflicting a poisonous wound by means of its bite.

Dr. Russell, in his account of various experiments made in India with this serpent, assures us that as a general standard for a comparison of the effects of its bite with that of other poisonous serpents, he never knew it prove mortal to a dog in less than 27 minutes, and to a chicken in less than half a minute. Thus fatal as it is, its poison seems not so speedy in opera-

tion as that of the rattle-snake, which has been known to kill a dog in the space of two minutes. The following interesting experiments are related by Dr. Russell to confirm the accuracy of this observation.

In the month of June 1787, a dog bitten by a Cobra de capello on the inside of the thigh, howled at first, as if in severe pain; after two or three minutes he lay down, continuing to howl and moan; after twenty minutes he rose, but with much difficulty, being unable to walk, and his whole frame appeared greatly disordered. He soon lay down again, and in a few minutes was seized with convulsions, in which he expired twenty-seven minutes after. This is the only instance mentioned in which the poisonous bite of the Cobra de capello proved fatal to dogs in much less than the space of an hour.—A large and very stout dog was bitten by another Cobra de capello on the inside of the thigh, which in a minute or two was drawn up, the first symptom in general of the poison having taken effect. He continued, however, nearly half an hour longer walking on the three remaining legs, seeming not otherwise disordered; but after this time, he laid himself along in great iniquitude, his head and throat being convulsed in an uncommon degree; he made several vain efforts to rise, his legs became both paralytic, and after continuing in this state for an hour, he expired.—A large dog was bitten by a Cobra de capello which had been captive only two days. He complained a good deal at the instant of the bite, and the leg was soon drawn up. In twenty-five minutes he was seized with convulsions, succeeded by stupor, in which state he lay for ten minutes; the convulsions, however, returned, and he expired in a quarter of an hour, being fifty-six minutes after the bite. This experiment was tried on the 11th of November.

August 9th, a Cobra de capello, which had lost two of his longest fangs, but retained two of the second order, was made to bite a very large stout dog. At first the dog complained loudly, though without drawing up the thigh, or shewing any other symptom of poison; but happening at this time to break loose, he was pursued, and brought back, after a chase of an hour and a half, much fatigued and heated. After resting a quarter of an hour, water was offered to him, which he refused, though he eat some morsels of bread thrown into it. About a quarter of an hour afterwards he became much disturbed, grew entirely outrageous, howling violently, snapping at and gnawing the stake to which he was tied with incredible ferocity. This continued about three hours, when growing faint, his howlings grew weaker, his convulsions increased, and he expired about four hours after the bite.—A pig bitten by a snake of this kind, which had been fed only once in seven days with milk, became greatly disordered in twenty minutes, and expired in less than an hour.—A chicken has been sometimes known to survive two hours after being bitten by a Cobra de capello. Chickens and pigeons bitten by a Cobra de capello, whose fangs had been eradicated, suffered no symptoms of poison; but when poison taken from the same snake was inserted into their bodies, either by incision or puncture, they suffered the usual symptoms, and very often died.

It was endeavoured also to ascertain the effects of the bite of the Cobra de capello upon reptiles of the same species, the result of which appears doubtful. In some instances, the bitten animal experienced no kind of injury, while to others the bite proved fatal. An attempt was made, on the 17th of August 1788, to make a Cobra de capello bite another (of the variety called *Nooni paragnoda*) in the tail, but that part being found too small, the body was bitten, a little above the vent. The bitten snake soon lost its former activity,

activity, and when put under a glass coiled itself up. In this state it was left, and after an hour and a quarter was found dead. On opening the belly, the parts immediately beneath the bite appeared much inflamed, though it could not be discovered whether any fangs had penetrated into the cavity.

A Cobra de capello, received by Dr. Ruffell from Ganjam, under the name of *Saltanus*, was made to bite another remarkably large Cobra brought from the same place, under the name of *Couliab*. The poison was shed on the place, but no marks of fangs could be perceived, and the Couliab remained as well as before: this experiment was repeated with the same result, though a little blood as well as poison was found on the part bitten. Some days after this, a Cobra de capello (of the variety called *Coodam nagoo*) was made to bite the Couliab on the belly; both fangs visibly acted; blood appeared on the wound, but no other consequence followed. A *Tar tuta* snake, bitten immediately after, in the same manner, died within two hours.

RUFUS. Rufous, with distant reddish-fuscous bands; spectacle-spot somewhat heart-shaped, and marked with four black spots. Seba. *Naja brasiliensis*, Laurenti. La Cèpede, &c.

Described by Seba and others after him as a native of Brazil. This is perhaps a variety of the preceding.

BUCEPHALUS. Brown, with transverse whitish bars; head large, cordated, and depressed; body compressed; tail very slender. *Serpens lufitanis cobra de capello diãa*, Seba. *Coluber bucephalus, bull-headed snake*, Shaw Gen. Zool.

According to Seba, this species is a native of Ceylon; he considers it as a kind of Cobra de capello, or hooded snake, in which respect he is mistaken. The length of this snake is between four and five feet; the head is extremely large, depressed, cordated behind, somewhat compressed at the sides of the mouth, and covered above by very large scaly plates. At some distance from the eyes are two remarkable, oblong, brown spots. The neck is thin, and, together with the whole body, extremely compressed on the sides; tail long, round, and tapering to a fine point. From the head, along the back, runs a row of large, broad, hexagonal scales, those on the other parts are ovate; the abdominal plates are very narrow. The general colour of the animal is rufous-brown, with moderately distant, broadish, transverse, pale bands, each of which, at its juncture with the scuta, is marked with a white spot.

RUSSELLI. Brownish-yellow, with acutely-ovate, blackish, dorsal spots, edged with white; lateral spots smaller and ovate. *Ratuka rekula pada*, Ruff. Ind. Serp. *Ruffellian snake*, Shaw Gen. Zool.

The abdominal plates, according to Dr. Ruffell, amount, in this species, to 168, and the scales under the tail to 59. The length of this snake is about four feet. Its colour an elegant pale yellowish-brown, marked throughout the whole length of the back with a continued series of large ovate spots of a deep brown colour, palest in the centre, and surrounded by a narrow line of white. In some parts those spots are nearly confluent; on each side of the body is a row of brown oval spots, smaller than those on the back; and besides these, a few still smaller transverse marks are sparingly scattered on the sides; the under part of the body is white, with a few dusky spots; the head is rather large, the snout obtuse, the mouth wide, the fangs large, and, as in several other poisonous serpents, double, a smaller fang being situated close to the larger one on each side.

Dr. Ruffell informs us, this species is scarce less common in India than the Cobra de capello; but from its not being carried about, like that and some other snakes, as a public

show, is not so universally known either among the natives or Europeans.

Several experiments were made by Dr. Ruffell to determine the effects of its bite, from which it appears to be one of the most poisonous of its tribe. A chicken bitten in the pinion by one of these snakes, which had been caught two or three days before, and seemed in high spirits, was instantly infected, seized with convulsions, and expired in thirty-eight seconds. Immediately after the chicken, a stout dog was bitten in the thigh; within less than five minutes he appeared stupefied; the thigh was drawn up, and he frequently moved as if in pain. He remained, however, standing, and eat some bread that was offered to him. In about ten minutes the thigh became paralytic; in fifteen minutes he entirely lost the use of the wounded thigh, and lay down, howling in a dismal manner, frequently licking the wound, and making, at intervals, ineffectual attempts to rise. In nineteen minutes, after a short cessation, he again began to howl, moaned often, his breathing became laborious, and the jaws were completely shut. The few succeeding minutes were passed alternately in agony and stupor, and in twenty-six minutes after the bite he expired. A second dog, of much smaller size, was next bitten, and expired in the space of six hours. After this, a rabbit was exposed to the bite of the snake, and died in less than an hour; and, lastly, a chicken bitten in the pinion expired in less than six minutes. The whole of the above experiments were made with the same snake in the course of the same morning.

GRAMINEUS. Green, beneath yellowish, with the edges of the abdomen spotted with green. *Boodro pam*, Ruffell Ind. Serp. *Grass-green snake*, Shaw Gen. Zool.

The length of this kind is about thirty inches. The head is rather large in proportion, and obtusely tapering, but not pointed, and is covered entirely with very small scales; the colour is as above described. This is a native of India, and was first described by Dr. Ruffell; it is of the poisonous kinds, and has the fangs remarkably long and slender. From the experiments of the last-mentioned writer it appears, that a chicken died, after having suffered long convulsions, and afterwards stupor, in about eight minutes from the bite; pigs and dogs were seized with a stupor, convulsions, &c. but in a few hours recovered from the effect of the poison.

CROTALINUS. Cinereous, marked above with large alternate blackish spots; beneath yellow, freckled with brown. *Coluber crotalinus*, abdominal scuta 154, subcaudal scales 43. Linn.

A large species, with the habit of the rattle-snake; the head is heart-shaped, the eye-lids protuberant, scales carinated. Native country unknown.

SEVERUS. Cinereous, with oblique linear whitish bands, edged with brown. *Coluber severus*, abdominal scuta 170, subcaudal scales 42. Linn.

Length about seventeen inches; thickness moderate; head broad, obtuse, livid, with cinereous band between the eyes, and behind the nose; eyes large; neck thick; the colour of the upper parts as before described; the abdomen dusky; sides speckled with white; tail short. The figure in Seba, quoted by Linnæus, is of a pale rufous colour, with yellowish bands, somewhat resembling Hebrew characters in form, and edged with brown; the abdomen pale yellow, with a row of blackish spots on each side.

PORPHYRIACUS. Violet-black, with the abdomen and sides crimson, the scuta margined with black. Zool. New Holl. p. 27. pl. 10. Abdominal scuta 188, anal scuta 74, subcaudal squame 45.

First described by Dr. Shaw, who speaks of it as a moderately large and beautiful species; the general proportions nearly

nearly the same with those of *Coluber natix*, the common English snake. The head is rather small, and covered in front with large scales; the colour of the head and whole under parts very fine deep violet; sides and abdomen crimson, deeper on the fore-part, the large scales near the scuta being carmine-coloured, with black tips; the abdomen rose-coloured, with a tinge of yellow, each scutum deeply edged with black, thus forming a beautiful series of transverse black bars down the abdomen. The tail measures about a sixth part of the whole length, and is furnished beneath, exclusive of the divided subcaudal scales, with about seven scuta, or undivided laminae, commencing immediately beyond the v. nt. which is edged with similar smaller squamæ; the colour of the under parts of the tail is a blueish-ash, the rose-colour of the abdomen ceasing at the commencement of the tail. In the *Zoology of New Holland*, Dr. Shaw describes this species as destitute of fangs, and consequently innocuous; an error arising from the mutilated state of the specimen he examined. The snake has been since observed to be furnished with these organs; and, as Dr. Shaw remarks, in his *General Zoology*, to be highly dreaded by the natives of Australia, as a poisonous species.

HÆMACHATES. Red, clouded with white; abdomen yellowish-white. *Serpens asiatica hemachates dicta*, S. b. *Hæmachate*, Cæpede.

Seba describes this snake as a native of the East Indies, having received it from Persia and Japan. Its general length is about two feet or more; its colour red, varying to deeper or paler in different individuals, and sometimes inclining to brown; the variegations white or whitish. The head is moderately large, and covered in front with large scales; tail extremely short and tapering to a point. La Cæpede considers it a poisonous snake.

AQUATICUS. Brown, with the abdomen banded with black and yellow. *Water viper*, Catesby.

We are acquainted with this species only from the account given of it by Catesby. "This serpent (says that writer) is called in Carolina the water rattle-snake; not that it hath a rattle, but is a large snake, and coloured not much unlike the rattle-snake, and the bite said to be as mortal. This snake frequents the water, and is never seen at any great distance from it. The back and head are brown, the belly transversely marked with black and yellow alternately, as are the sides of the neck; the neck is small; the head large, and armed with the like destructive weapons as the rattle-snake; it is very nimble, and particularly dextrous in catching fish. In summer great numbers are seen lying on the branches of trees hanging over rivers, from which, at the approach of a boat, they drop down into the water, and often into the boat on the men's heads. They lie in this manner to surprize either birds or fish, after which last they pounce, and pursue them with great swiftness, and catch some of a large size, which they carry on shore and swallow whole. One of these I surprized swimming ashore with a large catfish in his mouth. The tail is small towards the end, and terminates in a blunt horny point, about half an inch in length, and which, though harmless, is considered as of dreadful efficacy, by the credulous vulgar, who believe that the animal is able, with this weapon, not only to kill men and other animals, but even to destroy a tree by wounding it with it, the tree withering, turning black, and dying."

LACTEUS. Milky-white, the back marked by double black spots; head black, with a longitudinal white line. *Coluber lacteus*, abdominal scuta 203, subcaudal scales 32. Linn.

Length eighteen inches. A native of India and South America, and is reputed poisonous.

NIVEUS. Snowy-white, with variations. *Coluber niveus*, abdominal scuta 209, subcaudal scales 62. Linn. Inhabits Africa.

MELANUS. Deep black; sides clouded with bluish, the eyes brown, with the edge of the pupil silvery. *Coluber melanicus*, abdominal scuta 148, subcaudal scales 27. Gmel. Pallas It.

Observed by Dr. Pallas on the borders of the Volga and Samara rivers in Siberia. It has the general appearance of the viper, but differs in colour, being of a deep black on the back, and of a fleshy lufre beneath, marked with patches of a deeper cast, while the sides are clouded, and spotted at intervals with bluish. The eyes are of a bright white, with perpendicular pupils, and ferruginous irides; tail short, and gradually tapering to the tip.

BUCCATUS. Whitish, with large double brown dorsal spots; head somewhat depressed, cheeks timid. *Coluber buccatus*, abdominal scuta 107, subcaudal scales 72. Linn.

A poisonous species; it inhabits South America and India. Length twelve inches.

ATROX. Grey brown, with transverse linear whitish stripes; abdomen dusky with white transverse variegations. *Coluber atrox*, abdominal scuta 196, subcaudal scales 69. Linn.

Length about eighteen inches: it is a poisonous snake, and is a native of the island of Ceylon.

CORALLINUS. Glaucous, with scales somewhat heart-shaped, and three brown lines down the back. *Coluber corallinus*, abdominal scuta 193, subcaudal scales 82. Linn.

Linnaeus describes this as a poisonous species: it is a native of the eastern regions; it preys on lizards.

LEBERIS. Pale; head white; body marked above with linear black bands. *Coluber leberis*, abdominal scuta 110, subcaudal scales 50. Linn.

Described by Kalm, who informs us that it is a native of Canada, and that the upper parts are traversed by linear black bands; the head white with two rufous spots on the top, and a triangular spot over the nose. Linnaeus mentions it as a poisonous species, a particular considered doubtful by Dr. Gray.

AULICUS. Grey brown, with transverse white bands bifurcating over the sides. *Coluber aulicus*, abdominal scuta 184, subcaudal scales 60. Linn.

The length of this species is six inches; it inhabits America, and is one of the poisonous kind of snakes.

ELEGANTISSIMUS. White; head variegated with black; body marked above by a quintuple series of ocellated red spots. *Coluber elegantissimus*, Gmel. Laur. Amph. *Serpens lemniscata venulissima Americana*, Ssba.

This is a beautiful species, measuring in length about two feet; the colour is white, marked down the upper part with a quintuple series of black spots with red centres; the middle row is composed of very small spots, the next on each side with larger ocellated ones, and the lowest on each side, next the scuta, resembling that on the middle of the back, and consisting of small specks; the head is marked by a cross-shaped spot on the top, and by a few blackish ones across the snout; the tail is short, measuring two inches and a half in length, and tapering to a point.

RHOMBEATUS. Glaucous, with blackish lozenge-shaped spots, blue in the middle. *Coluber rhombeatus*, abdominal scuta 157, subcaudal scales 70. Linn.

Length from two to three feet; colour, in general, grey, sometimes brownish, with three alternating rows of ovate dusky spots, with large blue centres; the abdomen is pale or whitish, and often clouded with bluish grey. This is a native of India and South America.

JAVANICUS. Grey; head striped with blue; body marked with transverse blue stripes edged with golden.

Described by Mr. Wurm in the "Memoirs of the Batavian Society," for the year 1787. This is a large and most beautiful species, and is seen principally in the rice fields, whence it obtains the name of *Oular-Sawa*, or Rice-field Snake. Those which are found in the higher and more wooded situations arrive at a far superior size. The head of this snake is large and flat, and is covered, as in the major part of the coluber genus, with large scaly plates; the mouth is furnished with double rows of sharp teeth, but is destitute of fangs, the animal not being of a poisonous nature; the iris is yellow; upper part of the head grey, mixed with blue; from behind the eyes pass two blue stripes to the upper part of the neck, where they unite into an arch about an inch beyond the head; a third stripe of the same colour proceeds from the snout to the occiput, where it divides into two, and surrounds a yellow spot marked with a few blue specks; the upper part of the body is divided into a kind of lattice-work, formed by stripes of bright blue with gold-coloured edges; the middle parts of the square being of a grey colour, with changeable reflections of yellow, blue, and green; towards the sides the grey colour is of a lighter or paler cast, as well as on the tail, where the squares are smaller than on the back; each side of the body is also marked by a row of white spots, situated at the crossings of the blue stripes. This snake preys on birds, rats, and various other small animals.

BÆIFORMIS. Whitish, with brown variegations; white beneath, with very short scuta. *Pedda pada*, Ruffell Ind. Serp. *Bæiform snake*, Shaw Gen. Zool.

A new species described by Dr. Ruffell. The length of the specimen, examined by that writer, was about two feet and a half; but it is supposed to attain to a much larger size. It was short and thick with moderately large oblong-ovate head, covered with large scales; and the tail short and sharp pointed. The colour of the upper parts very pale or whitish brown, variegated on the back and sides, with large and small irregularly formed, deep-brown patches, and spots, those on the sides being mostly ocellated. The body is covered with very small scales, the three rows next the abdomen being much larger than the rest; abdomen white, the scuta being remarkably narrow or short, and reddish at the margins. The under part of the tail is variegated with black and white.

This is a native of India, and is represented as an animal of great strength, wreathing round the arm, if held for a short time, so closely as to numb the hand; it is not poisonous, its bite producing no other effect than that of temporary pain.

The serpent mentioned by Dr. Ruffell, under the name of *Bæra*, is considered as a variety of coluber bæiformis, and so also is the *Pedda pada*, t. 23, 24. The first is much larger than the serpent above described; the disposition of the scales and colours are the same, but the ground colour is white, and the tail is furnished beneath with several undivided lamellæ towards the tip, or after those immediately succeeding the vent, while the tip itself is again terminated by a few divided scales. This snake is found at Calcutta, where it is pretended the bite is very soon followed by eruptions on different parts of the body, though it does not prove fatal in less than ten or twelve days, but the whole of this is regarded as a mere popular error. The other supposed variety, the *pedda pada*, grows to a very large size, having been seen nine or ten feet in length. In its general appearance it resembles that first described, but the scales are larger in proportion.

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MELANURUS. Yellowish brown, with black head, and two black spots on the tail. Ruffell. Ind. Serp.

A small species about ten or eleven inches in length, scarcely of the thickness of a goose quill, and nearly of equal diameter from the head to the tip of the tail. The colour is a light yellowish brown, with a dotted black line running from head to tail along the middle of the back, and a few fainter fillets on the sides; the head is small, ovate, black, and covered with large scales; the tail short, scarcely measuring more than an inch in length, and is marked at its origin on the upper part, by a large rhomboidal black spot edged with white; and having a white speck in the middle; the tip of the tail is also marked by a similar black spot; the abdomen is of a pale orange colour, and the under part of the tail white, speckled, and variegated with black. The bite of this species is said to be painful but not poisonous. It is a native of India, and is described among the serpents of that country by Dr. Ruffell.

JARA. Black, with double linear white specks, and yellowish collar and abdomen. *Jara potoo*, Ruffell, Ind. Serp.

This is one of the new species of serpents described by Dr. Ruffell. It inhabits India. The length is fifteen inches; tail very short and tapering suddenly to a point. The abdominal scuta are 175 in number, and the subcaudal scales 56.

ARNENSIS. Yellowish-brown with narrow blackish transverse bands edged with white, and pale abdomen. *Arnee snake*, Ruff. Ind. Serp.

Inhabits the country of Arnee in the East Indies. The length is about eighteen inches; the colour above yellowish, with moderately distant blackish, or very deep brown, transverse bands which are whitish at the margins; the head is small; tail rather short and tapering to a sharp-pointed tip. Abdominal scuta 160, subcaudal scales 50.

SAGITTATUS. Brown, with whitish sagittated dorsal spots edged with black. *Tar tuta*, Ruff. Ind. Serp.

The length of this snake is two feet; the head is rather large in proportion, round, obtuse, and covered with large scales; neck and body slender, the colour on the upper parts yellowish brown variegated, with a chain or series of somewhat triangular, or sagittated spots; the abdomen is yellowish white, and the scuta is marked by a dusky spot on each side. This is a native of India.

STRIATUS. Greenish black, with spotted white bands, and bluish-white abdomen. *Gajoo tatta*, Ruff. Ind. Serp.

This is much smaller than the last, measuring only fourteen inches: the colour above is greenish black, marked with about twenty transverse bands, each composed of a number of longitudinal abrupt white or yellowish white streaks, and along the sides of the body are interrupted rows of similar streaks; the head is obtuse, and covered with large scales, the abdomen bluish-white. Abdominal scuta 174, subcaudal scales 40.

FASCIOLATUS. Cinnereous, with whitish transverse bands and glaucous abdomen. *Nooni paragoodoo*, Ruffell. Ind. Serp.

AGILIS. Banded alternately with white and fuscous, and varied with black dots: head small; tail short.—*Coluber agilis*, abdominal scuta 184, subcaudal scales 50. Linn. *Cerastes Agilis*, Laur.

A native of Ceylon. The head is small, covered with large scales; body slender and smooth, about a span in length, and covered with small scales; tail short, taper, and terminating rather obtusely.

SIMUS. Blackish, with white transverse bands; nose turned up. *Coluber*.

K.

SIMUS.

SMUS. Abdominal scuta 124, subcaudal scales 46. Linn. D. Garden.

Length eighteen inches; head rather large, and roundish, with the nose flat in front, and turned up into a slightly pointed tip: between the eyes is a black curved band, and on the top of the head a white cruciform mark, with a black central spot; abdomen dusky. A native of Carolina, and other parts of North America.

PELIAS. Brownish, with double transverse black bands, beneath green with a yellow lateral band.—*Coluber pelias*, abdominal scuta 187, subcaudal scales 130. Linn.

A native of South America and India. Described by Linnæus from the Museum of Deger.

MUCOSUS. Bluish, beneath pale, with angular head: lips striped transversely with black. *Coluber mucosus*, abdominal scuta 200, subcaudal scales 140. Linn. *Natrix mucosa*. Laur. Amph.

Described by Linnæus from a specimen in the Mus. Ad. Fr. It is a small species, measuring about eighteen inches in length; the native country is South America.

CINEREUS. Cinereous; abdomen white; tail reticulated above with brown, and lined transversely beneath. *Coluber cinereus*, abdominal scuta 200, subcaudal scales 137.

Indies, according to Linnæus South America and India: it resembles the common snake, and is about two feet in length.

DIPSAS. Green with two white stripes. Abdominal scuta 152, subcaudal scales 155. Linn. *Serpens surinamensis carule*, Seba. Inhabits Surinam and other parts of South America.

CASPIS. Body fasciated alternately above with yellow and fuscous, beneath yellow. *Coluber caspius*, Gmel. Lepech. It.

First described by Lepechin as an inhabitant of the shores of the Caspian sea, where it haunts the low grounds and bushy places. It is reported of this species, that when disturbed it first endeavours to escape, but if pursued or irritated, springs forwards on its assailant with great fury, though incapable of doing any injury by its bite. The usual length is about five feet.

PERUVIANUS. Black and white; abdomen rose-coloured. *Serpens Peruviana elegantissima et rara*, Seba.

A native of Peru; described by Seba, who informs us it is rare in European collections. This is an innocuous species. Linnæus does not notice this snake, as the number of its abdominal scuta, and subcaudal plates could not be ascertained.

HYGÆLÆ. White, with somewhat undulated black zones, and head fasciated longitudinally with black. *Serpens siamensis tenuis*, &c. Seba.

A small species of a white colour, barred with numerous irregular black bands, nearly surrounding the body; head small, covered with large scales, and marked by two broad longitudinal streaks uniting at the top of the snout: tail rather short and sharp pointed. Inhabits Siam.

PETHOLA. Lead colour, with testaceous bands. *Coluber pethola*, abdominal scuta 209, subcaudal scales 90. Linn. 207—103. Gronovius. 207—85. Boddart.

This snake inhabits Africa. In the middle of the head, between the eyes is a large shining shield, composed of many plates; the sides of the head and hind-head is covered with imbricated scales each side; and the snout is sharp.

No less than nine varieties of this snake are described by Gmelin after Laurenti. These we shall enumerate in the Gmelinian order, observing only that on further investigation it is not unlikely some at least of those supposed varieties

may prove to be specifically distinct. Those are not noticed by Dr. Shaw, but that writer thinks the *C. Petalarius* of the Museum Adolphi Friderici, can hardly be considered as a species distinct from *Pethola*.

β. *Coronella Africana*, &c. White, with spots on the back; those on the anterior part rounded, and gradually becoming rhomboidal, with the edges reddish. Laur. Amph.

γ. *Coronella ocellata*, &c. Bluish, with a quadruple series of black ocellated spots, which are blue in the middle, and are disposed longitudinally. Laur. Amph.

δ. *Coronella fasciata*, &c. Bluish white with black brown bands, and two longitudinal divided lines. Laur. Amph.

ε. *Coronella latirostrâ*, &c. Brownish, with a few pale bands, snout depress'd. Laur. Amph.

ζ. *Coronella latirostrâ, fasciata*, &c. With yellowish confluent bands near the belly. Laur. Amph.

η. *Coronella ceratoides*, &c. Brownish white, with very pale brown spots; occipital spots two, and longitudinal; dorsal ones elliptic, and disposed in a single stripe. Laur. Amph.

θ. *Coronella teniata*, &c. Middle of the back marked with a brown stripe; belly and sides whitish brown. Laur. Amph.

ι. *Coronella anguiformis*, &c. With entire circular brown bands, beneath obliquely concurrent.

PETULARIUS. Brown, with white bands, beneath pale. Abdominal scuta 212, subcaudal scales 102. Linn. Weigelabb. der. hall. Length from twelve to thirty inches; inhabits South America

LEMNISCATUS. Yellowish white, marked at equal distances with triple dark brown bands. *Coluber lemniscatus*, abdominal scuta 250, subcaudal scales 35. Linn. Amoen. Ac. *Natrix lemniscata*. Laur. *Serpens annulatus*, Seba.

A native of Asia. The length of this snake is about three feet, of a slender form, and white or yellowish marked throughout the whole length, at equal distances, with triple zones of black or deep brown, which entirely surround the body. The head is rather small, covered with large scales, and marked across the snout by a double zone, of which the smallest division passes across the nostrils, and the largest across the eyes. The whole animal is of a smooth and shining surface.

LUVERICUS. Flagelliform; white with equidistant black bands; body glossy. *Coluber luvericus*, Gmel.

Allied to the last species; the body is white, marked with single black bands; the head is marked across the snout by a black band, and at the top by two oblique stripes nearly meeting at an angle in front; the skin is remarkably smooth and glossy. The length of this snake is eighteen inches. According to Gmelin it is a native of Surinam; the snake described by Seba, as *Natrix lubrica, fasciata rubris*, and which is considered as a variety of the same species, is a native of Surinam.

DOLIATUS. Milk-white, marked above by large, approximated, suboval black rings. *Coluber doliatus*, abdominal scuta 164, subcaudal scales 43. Linn.

A small species measuring from eighteen inches to two feet in length; general colour milk white, marked throughout by large oval jet-black rings, the ends of which approaching each other on the top of the back, give the appearance of double bars, corresponding with the description given of this snake by Boddart, *Coluber albidus, annulus nigris per parva digestis*. Inhabits Carolina.

GEMMATUS. Blue, with a black middle-stripe spotted with white, and two lateral white stripes. *Le Chapellei*, La

La Cepede. Abdominal scuta 166, subcaudal scales 103.

The length of this beautiful snake is about fifteen or sixteen inches; the colour on the upper parts blue, with three narrow equidistant stripes from head to tail; the two lateral stripes being white, the middle one black, marked by a row of small white specks alternately oblong and round, resembling a small string of beads and bugles: the head is covered with large scales, and marked on each side with three or four spots, forming a band across the eyes, the top spotted with pale blue marks bordered with black; the abdomen white. The scuta are each marked at the edge with a small black speck, forming two rows down the abdomen. The native country of this kind is unknown, the species was described by La Cepede from a specimen in the royal cabinet.

BILINEATUS. Rufous, with two golden yellow stripes. *La double raie*, La Cepede.

This snake measures twenty-five inches in length, of which the tail exceeds six inches. The general colour is rufous; every scale is bordered with yellow, and down the back from the head to the tail run two bright yellow stripes of a golden hue. The scales on the head are large, those on the body smooth. The native country is unknown.

TRILINEATUS. Rufous, with three black lines. *La trois raie*, La Cepede.

The length is about eighteen inches; the head is covered with large scales; tail about two inches and three quarters long. This is a native of Africa.

TRIFASCIATUS. Body marked with three broad black stripes, the middle one divided by a white line, and three spotted lines down the abdomen. Shaw Gen. Zool.

A small species, measuring a foot in length, and being rather thick in proportion; head rather large, blackish, with the futures pale. Described from a specimen in the collection of Dr. William Hunter.

DIONE. Pale blue, spotted with brown, and three whitish lines. Pallas It.

This species is a native of the salt deserts towards the Caspian sea, and of the hilly regions near the river Irtyz; and was first described by Dr. Pallas. It is of a slender form, about two feet in length; the head small, tetragonal and commonly reticulated with blackish futures. The two intermediate spaces between the three lines on the back are marked with a row of dusky alternate spots; and the tail is about one sixth of the whole length.

MYCETERIZANS. Head angular, with sharp pointed snout, and a yellow line on each side of the abdomen. *Coluber myceterizans*, abdominal scuta 192, subcaudal scales 167. Linn. *Coluber subcaeruleus lateribus lineatis*, Boddaert. *Natrix miederizans*, Laur.

This snake is in general of a grass-green colour, and is distinguished in particular by the yellow line which extends the whole length of the body on each side of the abdomen. It is of a slender form, measuring about three feet and a half in length, and about half an inch in diameter. The head is moderately large, long, and sharp snouted, the upper jaw extending far beyond the lower. Linnæus was erroneously led to consider this as a poisonous species, from thefang-like appearance of the large and long teeth in the upper jaw. It is a native of many parts of North America, where it is principally seen on trees, moving with great velocity in pursuit of insects, on which it feeds.

Gmelin describes the *natrix flagelli formis* of Laurenti, and also the *anguis viridis* of Catesby, as two varieties of the *coluber myceterizans*. The *Bola Passiriki* of Dr. Russell may be perhaps admitted likewise as a variety. This differs in the colour of the under parts, instead of green being of

a cinerous pink colour, elegantly freckled with very numerous minute black and yellowish dots; the margin of the scuta being edged with dull yellow; the skin of the neck also, when the animal is irritated, exhibits by the dilatation of the skin on that part, a beautiful variegation of black and white reticular marks, which do not appear at other times. This creature is represented as of a ferocious nature, hissing violently, and snapping at any thing opposed to it, but producing no other effect by its bite than that of temporary pain in consequence of mere puncture.

COLUBER NASUTUS. *Serpens viridis, ore acuminato ex Java, aspidio species*, Seba.

Whether this be distinct from the former is uncertain; the head is somewhat larger in proportion, and the body less slender: in other respects it very nearly corresponds. The length is about three feet. This snake according to Seba is a native of Java.

LINEATUS. Blue-green, with three or five brown linear stripes, the middle one broadest. *Coluber lineatus*, Linn. *Serpens ceilonica lineis subsuffis*, Seba.

This snake is a native of India, and is commonly about three feet in length. The general colour is pale bluish green above, with a golden gloss, and is marked throughout the whole length by five longitudinal narrow bands, or stripes of dusky brown or greenish. In young specimens there are rarely more than three stripes. The form of this snake is long and slender, with the head small, the abdomen flattish, and the tail long and thin.

JACULATRIX. Whitish, with three blackish stripes, the middle one broadest. *Coluber jaculatrix*, Linn. *Serpens Americana sequipiles diâa*, Seba.

Resembles *lineatus*, but is smaller; the general colour whitish tinged with blue, and marked by three longitudinal stripes of black or deep brown, of which that in the middle is broadest. This appears to vary in colour, that described by Seba being yellowish instead of white. The abdominal scuta are 163 in number, the subcaudal scales 77. This kind inhabits Surinam, and is considered as a harmless animal.

SIBILANS. Bluish, with five dusky lines, and the head spotted. *Coluber sibilans*, abdominal scuta 166, subcaudal scales 100.

This, like the last, resembles *coluber lineatus*, being marked, as in that species, with five dusky stripes, the middle one of which is the broadest, and is nearly black, with a whitish speck on each of the scales. The head is ovate, covered with large scales, and marked with several oblong, blue, subangulated spots, with black edges; and the tail is very long and slender. This animal is of considerable size, sometimes measuring four feet in length; it is a native of Asia, and is esteemed harmless.

SITULA. Grey, with a longitudinal dusky band, bounded on each side by a black line. *Coluber situla*, abdominal scuta 236, subcaudal scales 45. Described by Hasselquist as a native of Egypt.

SAURITA. Brown, with three blue-green stripes. *Coluber saurita*, abdominal scuta 156, subcaudal scales 121.

This is the ribbon snake of Catesby, a species about three feet in length, and very beautiful. The general colour is brown above, with three moderately-broad longitudinal bluish-green stripes; the head is rather small and somewhat pointed, the body slender, and the tail thin. Catesby represents it as an animal extremely swift in its motions; it inhabits Carolina and many other parts of North America, frequents trees, and is perfectly innoxious.

VITTATUS. Whitish, with three black stripes, the middle one very narrow; abdomen white, with the edges of the

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feuta brown. *Coluber vittatus*, abdominal feuta 142, subcaudal feales 78. Linn. *Coluber de terrazona*, Seba.

The length of this kind feldom exceeds thirty inches; the colour is whitifh, tinged with blue, and marked along the whole length of the back by three black or dark brown ftripes, the middle one of which is the narroweft; between this and the principal longitudinal ftripe on each fide is a pair of extremely narrow or linear ftripes, which are gradually loft after paffing fome diftance down the back. The head is rather fmall; of an elongated form, covered with large feales, and marked with black variegations; the tail is of moderate length, flender, and gradually tapering to a point. This fnake is a native of South America, and is not of the poifonous tribe of ferpents.

MONILIS. Whitifh, with broad brown bands, and three fpois on the neck. *Coluber monilis*, abdominal feuta 164, fubcaudal feales 82. Linn.

A native of South America. This is a fmall fpecies meafuring about a foot and half in length; the colour whitifh, banded throughout the whole length with very broad tranfverfe brown bars; the head is of moderate fize, whitifh, and bordered with brown.

SCABER. Grey, spotted with brown, and the feales carinated by a rifing point. *Coluber feaber*, abdominal feuta 228, fubcaudal feales 44. Linn. *Raube natarr*, Merrem.

Length about eighteen inches, the form rather flender; head fmall, and marked at the back of the neck with a few tranfverfe ftrreaks; the fpois on the back are fomewhat rhomboidal, of a brown colour, lighteft in the centre, and difpofed in a triple feries. This fnake is a native of India.

MAURUS. Brown, with two black dorsal lines, fides tranfverfly banded with black, and the abdomen black. *Coluber maurus*, abdominal feuta 152, fubcaudal feales 66. Linn. Syst. Nat. A native of Algiers.

JUGULARIS. Black, throat fanguineous. Haffequift. Defcribed as a native of Egypt; the abdominal feuta are 195, and the fubcaudal feales 102.

COCCINEUS. Black, with the back yellow, spotted with red, and the abdomen pale. *Coluber coccineus*, abdominal feuta 175, fubcaudal feales 35. Gmel.

Length about two or three feet, form rather flender, with the head fmall, the ground colour black, with about twenty-three fubovate fpois of bright red, with the fpaces between yellow. This is a native of South America.

CANDIDUS. White, with large ovate brown dorsal fpois. *Coluber candidus*, abdominal feuta 220, fubcaudal feales 50. Linn. *Serpens afculapii brafilienfis*, Seba.

General colour milk white, marked throughout with a row of deep brown ovate patches; the head is brown, and covered with large feales; tail of moderate length, gradually tapering to the extremity. This is a native of South America.

NEBULATUS. Clouded with fufcous and cinereous, beneath varied with white and brown. *Coluber nebulatus*, Linn. Weigel. Abh. Hall. *Cerastes nebulatus*, Latreil.

A native of America. This is of a moderate fize, meafuring about two feet in length; the head is rather large in proportion, and covered with feales of confiderable fize; body rather flender, and the tail tapering rather fuddenly from the body. The colour is yellowifh brown, clouded with irregular deep-brown, or black fh variegations difpofed fomewhat in the form of bands, and nearly furrounding the body.

PADERA. White, with blackifh dorsal fpois, connected by a line and lateral fpois. *Coluber padera*, abdominal feuta 198, fubcaudal feales 56. Linn. A native of India.

AUSTRALASIE. Blackifh brown, fpeckled with yellow;

feuta very narrow, and the abdomen clouded with brown and yellow. *Auftralafian fnake*, Shaw Gen. Zool. White's Journ. New South Wales.

This is a large fnake, meafuring nine or ten feet in length, and being rather flender in proportion; the colour above deep or blackifh brown, variegated with numerous yellow fpecks, arifing from the circumfite of the middle of every feale being marked with an ovate yellow fpoit. On the fides of the body many of the feales are yellow on one half and black on the other, and by degrees appear more tinged with yellow as they approach the abdomen, which is clouded with a mixture of brown and yellow; the head is fmall, and covered in front with moderately large feales; the teeth rather large, and unaccompanied, fo far as can be afcertained from the dried fpecimens hitherto examined, by any poifonous fangs.

SCHOCKARI. Cinereous brown, with a double white longitudinal band each fide; abdomen whitifh; throat yellowifh, and fpeckled with brown. *Coluber fchockari*, abdominal feuta 180, fubcaudal feales 114.

Defcribed by Linnæus after Forfkal, as being about a cubit and a half in length, and the thicknefs of a finger; the colours as above defcribed, except that, as the fnake advances in age, a narrow ftripe, compofed of fmall whit fh fpois, is observable down the middle of the back. The head is ovate, obtufe, and covered with large feales, and the tail about a third of the whole length. A native of the woody parts of Arabia.

HOELLIER. Entirely red. Forfk. Forfkal defcribes this as a native of Arabia. It is about a foot in length; the bite of this fnake is faid to caufe an inflamed tumour, and its breath to excite an itching in the fkin.

REGINE. Violaceous brown; beneath white, with a femi-orbicular brown fpoit on each alternate feuta. *Coluber regine*, abdominal feuta 137, fubcaudal feales 70. Linn. Weigel. Abh. Der. Hall. &c.

Length twelve inches; the tail is of a moderate length, and rather flender, and the feales beneath are plain. A native of India, and confidered, by fome writers, as an inhabitant likewife of America.

CYANEUS. Deep blue, beneath cinereous. *Coluber cyaneus*, abdominal feuta 110, fubcaudal feales 111. Linn. *Anguiculus firinamensis cyaneus*, Seba.

This is a fmall fpecies; the head is of a moderate fize, rather long, and covered with feales of a large fize; tail long, and tapering gradually to a point. Inhabits South America.

EXOLETUS. Blueifh grey; head oblong and flattifh; lips and throat white. *Coluber exoletus*, abdominal feuta 147, fubcaudal feales 132. *Natrix exoletus*, Laur. Amph. p. 78.

Inhabits South America and India. The length is three feet; the feales on the body are obtufe, and arranged in eleven rows; the head oblong and flattifh; tail flender, a foot in length, and pale beneath.

DHARA. Coppery-grey, with the edges of the feales whitifh; beneath white. *Coluber dhara*, abdominal feuta 235, fubcaudal feales 48.

The length of this fnake exceeds a cubit; the thicknefs lefs than a finger. The head is ovate, obtufe, and covered with large feales, of which thofe in the middle between the eyes are larger than the reft. A native of Arabia. Forfk.

TYRIA. Whitifh, with a triple feries of rhomboidal fpois. *Coluber tyria*, Linn. Defcribed by Haffequift as a native of Egypt.

FULVIUS. Fulvous, spotted with brown, the body annulated with black bands, and the tail very fhort. *Coluber fulvius*, abdominal feuta 218, fubcaudal feales 31. Linn.

Length

Length about eighteen inches; the head brown above, and covered with large scales. A native of North America.

CONSTRUCTOR. Shining black, with the body very long and slender. *Coluber constructor*, abdominal feuta 186, subcaudal feales 92. Linn. *Black snake*, Catesby. Carol.

According to Catesby, this is a large and very long snake, some attaining to the length of six feet; they are entirely of a shining black colour, and are very nimble and beneficial in killing rats, which they pursue with wonderful agility to the roofs and all parts of houses and barns, where rats are able to run, and for this service are preferred by most of the inhabitants; they are bold and furious, leaping at and biting those that attack them, though no harm ensues, their bite not being venomous; it is commonly said, in Carolina, they will attack the rattle snakes, and swallow them. "It is certain," says Catesby, "most or all snakes will devour one another, not only of their own but of all other kinds, which I have often seen; one, after a long struggle, swallowing another, but little less than itself."

SIRTALIS. Brown, with three blueish-green bands. *Coluber sirtalis*, abdominal feuta 150, subcaudal feales 114. Linn. Described by Kalm as a Canadian species.

DECORUS. Blueish-green, with a double lateral band of black, and black spots on each side the neck.

A species described by Dr. Shaw, from a specimen in the British Museum. Its habit is slender and flagelliform; length about two feet and a half; the colour pale, blueish, gilded green, with iridescent variegations; beneath paler, or more inclining to white; on each side the body, near the abdomen, a double black stripe; head longish, covered with large scales, immaculate, and marked each side, through the eyes, by a broadish black stripe broken into spots, and which, passing to some little distance along the neck, becomes divided, and forms the double lateral stripe before mentioned. The eyes are large: tail very long and slender.

DOMICELLA. White, with numerous deep black transverse bands meeting beneath, and a blackish abdominal line. *Coluber Domicella*, abdominal feuta 118, subcaudal feales 60. Linn. *Anguis bicolor elegantissimus malabaricus*, Seba.

Length about two feet and a half, diameter half an inch; the head is small, covered with large scales; tail rather short and tapering to a point. This is a native of India; it is said the ladies in India sometimes carry this snake in their bosoms, and hence Linnæus named it domicella.

VIROIDISSIMUS. Bright green; abdomen whitish, with the feuta dilated towards the middle. *Coluber viridissimus*, abdominal feuta 117, subcaudal feales 122.

This beautiful snake is a native of Sericam. The length is about three feet; head slightly obtuse, of moderate size, covered with very large scaly plates; the remainder of the upper parts with ovate scales; the tail is of moderate length and slender. The green on the back inclines more or less to blue or purple in different individuals, and the abdomen in some than in others. It is esteemed a harmless species.

CURSUS. Greenish, with two dorsal stripes of linear white spots, and whitish sides and abdomen.—*La Courresse*, Cepad. Abdominal feuta 185, subcaudal feales 105.

A species described by La Cepadé, from a specimen in the Royal Cabinet at Paris. The length is near three feet; the head is covered with large scales, the tail of moderate length and gradually tapering to the tip. It is said to be a timid animal, and remarkable for the swiftness of its motions. This inhabits the island of Martinico.

HICKANELLA. White, speckled above with blue, and variegated with blue on the abdomen. *Serpens hickanelle Americanus*, Seba.

A native of South America, where it frequents houses, and is very useful in destroying rats, mice, and other vermin. It is about two feet and a half in length, the thickness moderate, head oblong, and covered with large scales, tail rather short, and gradually tapering.

PERLATUS. Pearl-coloured; head and tail sea-green; the former marked by a red spot. *Serpens ex novo Hispanicus*, a Fahro Lynceus.

This snake is about two feet and a half in length, and rather thick, except towards the tail, where it gradually tapers to a slender point; the top of the head is covered with small scales except about the nose and between the eyes. It is a native of New Spain.

PLATURINUS. White, spotted with brown, and annulated with broad brown zones. Shaw Gen. Zool.

Described from a specimen in the museum of Dr. Williams Hunter. It resembles the common snake *C. natrix*, but the tail is rather more slender in proportion; the head is rather large, and covered with large scales of a black brown colour, elegantly marked with intervening spaces of white; the whole animal is about three feet and a half in length.

ARGUS. Chestnut-brow, banded with transverse rows of ocellated red spots; beneath yellow. *Coluber argus*, Linn. *Serpens arabica brassiliensis ibobocata*, and *Boiguacu diâa*; alias *argus*, Seba.

The argus snake is a large and elegant species, measuring, according to Seba, above five feet in length, and being of a moderate thickness in proportion. The head is large, flat-tish, covered in front with small scales, and so very protuberant on each side at the hind part, so as to appear heart-shaped. The ground colour is brown, very beautifully marked from head to tail by numerous transverse rows of round ocellated red spots, surrounded by a white iris, and an exterior red one; the abdomen beneath is pale yellow; tail moderately slender and tapering to a point. It is a native of Arabia, and seems to be considered as a poisonous species.

OCCELLATUS. Chestnut-brown, with ocellated brown spots, and yellow abdomen. *Serpens guineensis rarissima argus diâa*, Seba.

In size resembles the viper; the head is covered with small scales; tail tapers to a moderately slender tip. This, according to Seba, is a native of Guinea, and is a rare species.

CHIAMELLA. Blue, the scales marked with a white spot, body beneath yellow. *Serpens americana chiamella diâa*, Seba.

A beautiful species about four feet and a half in length, found in the West Indian islands.

ZEYLONICUS. Abdominal feuta 180, subcaudal feales 80. Gmel. Gronov. *Coluber maculis majoribus brunneis*, Boddaert. *Serpens maculata ceylonica*, Seba. *Serpens americanus*, Scheuchz.

CATUS. White; the scales disposed in fours, black, and thickly crowded into patches. *Coluber catus*, Gmel. *Coronella catus*, Laur. Amph.

A native of America; it is observed of this snake that it lies in wait, and springs upon mice like the cat, whence its name.

CERVINUS. White, dotted in the middle with black, and branched with black at each end. Gmel. *Coronella virginica*, Laur. Amph. Inhabits America.

TESSELLATUS. Above alternately tessellated with black and brown; beneath black with white unequal spots each side; head long and shielded. Gmel. *Coronella tessellata*, Laur. Amph.

RUBER. Bright red with the spots alternately uniting; beneath white. Gmel. A doubtful species.

MOLUURUS. Abdominal plate 248, subcaudal scales 59. Gmel.

This kind inhabits South America, and resembles the Boa tribe, but is distinguished by the plates, and large scales on the head, as in the coluber genus.

MINERVÆ. Glaucons, with a brown dorsal stripe, and three on the head; abdominal scuta 238, subcaudal scales 90. Linn.

Length about eighteen inches; thickness exceeding that of a swan quill; the colour glaucous, with a broad, longitudinal, brown band down the back, and three longitudinal bands on the heads, two of which pass through the eyes. The head is oblong, ovate, convex, and smooth; the eyes large; tail slender, and measuring about a third of the whole length. Described by Linnaeus from a specimen in the museum Adolphi Friderici brought from the East Indies.

SCUTATUS. Black; scuta extremely broad; tail subtriangular. *Coluber scutatus*, abdominal scuta 190, subcaudal scales 50. Pallas.

Resembles the common snake, *coluber natrix*; the length is about four feet; colour entirely black, except that the abdomen is marked alternately on each side with a row of smallish square yellowish-white spots. The principal character consists in the scuta being remarkably wide, extending on each side in such a manner as to embrace two-thirds of the body. This species was observed by Dr. Pallas about the borders of the river Ural; it is found occasionally both in the water and on land.

HIPPOCREPTIS. Livid, spotted with brown, with a reversed lunulated or horse-shoe mark on the back part of the head. *Coluber hippocrepis*, abdominal scuta 232, subcaudal scales 94. Linn. Mus. Ad. Fr. *Natrix hippocrepis*, Laur.

Length about twelve inches; head of moderate size, marked by a transverse arched brown band between the eyes, and a larger horse-shoe-shaped mark on the back of the head; abdomen pale; tail tapering gradually from the tip. A native of America.

DOMESTICUS. Grey, spotted with brown; a bipartite black spot between the eyes. *Coluber domesticus*, abdominal scuta 245, subcaudal scales 94. Linn.

This is a native of Barbary, where it appears to be in some degree domesticated, being very common in the houses of the inhabitants, where it is kept to destroy the smaller kind of noxious animals. In its general appearance this snake is allied to the last-mentioned species, and like that is perfectly harmless.

DUBIUS. Abdominal scuta 141, subcaudal scales 24. Linn. Gron. Mus. Seb.

EXALBIDUS. Whitish with transverse broad spots mixed with black and white.

COLUBER EXALBIDUS, abdominal scuta 135, subcaudal scales 42. Gmel. *Coluber exalbidus maculis transversis latissimis ex et albo mixtis.*

CAHIRINUS. Grey, with large oval brown spots on the back, and small quadrangular notched spots on the sides; beneath silky white. *Coluber cahirinus*, abdominal scuta 230, subcaudal scales 82. Forst. Fn. Arab.

Inhabits Cahira. Length four feet and a half, and the thickness that of a finger; the head is flattish, subcordated, with two pale oblong scales on the crown,

CALAMARIUS. Livid, with transverse brown bands and linear points; beneath tessellated with brown and white.

Coluber calamarius, abdominal scuta 140, subcaudal scales 22. Linn.

This is a small snake, measuring about a span in length, the thickness that of a goose-quill; colour above livid, sprinkled with linear dusky spots, and marked by several dark narrow transverse bars; the head is very small, convex, and ovate; the tail short and terminating obtusely. This species inhabits America.

CARINATUS. Lead-coloured, with large ovate, porous scales; back carinated; abdomen whitish. *Coluber carinatus*, abdominal scuta 157, subcaudal scales 115. Linn. Mus. Ad. Fr.

A large species, growing to the length of five or six feet, and of a moderate thickness; tail tapering gradually to a point; tail much carinated, rising into a ridge on the top; colour deep bluish brown, or cinereous, inclining to lead-colour, paler or whitish underneath; scales very large and marked with numerous impressed points as if pierced with pin-holes. This is represented as a harmless species; it inhabits North America, and varies in colour.

GETULUS. Bluish-black, with linear yellow lines on the sides and bifid bands on the belly. *Coluber getulus*, abdominal scuta 215, subcaudal scales 44. Linn. D. Garden.

Inhabits Carolina, where it frequents moist woods and shady places, and preys on lizards. Length about three feet. An elegant species.

Plicatilis. Livid, with a stripe of dusky brown confluent spots on each side, the anterior ones ocellated with a white pupil. *Coluber plicatilis*, abdominal scuta 131, subcaudal scales 46. Linn. Amoen. Acad. *Cerastes plicatilis*, Laur. Amph. *Serpens balisalan-boeket*, Seba.

Length from two to three feet; the colour brownish-ellor or livid, with a dusky and lateral stripe of confluent spots immediately above the centre, the anterior ones of which have a white dot in the centre. The abdomen is pale, and marked with three or sometimes four rows of small dusky spots. The head is covered in front with large scales, snout obtuse; tail thick and rather blunt. The specimen described by Linnaeus measured, as above-mentioned, less than three feet, that described by La Cèpede, a specimen in the Museum of the king of France, was more than six feet long, from which it appears this snake is of a large size when full grown.

BATAEN. Spotted with black and white. Forst. Fn. Arab.

Described by Forskal as a native of Arabia; it is a foot in length and two inches in thickness, and is highly poisonous; the body swelling to a great size after being bitten by this snake.

HANNASCH. Entirely black. Gmel. Inhabits Arabia, a cubit in length, and as thick as a finger.

PURPURASCENS. Abdominal scuta 189, subcaudal scales 122. Gmel.

PICTUS. Abdominal scuta 172, subcaudal scales 142. Gmel. Boddaert.

HAFJE. Black, with oblique bands, and scales half white. *Coluber hafje*, abdominal scuta 207, subcaudal scales 109. Linn.

First described by Forskal. This snake inhabits Lower Egypt, is of a very large size, when irritated lifts up, and stretches out its head to bite.

PULLATUS. Bands of the body black with white dots; temples snowy with black spots; beneath white with black spots. *Coluber pullatus*, abdominal scuta 217, subcaudal scales 108. Gmel. A native of Asia.

CABACARAS. Blue, with the scales on the fore-part of the

the body elongated; those behind rhomboidal, and the neck transversely striated with black, *Coluber caracas*, abdominal scuta 190, subcaudal scales 125. Linn. *Serpens caracas brasiliensis singularis*, Seba.

A species of moderate size, length two feet and a half; the head rather large and oblong; snout obtuse; from behind each eye a black streak; colour pale blue, the posterior part of the body tinged with rose colour; the scales on the fore parts of the animal are of a narrow lengthened form, and on the hind parts rhomboid; neck and anterior parts elegantly marked by numerous transverse black lines; tail rather long, and gradually tapering to the tip. This species inhabits Brazil.

STOLATUS. Glaucous, with two whitish stripes, and quadrangular transverse brown spots between. *Coluber stolatus*, abdominal scuta 143, subcaudal scales 76. Linn. Laurenti. Seba.

Described from a specimen in the Museum Adolphi Fridenici as a poisonous snake, but it appears erroneously so. This species inhabits India. It is of the middle size, measuring from a foot and a half to two feet or more in length. The colour is bluish above, with two rather remote white lines down the back, and a continued series of brown, transverse, equidistant zones. The abdomen is pale or white, each scutum being marked on each side by two small specks; the head is covered with large scales, pale or bluish above, and of moderate size; tail rather short and tapering to a point.

AURORA. Orange coloured, with the dorsal band and abdomen yellow. *Coluber aurora*, abdominal scuta 179, subcaudal scales 37. Linn. Mus. Ad. Fr. *Cerastes aurora*, Laur. Amph. *Serpens aconius*, &c. Seba.

Length two feet and a half, and of moderate thickness in proportion; general colour dull orange, with a broad dorsal line of pale yellow; head rather large and covered with very large scales; tail rather short and tapering to an obtuse point. Inhabits South America.

PALLIDUS. Grey, speckled with brown, and marked with a double, interrupted black line on each side. *Coluber pallidus*, abdominal scuta 156, subcaudal scales 96. Linn. Amoen. Acad.

Linnæus describes this as being a foot and a half in length, and the thickness of a swan-quill, with the back slightly angulated each side. The head is roundish, much thicker than the neck and covered with large scales; the ground colour pale variegated with scattered grey spots and points. Inhabits India.

ORIENTALIS. Abdominal scuta 202, subcaudal scales 95. Gmel. Boddart. *Viperæ vera orientalis*, Seba. Inhabits Eastern countries.

OVIVORUS. Abdominal scuta 203, subcaudal scales 73. Gmel. *Guinipujura*, Pfl. Brasil.

We only know of this species that the plates and seals are as above described, and that the species inhabits America.

CENCHOA. Head globose; body whitish, with transverse rhomboidal brown bands. *Coluber cenchoa*, abdominal scuta 210, subcaudal scales 124. Linn. *Anguis de cenchoal americanus*, Seba.

A long and very slender species growing sometimes to the length of three or four feet, and yet scarcely exceeding the thickness of a swan-quill. The head is very large and nearly globular, the neck extremely thin; and the tail remarkably long, measuring nearly a third part of the whole animal, and gradually tapering to the extremity. The colour is white or yellowish, marked throughout the whole upper part from the head to the end of the tail, with nu-

merous transverse rhomboidal bars, or patches of brown, the points of which descend on each side.

FLAGELLUM. Extremely long, slender, and brown; abdomen pale. *Coacab-cobip snake*, Cateby.

This species measures from four to five feet; or even six feet in length, and is remarkably slender. Cateby, who describes this snake, speaks of it as an active nimble creature, running very swiftly and being perfectly harmless, "yet, says he, the Indians report, not without gaining many proselytes to their silly belief, that it will by a jerk of its tail, separate a man in two parts." This snake is a native of Carolina and Virginia.

AHAFTULLA. Bright blue-green and iridescent; abdomen pale, with a black streak across the eyes. *Coluber ahaftulla*, abdominal scuta 163, subcaudal scales 150. Linn. Amoen. Acad. *Natrix ahaetulla*, Laur. Amph. *Serpens ornatiflora amboinensis bouguatrorra*, Seba. *Long green Borneo snake*, Petiver.

The general colour is a bright blue green with a golden gloss, and highly iridescent. The length is from three to four feet, and the diameter about three-fourths of an inch; the head is covered above with large scales, and the snout is slightly elongated, though not pointed; the tail is somewhat angular, and of considerable length. It is an innocuous species, is found in several parts of India, and is esteemed one of the most beautiful of the serpent race.

AESTIVUS. Blue green, slender; snout obtuse; abdomen pale green. *Coluber aestivus*, abdominal scuta 155, subcaudal scales 144. Gmel. *Green snake*, Cateby.

Long and slender, the general length about three feet; the head is obtuse; colour of the upper parts blue green, slightly tinged with purple; tail very long and slender. This kind inhabits many parts of North America, where it frequents trees and preys on flies and other insects. Cateby, to whom we are indebted for the above particulars, adds, that it is easily reclaimed from its natural wildness, becoming tame and familiar, and affirms that some people carry it in their bosoms.

FILIFORMIS. Very slender, black; beneath white. *Coluber filiformis*, abdominal scuta 165, subcaudal scales 158. Linn. Mus. Ad. Fr. *Natrix filiformis*, Laur.

Length about twelve inches, and thickness that of a goose-quill; the colour above black, appearing like a broad dorsal stripe, beneath white; the head is ovate, twice the diameter of the body, above black and beneath white; tail about one-third the whole length, very slender, and sharp-pointed. A native of India.

TORQUATUS. Black above, beneath red, with a white collar round the neck. Shaw Gen. Zool. *Little black and red snake*, Edwards.

A small species, less than an earth-worm; head and upper parts jet black, and glossy; the head rather large, and covered with large scales; eyes flame-coloured. This is a native of Pennsylvania where it inhabits crevices of rocks, old walls, &c. and feeds on insects.

SIPEDON. Entirely black or deep brown. *Coluber sipedon*, abdominal scuta 144, subcaudal scales 73. Linn. A native of North America; described by Kalm.

DABOVA SNAKE, Le daboie, La Cepede.

Described by La Cepede who considers it as the species which in the kingdom of Juda, and some other parts of Africa, is regarded as a deity, and kept in temples consecrated to its worship. This superstition is said by the traveller, De Marchais, to have arisen from the following circumstance; the army of Juda being on the point of yielding to that of Ardra, it happened that a large serpent of this species made its appearance, which the chief priest probably

probably knowing it to be innocuous lifted it up in his arms and displayed as a kind of miracle, or at least as a propitious omen, persuaded the army again to rally, by which means a signal victory was obtained, and the animal was in consequence exalted into a divinity. It is said to arrive at a very considerable size, and is of a whitish colour, ornamented on the upper part throughout the whole length by a triple row of large oval rufous patches bordered with black, the head is rather large, and is covered with oval carinated scales similar to those on the rest of the animal. The individual described by La Cèpede was preserved in the Royal Cabinet, and measured three feet five inches in length.

BRASILIAN SNAKE, *La brasiliens*, La Cèpede.

Length three feet; head and body covered with oval carinated scales, snout terminated by a large and almost perpendicular scale rounded at the top, but emarginate at the bottom for the passage of the tongue; upper parts of the animal marked with large oval rufous patches bordered with black, and in the intervals between the large patches are several much smaller ones of a dusky colour; fangs very large. This is a native of Brasil, and La Cèpede believes may be about six feet in length when it has attained its full size.

TRIANGULAR-HEADED SNAKE, *La tête triangulaire*, La Cèpede.

Refembling the common viper in general appearance. The colour is greenish, with spots of different shapes on the head and body, uniting so as to form a regular band down the back; abdomen dusky, edged with white. The head is of a more triangular shape than usual, and covered with smooth scales, as are likewise the body. Its total length is two feet. This kind inhabits the island of Eulstatia.

PANTHER SNAKE, *La tigrée*, La Cèpede.

Allied to the last; length about eighteen inches; head as in the common viper. Colour of the upper parts whitish, rufous, with dusky spots bordered with black like those on the skin of the panther or leopard. The native country unknown.

The *coluber hydrus*, and *coluber laticaudatus* of Linnæus, are excluded from the above, and will be described under the article HYDRUS, the new genus to which they are referred by Mr. Schneider, and which we think it right to adopt. They are generally distinguished from the colubrine tribe by having the body slender in front, becoming gradually thicker, scaled, and the tail compressed. See HYDRUS.

COLUBRARIA *Insula*, in *Ancient Geography*, an island of the Mediterranean sea, near the Baleares. Pliny says that the soil engendered serpents. It is thought to be the present isle of Formentera, and the same with that which the Greeks called Opdiua, from *ὄπις*, *aphis*, a *Serpent*. It lies S. of Yicca, and was inhabited.

COLUBRINUM *Lignum*. See LIGNUM COLUBRINUM.

COLVEND *Copper-Mine*, in *Mineralogy*, Galway county, in Ireland; the specimens of ore found in this mine are very beautiful and deserving the attention of mineralogists and collectors. See Willmes's Mineral Kingdom.

COLVILLE, CAPE, in *Geography*, a cape on the east coast of New Zealand; lying in S. lat. 36° 26'. E. long. 194° 27'. This cape rises directly from the sea, to a considerable height, and is remarkable for a lofty rock, which may be distinguished at a very great distance. From the S. point of this cape the river Thames runs in a direct line S. by E., and is no where less than three leagues broad for the distance of fourteen leagues above the cape, and there it is contracted into a nar-

row stream, but continues the same course through a flat country, or broad valley, which lies parallel with the sea-coast. On the east side of the broad part of this river the land is tolerably high and hilly; on the west side it is rather low, but the whole is covered with verdure and wood, and has the appearance of great fertility, though there were in Cook's voyage, Nov. 1769, but a few small spots which had been cultivated. Six leagues within cape Colville, under the eastern shore, are several small islands, which, together with the main, seem to form good harbours; and opposite to these, under the western shore, the other islands of which, probably, good harbours may be formed. The river affords good anchorage, and is defended from the sea by a chain of islands, lying across the mouth of it, and on this account called by Cook "Barrier Islands;" these stretch N.W. and S.E. 10 leagues. The S. end of the chain lies N.E. between two and three leagues from cape Colville; and the N. end lies N.E. 4½ leagues from Point Rodney. "Point Rodney" lies W.N.W. nine leagues from cape Colville, in S. lat. 36° 15'. W. long. 84° 33'. The natives, residing near the river, are numerous; but they are a strong, well-made, and active people, and all of them paint their bodies with red ochre and oil from head to foot. Their canoes were large and well built, and adorned with carving.

COLUMB, ST. MAJOR, a market town of England, in Cornwall, in the hundred of Pider; 19 miles N.E. of Truro, and 245 W. of London. This town had for some years a communication with the sea coast by means of the Columb canal, but which is now filled up and disused. The Mewgan canal was also another abortive attempt at conducting a permanent navigation into this elevated neighbourhood for the conveyance of its China stoneware and potters' clay to the place of shipping.

COLUMB, *St. Minor*, a village of Cornwall, in the hundred of Pider: the situation of its church steeple was determined in the Government Trigonometrical Survey in 1798, by observations from St. Agnes's station, distant 58,448 feet, and bearing 44° 7' 57" S.W. from the parallel to the meridian of St. Agnes; and from Henbarrow station distant 53,942 feet; whence is deduced its latitude 50° 25' 21" 0 N. and its longitude 5° 1' 29.3" or 20" 5.9 W. of Greenwich.

COLUMBA, in *Ornithology*, the genus pigeon. Those have the bill straight, and descending towards the tip; the nostrils oblong, and half covered with a soft tumid membrane.

The pigeon tribe is divided into two families, the first having the tail even at the end, and of moderate length; the other cuneated and long.

* *Section*. Tail of moderate length, and even at the end. **OENAS**. Bluish; neck above glossy-green; double band on the wings and tip of the tail blackish. Linn. Fn. Succ. *Oenas*, or *Vinago*, Aldr. Will. *Stock dove*, Arct. Zool. *Holtstaule*, Friesch.

The rock dove inhabits Europe and Siberia, frequenting rocky places and ruins in retired situations.

DOMESTICA. Cincereous; rump white; band on the wings, and tip of the tail blackish. Linn. Fn. Succ. Scopoli. *Columba domestica*, Briff. *Common pigeon*, Ray, Albin, &c. *White rumped pigeon*, Lath.

The common, or domestic pigeon admits of an infinite number of varieties, many of which are remarkable for the beauty and elegance of their plumage; the principal varieties of these birds have been minutely regarded by Buffon and some other writers, and are enumerated in the following order in the Gmelinian *Sytlema Naturæ*.

LIVIA. Stock dove. Wings with a double blackish band, called by Buffon *biset*, and by Albin the *stock dove*.

SAXATILIS. Rock pigeon. Quill-feathers fulvous. *Columba rupicola* of Ray.

HISPANICA. Roman pigeon. Cere whitish and scurfy. *Columba romana* of Brisson. *Columba domesticus major*, Ray. *Pigeon romain*, Buff. *Greater tame pigeon*, Willughby.

DASYPUS. Rough-legged pigeon. Legs rough with feathers. *Rough footed dove*, Willughby. *Rauchsfisge taube*, Frisch.

CRISTATA. Crested pigeon. Head crested; legs hirsute and cinerous. *Pigeon huppé*, Buff.

NORWEGICA. Norway pigeon. Head crested; legs hirsute and snowy. Briff.

BARBARICA. Barbary pigeon. Area of the eyes naked and papillous; a double black spot on each wing. *Pigeon de barbarie*, Buff. *Barbary pigeon*, Ray.

CUCULLATA. Jacobine. Feathers of the hind head erect, reflected. *Columba anglica*, or *ruffica*, Gess. *Pigeon nonain*, Buff. *Jacobine*, Ray. *Zahne selbstaube*, Frisch.

HISPIDA. Laced pigeon. Down small, erect, and dispersed over the back and wings. *Columba crispata*, Aldr. *Pigeon frisé*, Buff.

TURBITA. Turbit pigeon. Feathers on the breast recurvate. *Pigeon à cravate*, Buff. *Turbit*, Ray.

LATICAUDA. Shaker pigeon. Tail erect, many-feathered, and broad. *Pigeon paon*, Buff. *Broad-tailed shaker*, Ray. *Pfaunttaube*, Frisch.

GYRATRIX. Tumbler pigeon. Throws itself over and over in flight. *Pigeon culbutant*, Buff. *Tumbler*, Ray. *Tummeltaube*, Frisch.

GALEATA. Helmet pigeon. Head and quill-feathers of one colour, and different from that of the body. *Pigeon casquée*, Buff. *Helmet pigeon*, Ray.

TURCICA. Turkish pigeon. Cere papillous and red. *Türkische taube*, Frisch. *Turkish or Persian pigeon*, Willughby.

TABELLARIA. Carrier pigeon. Cere broad, carunculated and whitish; eye-lids naked. *Carrier pigeon*, Ray, Willughby.

GUTTUROSA. Cropper pigeon. Breast inflated. *Pigeon grosse gorge*, Buff. *Cropper pigeon*, Ray. *Kropftaube*, Frisch.

EQUES. Light-horseman pigeon. Breast inflated; cere carunculated. *Light horseman pigeon*, Ray.

PERCUSSOR. Smiter pigeon. Strikes its wings violently in flight. *Smiter pigeon*, Ray, Willughby.

JUBATA. Turner pigeon. Crest hanging down from the crown like a mane. *Turner pigeon*, Will.

MACULATA. Spot pigeon. White tail and frontal spot of one colour. *Spot pigeon*, Willughby.

MONTANA. Orbits naked and red; body rufous, beneath yellow. Linn. *Columba rufa cayennensis*, Briff. *Perdix montana*, Ray. *Mountain partridge*, Sloane, Brown, &c. *Partridge pigeon*, Latham.

This bird, is eight inches and a half in length. The bill is red, with a black tip; the irides red, and surrounded with a warty skin of the same colour; the upper parts of the body are rufous, with a purplish hue; the under part of the neck, with the breast flesh colour; belly, sides, and vent, somewhat rufous; under wing-coverts, quills, and tail rufous; legs red, with the claws black. Those birds inhabit Cayenne; they build in trees which have the boughs hanging low, and line their nests with hair and cotton. They feed on the berries of the myrtle. Dr. Latham suspects, that this species is found in St. Helena, as a bird

is mentioned in Mr. Anderfon's catalogue, under the name of *columba perdix*, and which is said to be very common in that island. A kind of pigeon, conceived to be a variety of the above, is described by Edwards; the forehead is of a clay colour; the head and neck, reddish purple; back, wings, and tail, red brown, with a gloss of copper-colour; the fore part of the neck is reddish clay colour; breast, belly, thighs, and under tail-coverts, light clay colour; a white mark on each side under the eye, and another at the side of the throat, and just at the joint of each wing.

TETRAOIDES. Head, and neck black, with white margin. Scop. *Tetraoid pigeon*, Lath.

The only account we have of this bird, is from the work of Scopoli. Ann. 1. p. 125. He informs us it equals the red-legged partridge in size, and that the head and neck are black, and encompassed with a white margin, as in that bird. The description was taken from a bird living in a menagerie.

LEUCOCEPHALA. Bluish; orbits and crown white. *Columba leucocephala*, Linn. *Columba minor, capite albo*, Ray. *Columba saxatilis jamaicensis, le pigeon de roche de la Jamaïque*, Briff. *Bald pate pigeon*, Sloane. *White crowned pigeon*, Arct. Zool.

Breeds in vast numbers among the rocks on the coasts of Jamaica, St. Domingo, and the Bahama islands; and subsists on the berries of the sweet wood. The length is ten inches and a half; the bill red with a white tip; the eyes surrounded with a white skin, the irides yellow; crown of the head white, beneath changeable; neck green and blue, varied with a gloss of copper; the quill, feathers, and tail are brown; the legs red, with grey claws.

LEUCOPTERA. Orbits naked, and blue; tail feather cinerous, with the tips white, the middle ones fulvous, Linn. *Columba indica*, Briff. *Brown Indian dove*, Edwards. *White winged dove*, Brown, Jam.

This bird is the same size as the common turtle, and measures in length eight or nine inches. The bill is dusky black. A fine blue skin furrounds the eyes, and according to the figure in the plates of Edwards, goes on to the base of the upper mandible. The irides are crimson; the forehead, cheeks, and front of the neck and breast, pale rufous brown; hind part of the head and neck dull brown. The upper part of the body is dark brown, with a mixture of blue; greater wing-coverts the same, but the outer margins, and tips are white. The two middle tail feathers, are the same colour as the back, the rest dull ash, with white tips; legs red, with black claws. The white winged dove, inhabits the East Indies, and is observed to stir up its tail at intervals, like the common wagtail.

FUSCA. Fulvous; eyes black; neck and breast white, undulated with black. Jacq. Beyr.

This is the size of the turtle, and inhabits Carthage, in America. Latham considers it as a variety of the last.

MARTINICA. Somewhat violaceous; abdomen reddish; quill feathers-rufous on the inner webs. *Columba martinica*, Linn. *Columba violacea martinica*, Briff. *Pigeon violet de la martinique*, Buff. *Martinico pigeon*, Lath.

About the size of a turtle; the length nine inches and a quarter; the bill is red, and the eyes are surrounded with crimson tubercles; the head, neck, and upper parts of the body, are chestnut glossed with violet; the under parts of the body, more or less rufous; the quills the same as the upper, but on the outer edges only, the inner rufous; the tail feathers, the same on both margins; legs reddish with brownish claws. Inhabits Martinico. *Le pigeon de la Martinique* of Brisson, and which Buffon calls *Le pigeon rouge de Cayenne*, is considered as a variety or rather the female

male of the above mentioned bird; it is of a reddish brown colour, with a collar of golden violet; the wings are spotted with black; lateral tail feather black at the end, with the tip white. Inhabits also Martinico.

JAMAICENSIS. Purplish brown, beneath white; tail feathers blue, terminated by a white line. *Columba jamaicensis*, Linn. *Pigeon de la Jamaïque*, Buff. *Columba minor ventre candido*, Raii. *White bellied pigeon*, Lath. *White bellied dove*, Sloane.

The length of this species is nine inches. The nostrils are much elevated, and form two tubercles at the base; the top of the head, with the under parts of the neck and body are white; hind part of the neck varied with blue and purple; back, rump, and upper tail-coverts, purplish brown, with a light reddish tinge. This bird is found in the savannas of Jamaica, in the month of January. It feeds on berries, frequents trees, and has a mournful note, which is sometimes very loud and disagreeable.

CORONATA. Bluish, above cinereous; orbits black; erect crest; shoulders ferruginous. Gmel. *Columba nungens*, Scop. Ann. *Phasianus cristatus indicus*, Briff. *Faisan couronné des Indes*, Buff. *Gouris de la nouvelle Guinée*, Sonnerat. *Grest crowned Indian pigeon*, Edwards.

The crowned pigeon is nearly the size of a turkey, in which particular, it far exceeds any other species of the same tribe. Brisson has placed it with the pheasants, and his example is followed in the *planches enluminées*, but the bird possesses in every respect, the manners of the pigeon tribe; its note is cooing and plaintive like those birds, only louder in proportion. We are told, the mournful notes of these birds, alarmed the crew of Bougainville very much, when they touched in their voyage at one of the islands they inhabit, as they mistook it at first for the cries of the human species. The crowned pigeon, we are assured by Scopoli, has been known to build its nest and lay eggs in Europe, though the young were not hatched; they made a nest on trees in the menagerie, where they were kept, composed of hay and stalks. The female it is observed never fat, but stood upon the eggs, and it is supposed by Scopoli, that it must be from this cause alone, these eggs proved abortive. In the East Indies, they are occasionally kept in court yards like other domestic poultry.

CRISTATA. Reddish brown, crested; under side, head, and neck, black; back and tail green; front with six very long, erect feathers. *Columba cristata*, Gmel. *Le zontoul de Malacca*, Sonnerat. *Uncannon bird from Malacca*, Phil. Trans. *Lesser crowned pigeon*, Lath.

The bill of this species is conical and rather bent; the colour black, except the under mandible, which is yellow at the base. On the fore part of the head, are six very long black bristly hairs, which stand upright, and may be depressed or elevated by the bird at pleasure; on the back part of the head, is a crest of a gilded red colour, composed of hard and stiff feathers. The space between the two crests is white, forming a band across the head. The eyes are encircled with stiff white feathers. The legs are yellow; the toes are separated at their origin, and the hind claw is delicate of a claw. Size of the common pigeon. A variety of this bird, formerly in the Leverian Museum, measured ten inches in length: the bill was yellowish, with the tip black; the back part of the head, crested as in the former; the forehead white, passing backwards on each side beneath the crest; the eyes were surrounded with feathers of a reddish colour, which passed backwards in a point; and the head and neck were of a dark reddish brown; breast, belly, and vent, violet black; wings blue reddish brown; back, rump, and tail, dull brownish green; tail-coverts long and falling

over the tail; legs reddish yellow, with black claws. The history of this last bird is unknown, but it is considered as a variety, or perhaps a sexual difference.

POMPADORA. Green; wings purplish, quills black; chin and throat yellow. Gmel. *Pompadour pigeon*, Lath. Gen. Syn. Brown. Illustr. *Yellow faced pigeon*, Brown (fem).

The Pompadour pigeon is a native of India, and appears to be most common in the island of Ceylon. It is constantly seen on trees, and for the most part on those known by the name of *Waringia grathebris*, on the berries of which it delights to feed. They are shot by Europeans, who esteem them excellent eating; the natives take them with bird-lime. The size is less than that of the common turtle; the back, breast, and belly, are pale green; the wing-coverts of a fine pompadour colour; tail green; and legs red. The female is paler, and has the wing-coverts the colour of the body. These birds are common in the country about Bangalore, where they are called *coovla*; it is said to have a whistling note, resembling that of the thrush.

ERYTHROPTERA. Black; eye-brows, and front white; neck above, shoulders and wing-coverts garnet colour; tail from the base to the middle cinereous; legs brown.

Length nine inches and a half; tail two inches and a half long and even at the tip; legs brown.

This inhabits the island of Eimeo. Another bird much resembling this, and supposed to be the female, was met with at Oahete; the forehead, throat, front of the neck and breast, were white, the hind part of the neck dusky; over the eye a ferruginous streak, passing a little downwards on each side of the neck; the back dusky black; belly dusky; quills and tail blackish. Another analogous kind, found in the South Sea islands, is of a reddish black colour, with the breast, and eye-brows white, and the legs red.

ALBICAPILLA. Green; crown hoary; sides of the neck chestnut with a golden gloss; greater quill feathers and tail black. *Columba albicapilla*, Gmel. *The pigeon vert à tête grise d'Antique*, Sonnerat. *Grey headed pigeon*, Lath.

A native of the isle of Panay. Its size is equal to that of the common pigeon; the bill dull red with the irides yellow; the lesser quill feathers are green, with a metallic lustre, and on the arm-pits is a semi-circular spot, half grey, and half green; the legs are dull red.

INDICA. Body purple; shoulders green; cap bluish. *Columba indica*, Linn. *Palumbus amboinensis*. *The pigeon ramier d'amboina*, Briff. *Green winged pigeon*, Lath.

Size of the turtle; the bill scarlet and ten inches in length; nostrils bluish; forehead white, with a streak of the same through the eye. The sides of the head, neck, and breast is reddish, the hind part deepest; upper part of the back and wing-coverts green gold, glossed with coppery; ridge of the wing spotted with white; lower part of the back, rump, and upper tail-coverts reddish brown; quills brownish, and rufous next the base; tail three inches long; two middle tail feathers black; the rest cinereous, with the tips black; legs red, with black claws. A native of Amboina. Jacquin describes a variety of this bird, having the quills and tail feathers green; wing-coverts violet; and the rump and vent blue.

PURPURATA. Green; cap scarlet; vent fulvous; head, neck, and collar white. *Columba purpurata*, Gmel. *Purple-crowned pigeon*, Lath.

A general inhabitant of the islands in the Pacific ocean, and subject to considerable variations in the colour of its plumage. The natives of Tongo Taboo call it *kurakuru*, those of Otaheite Oopa, and Oopara. It lives on the banana, and is easily tamed.

JAMBOOS. Green; front red; breast white. *Columba jambu*, Gmel. *Pooni jamboa*, Marsd. *Jambo pigeon*, Lath.

Rather smaller than the common dove; the bill is yellow, the fore part of the head of a deep pink, resembling the colour of the blossoms of the jamboo, whence its name of jamboo pigeon; the back, wings, and tail are green, with the breast and crop white; the eyes are yellow, and from the orbits to the breast extends a white streak, edged on one side with green, and on the other with pink. This is a native of Java, and feeds chiefly on berries.

RUBRICAPILLA. Violet-black; cap and orbits of the eye naked and red; neck, upper part of the back, and breast greyish. *Columba atricapilla*, Gmel. *Le pigeon violet à tête rouge d'Antique*, Sonn. *Red crowned pigeon*, Lath.

Found in the isle of Panay by M. Sonnerat. This bird is the size of the jacobin pigeon. The bill is grey. At the base of the upper mandible is a fleshy membrane of a bright red colour entirely encircling the eye; and legs grey.

PURPUREA. Green; head and neck purplish; breast fulvous; vent scarlet. *Columba purpurea*, Gmel. *Purple pigeon*, Brown, Lath.

Size of the common wood-pigeon. The front is pale green; breast orange; back, scapulars, and belly light green; quills dusky. A native of Java where it is called *janan*.

EIMENSIS. Greenish brown; front, collar, and beneath vinaceous; crown and neck above brown; double band on the breast purple and white. *Columba eimensis*, Gmel. *Purple breasted pigeon*, Lath. Inhabits the island of Eimeo. Length fourteen inches.

VERRANS. Green, beneath yellow, outer margin of the wing pale yellow. *Columba verrans*, Linn. Gmel. *Le pigeon vert de Philippines*, Buff. *Columba madera spatana*, Raii Syn. *Le pigeon vert male de l'isle de Luçon*, Sonnerat. *Parrot pigeon*, Lath.

Inhabits the islands of Manilla and Panay. The female is of a greenish-grey, and greenish yellow beneath. The species is rather larger than the turtle.

AROMATICA. Green-olive; back bay-colour; double bar on the wings yellowish and black; quill feathers black, with yellow edges. *Columba aromatica*, Gmel. *Columba viridis amboinensis*, Briff. *Pigeon vert d'Amboine*, Buff. *Aromatic pigeon*, Lath.

Size of the common turtle; length ten inches and a half. The bill is greenish; crown grey; tail beneath black at the base, and at the tip whitish; legs grey or red. A native of Amboina.

ST. THOMAE. Green; vent yellow; bill curved, blue, and red at the base. *Columba viridis S. Thomae*, Briff. *A wild pigeon from St. Thomas's island*, Will. Ray. *St. Thomas's pigeon*, Lath.

The size of the common pigeon; the eyes are black, surrounded by blue orbits, with the wings and tip of the tail brown. Inhabits the island of St. Thomas.

CURVIOSTRA. Green; beneath yellowish; vent white; back and shoulders bay; wings with two yellow bars; middle tail feathers green; lateral ones cinereous with a black band. *Columba curvirostra*, Gmel. *Hook billed pigeon*, Lath.

Inhabits the isle of Tanna in the South Seas; the bird, supposed to be the female of this species, differs from the male in having the back and shoulders green, and the under tail-coverts, together with the vent white.

TANNENSIS. Green; wing-coverts spotted with white; secondary quill feathers edged with yellow at the tip. Lath.

Described from a drawing in the possession of Sir Joseph

Banks. The bird is eleven inches in length, and inhabits the isle of Tanna. This is, perhaps, only a variety of the last.

CYANOCEPHALA. Vinaceous-brown; head and throat blue, with a white band between the eyes. *Columba cyanocephala*, Linn. *Turtur jamaicensis*, Briff. *Tourterelle de la Jamaïque*, Buff. *Turtle dove from Jamaica*, Albin. *Blue-headed turtle*, Lath.

A native of the island of Jamaica, Cuba, and other warm parts of America. Size of the common pigeon.

PACIFICA. Back greenish brown; head, neck, breast, and abdomen cinereous white; tail blackish. *Columba pacifica*, Gmel. *Ferruginous vented pigeon*, Lath.

The length of this species is thirteen inches and a half; the nostrils are gibbous, the throat whitish; breast vinaceous, and the legs either red or brown. It is a native of the Friendly Islands. A variety of this species has the head, neck, breast, and belly whitish; back, wing-coverts, and tail greenish, and the bill gibbous at the base. This inhabits Otaheite and Tongataboo.

MEXICANA. Fulvous, orbits scarlet; breast and tip of the wings white. *Columba mexicana*, Briff. *Pigeon du Mexique*, Buff. *Cebolot*, Ray. *Mexican pigeon*, Lath.

A native of Mexico; the irides are black; the legs red.

NAEVIA. Above fulvous, spotted with black; beneath pale fulvous; under tail-coverts, and beneath the wings, cinereous. *Columba naevia*, Gmel. *Oenus mexicana*, Briff. *Hoiolot*, Ray. *Black spotted pigeon*, Lath.

Inhabits the same country as the last, and frequents woods; size of the common pigeon.

HOILOT. Rufous purple; lesser wing-coverts white; bill and legs scarlet. *Columba Hoiolot*, Gmel. *Columba mentana Mexicana*, Briff. *Hoiolot*, Ray. *White-shouldered pigeon*, Lath. Inhabits the mountainous parts of Mexico.

CAERULEA. Blue; beneath, bill, legs, and wing-coverts red. *Columba caerulea*, Gmel. *Columba caerulea mexicana*, Briff. *Flacohoiolot*, Ray. *Blue pigeon*, Lath.

Size of the domestic pigeon; and an inhabitant of Mexico.

PALUMBUS. Cinereous; tail feathers black on the posterior part; primary quill feathers whitish on the outer edge; neck on each side white. *Columba palumbus*, Linn. *Le pigeon ramier*, Buff. *Colombo fassaiuolo*, Cetti. *Ringel tauben*, Gunt. *Ring pigeon*, Lath.

Inhabits the woods of Europe and Siberia, and builds its nests on trees.

ENEA. Legs feathered halfway down; beak and legs greenish; body brassy. *Columba enea*, Linn. *Palumbus moluccensis*, Briff. *Pigeon ramier des moluques*, Buff. *Nutmeg pigeon*, Lath.

Inhabits the Molucca islands, and feeds on the nutmeg; its size is equal to that of the ring-pigeon. A variety of this species is described by Sonnerat, under the title of *Pigeon cuivre mangeur de muscade*, and which appears to have been found in New Zealand; another variety has been met with at Amsterdam island, where it is called *Orooba ya*.

ALBA. Body white; primary quill-feathers and tip of the tail black. *Columba alba*, Gmel. *Le pigeon blanc mangeur de muscade*, Sonnerat. Voy. *White nutmeg-pigeon*, Lath.

This bird inhabits New Guinea, and is described by Sonnerat, who mentions its feeding on nutmegs, observing, that it is probably only the outer skin which serves them for nourishment, as the nut itself is voided whole, and so little altered, that, after passing through the organs of digestion, it is not rendered less fit for vegetation; and hence it happens, that those birds flying from one island to another, dis-

perfe, and fow the feeds of thofe valuable plants in every part they frequent. A variety of this fpecies having the tail white inftead of black.

GUINEA. Orbits naked and rufous; wings spotted with triangular fpoats of white; tail-feathers black at the tip. *Columba guinea*, Linn. Gmel. *Pigeon de guinée*, Buff. *Le tourterelle du cap de Lun efpérance*, Sonner. *Triangular spotted pigeon*, Edwards, Lth.

Inhabits the rocky parts of Africa, and is a particular common about the Cape of Good Hope. The fize is that of the wood-pigeon; its bill is brown, irides yellow; head and neck cinereous, upper parts gloffed with violet and purple; rump and belly white.

CARIBÆA. Blueifh; abdomen white; head, lower part of the neck, and breast purplifh; tail falciated tranfverfely with black. *Columba caribæa*, Gmel. *Columba cauda falcata notata*, Ray. *Ring-tail pigeon*, Lath.

A bird the fize of the ring-pigeon, and which is found in all the woods of the Caribbee iflands. It is in great eftem for food, each bird felling for the table at the price of a dollar. In Jamaica it is frequently called the mountain pigeon. An fupposed variety of this bird is defcribed by Jacquin, which has the tail cuneated, the orbits bare of feathers, and yellowifh, and the body blueifh; the tail of the laft-mentioned bird is as long as the body, and is deftitute of the black band fo confpicious in the ring-tail pigeon. We conceive this ought fcarcely to be confidered as a mere variety.

ZEALANDICA. Red; abdomen white; rump blue; tail black. *Columba novæ zelandiæ*, Gmel. *New Zealand pigeon*, Lath.

A native of New Zealand, obferved by the Englifh circumnavigators, in Dufky bay, where the inhabitants call it *Hagarreroo*. The length of this bird is eighteen inches. The bill and irides are red; quill-feathers dufky; vent blueifh.

BRUNNEA. Cap, neck above, back, and wing-coverts brown; breast, neck beneath, and the rump fhining green. Lath. Inhabits New Zealand; the bill and legs are fanguineous.

CHALCOPTERA. Brown-cinereous, edged with rufous; front and chin white; a bright copper-gold band acrofs the wing, and a black one near the tip of the tail. *Columba chalcoptera*, Lath. Ind. Orn. *Bronze-winged pigeon*, Phil. Bol. Bay.

This beautiful bird is a fpecies recently difcovered, and was firft defcribed by governor Phillips, in his account of Botany bay. It is the fize of the common wild pigeon, and appears to be found chiefly in Norfolk ifland. The moft remarkable character of the bird is the rich band of coppery-gold acrofs the wings; a few fpoats of the fame colour occurs alfo on the leffer wing coverts. Its bill and legs are red; quill-feathers brown, beneath rufous; the two middle tail-feathers brown, the reft pale lead colour.

MADAGASCARIENSIS. Legs feathered; tail violaceous; body blue-black. *Columba madagafcarienfis*, Linn. *Le fouinga*, Buff. *Pigeon ramier bleu de madagafcar*, Pl. Enl. *Madagafcar pigeon*, Lath.

The length of this fpecies is ten inches and a half; its fize that of the common pigeon. The bill and legs are red; the eyes placed in a bare reddifh fkin; the feathers on the neck are narrower than the others, and have a mixture of afh.

AUSTRALIS. Green; abdomen, vent, and thighs spotted; fhoulders violet. *Columba australis*, Linn. *Palumbus viridis madagafcarienfis*, Buff. *Pigeon ramier verd de madagafcar*, Buff. *Madagafcar pigeon*, Lath.

A native of Madagafcar. Length twelve inches; bill

lead colour; eyes and legs fanguineous; pofterior part of the abdomen and thighs spotted with black. Perhaps a variety of the laft.

FRANCIÆ. Blue; orbits naked; rump and tail red; feathers of the neck long, narrow, and pointed at the end. *Columba franciæ*, Gmel. *Le pigeon hollandais*, Sonnerat. *Hacked pigeon*, Lath.

This bird confiderably exceeds the ring-pigeon in point of fize. The bill and irides are crimfon; the feathers of the neck, neck, and breast are long, narrow, pointed, of compact texture, and with a highly polifhed furface. It inhabits the ifle of France, and is never eaten, the fefh being reputed poifonous.

MACULATA. Deep green; body above spotted with whitifh; belly blackifh; tail black, with the tip ferruginous. *Columba maculata*, Gmel. *Spotted green pigeon*, Lath.

Defcribed by Dr. Latham from two fpecimens, one in the collection of general Davies, the other in that of fir Jofeph Banks. The length is twelve inches. The bill black, with the tip yellow; the general colour is dark green, with a gloffy furface; the head and neck darker than the reft. The feathers of the neck are long and narrow; every feather of the wings and fcapulars are marked with a pale cinereous-white, and fub-triangular fpot; the quill-feathers are black, with the tip cinereous; the legs are brown, and are covered half way down with downy feathers. The native place of this fpecies is unknown.

NICOBARICA. Tail white; body black; wings blue; back fhining green; feathers of the neck long. *Columba nicobarica*, Linn. Gmel. *Pigeon de nincombar*, Eull. *Nicobar pigeon*, Albin.

This is one of the moft fplendid of the pigeon tribe. Its fize is that of the common pigeon; the bill is dufky; the irides hazel; head, neck, breast, belly, and thighs, and under tail-coverts dark blueifh-purple; the feathers on the neck are long and pointed, and with the upper parts of the wings are of the fineft green colour, gloffed with the moft vivid hues of red, blue, copper, or golden. The tail and upper coverts are white; legs reddifh. The female is diftinguifhed by the plumage being lefs brilliant and gloffy, and in having the pointed feathers of the neck fhorter than in the male. Thofe birds inhabit the ifle of Nicobar.

SPECIOSA. Ferruginous; tail blackifh; neck and breast varied with rufous, white, and purple undulations. *Columba fpeciofa*, Gmel. *Le pigeon ramier de Cayenne*, Buff. *Le ramiret*, Ib. *Scallop-necked pigeon*, Lath.

Rather larger than the common turtle. The bill is red, covered with a white cere; the head ferruginous; neck and breast varied with rufous white and purple, each feather being rufous, with a white mark, and the margin blue, giving the whole plumage in this part a beautiful undulated appearance; the back and wings are ferruginous; quills darker than the reft; tail dufky black, and rounded; the legs red. The female is marked in the fame manner as the male, but is much duller in colour. A native of Cayenne.

TURTUR. Tail-feathers white at the tip; black grey breast fefh-colour; on each fide of the neck a patch of black feathers, white at the tip. *Columba turtur*, Linn. *Turtur auritus*, Ray. *Palumbus turtur*, Klein. *Tourterelle*, Buff. *Tortora*, Zinnar. *Common turtle*, Penn.

The turtle is a general inhabitant of Europe, China, and India, and appears to be moft frequent in Turkey and the fouthern parts of Ruffia, and in the rocky country beyond the lake Baikal. In England thofe birds are not uncommon during the fummer, but it is only in this feafon that they

they are observed with us, for they arrive late in the spring, and depart in autumn. They build on the highest trees in thick and deep forests, and lay two eggs like the other kinds of pigeons.

It is related by baron de Tott, that this bird is highly favoured in the Turkish dominions, where it is extremely plentiful, government allowing a certain rate per cent. on the duty imposed on corn that those birds may be allowed to feed unmoled. A crowd of them constantly alight on the vessels which cross the port of Constantinople, and carry the corn uncovered either to the mills or magazine, and the boat-men never oppose them. This permission to feast on the grain brings them in great numbers, and familiarizes them to such a degree, that they are seen standing on the shoulders of the rowers watching for a vacant place where they might fill their crops in turn. The same custom is mentioned by Sonnini.

"In the Leverian Museum (says Dr. Latham) is a bird shot in Buckinghamshire, which differs from the common turtle in having almost the whole side of the neck black, instead of a patch only, and instead of each feather being tipped with white, there is a round spot of white on each very near the end, giving the sides of the neck a most beautiful appearance." There were three of those elegant birds in the Leverian Museum, including the male, female, and young, all which are now preserved in the London Museum. Those we are persuaded ought rather to be considered as a distinct species than a variety of the turtle. Two others, considered as varieties of this bird, are the Portugal dove of Albin, and *La tourterelle grise de l'isle de luçon* of Sonnerat, the first inhabits Portugal, as its name implies, and is of a brown colour, with the spot on the side of the neck varied with black and white, and the lateral tail feather on the outer side tipped with white; the other is distinguished principally by having the two middle tail-feathers black, and the lateral ones white. This inhabits Manilla. Besides the above Dr. Latham describes *La tourterelle brune de la Chine* of Sonnerat as a further variety of this bird in his "Synopsis," but in the "Index Ornithologicus," it is enumerated as a species under the name of *orientalis*.

ORIENTALIS. Griseous brown; feathers on the sides of the neck black, with pale cinereous tips; band on the wings yellow. *Chinese turtle*, Lath.

A native of China, and of the size of the common turtle; the bill and irides are red; head, neck, breast, and back dirty brownish grey, palest on the breast; wings brown; rump and tail deep cinereous grey; belly and thighs vinous grey; legs red.

ÆGYPTIACA. Testaceous-flesh colour; chin spotted; the feathers black, and two lobed, truncated and ferruginous at the tip. Fork. Fn. Arab.

This bird is described by Forkal, who informs us it frequents houses in Egypt; the bill is black; head violet and flesh-colour; orbits naked and bluish; back cinereous; breast violaceous flesh-colour; belly and thighs whitish; wings brown; the two outermost tail feathers cinereous at the base, black in the middle, and the remainder white; the two next on each side cinereous at the base, black in the middle, cinereous beneath, and whitish at the tips, the fifth on each side brown, in the middle pale black, the two middle ones wholly brown; legs flesh-colour.

SURINAMENSIS. Cinereous, beneath white; chin varied with black and green; bill blue. *Columba surinamensis*, Gmel. *La tourterelle*, Sonnerat. *Surinam turtle*, Lath.

Length ten inches; the bill long and slender, of a fine deep blue without, and red within; and the legs red. The species is thus described by Fermin, who informs us it is a

common bird in Surinam. It lays eggs twice in a year, making its nest in woods on the highest trees; the flesh is juicy and delicious.

RISORIA. Above yellowish, beneath white, with a black crescent on the back of the neck. *Columba risoria*, Linn. *Turtur torquatus*, Briss. *Turtur indicus*, Aldr. *La tourterelle à collier*, Buff. *Indian turtle*, Albin. *Collared turtle*, Lath.

Exceeds ten inches in length; the female differs from the male in having the colours less vivid, and inclining to grey. Inhabits India, and the southern parts of Europe.

La tourterelle grise de la Chine of Sonnerat is considered as a variety of this bird; it is of a brown colour, beneath vinaceous grey; crown grey; black crescent on the neck, above spotted with white; lateral tail-feathers black, spotted with white. This kind inhabits China and Madras.

La tourterelle mule, turtur hybridus of Briss. is also of this species; or, at least, a mixed breed between the common and collared turtles. The head, neck, and breast are vinaceous; the back dull reddish-ash-colour; belly, beneath the wings, and tip of the tail as in the last mentioned bird; the quills are brown; legs sanguineous.

SINICA. Fuscous, fasciated with black; abdomen somewhat sanguineous; wings and bill black. *Columba sinica*, Linn. *Turtur sinensis striatus*, Briss. *Tourterelle rayée de la Chine*, Buff. *Dove* from China, Albin. *Striated turtle*, Lath.

This is a native of China, and is the size of the last. The bill is bluish ash-colour; the irides white; crown of the head ash colour; tail palish brown; legs red, and claws white.

STRIATA. Orbits and lores white; body cinereous, fasciated with black; beneath rufous. *Columba striata*, Linn. *Turtur indicus striatus*, Briss. *Tourterelle rayée des Indes*, Buff. *Barred turtle*, Lath.

Length nine inches and a half; the bill three quarters of an inch long, and of a pale horn colour; the nostrils pale blue; irides blue grey. The eyes are placed in a bare white skin, which passes to the nostrils; forehead, cheeks, and throat pale blue; top of the head and hind head incline to rufous; upper part of the neck, the back, and wing-coverts are brownish ash marked with transverse arcuated black bands; sides of the neck and body bluish, crossed with blue, black, transverse slender lines; fore part of the neck, breast, belly, and thighs tinged with rose-colour; under tail-coverts white; legs pale red; claws brown.

This bird is frequent at Malacca and the island of St. Helena; and is also found, according to Jacquin, in South America.

SURATENSIS. Griseous; neck above black; hind head white; nape banded with rufous; quill-feathers black; back, rump, and tail obscure grey. *Columba suratensis*, Gmel. *La tourterelle de Surate*, Sonner.

About ten inches in length. The bill is black; the irides and legs red. It is a native of Surat in the East Indies.

CAMBAYENSIS. Grey, beneath white; head somewhat vinaceous; collar beneath black, varied with rufous; lateral tail-feathers half black and half grey. *Columba cambayensis*, Gmel. *La tourterelle grise de Surate*, Sonner. *Cambayana turtle*, Lath.

Described after Sonnerat as a native of Surat, and other provinces of Cambaya. Its size is that of the collared turtle.

VRIDIS. Brassy, fore part of the neck purple-violet. *Columba viridis*, Linn. *Turtur viridis amboinensis*, Briss.

Le turvert, Buff. *La tourterelle à gorge pourprée d'amboine*, Pl. Enl. *Green turtle*, Lath.

The length of this bird is seven inches and three quarters. The bill is red; fore part of the head and throat ash-colour; the hind head and back part of the neck, back, rump, upper tail and wing-coverts, breast, belly, sides, and thighs green gold, glossed with copper; the greater wing-coverts have the outer edges of the feathers at the tip sulphur-coloured; under wing-coverts ash, quills blackish; tail blue-green, glossed with copper; the legs are red, and covered half their length with feathers; the claws grey-brown. This bird inhabits Amboina.

MALABARICA. Cinereous, beneath white; middle wing-coverts with oval spots; lateral tail-feather black two-thirds their length from the base, the remaining part white. *Columba malabarica*, Gmel. *Tourterelle de la cote de malabar*, Sonner. *Melbar turtle*, Lath.

A species of the size of the last, and also described by Sonnerat. It inhabits the coast of Malabar. The bill and irides are red; the head, back, and wings are of a pale cinereous-grey; the neck and breast grey, tinged with vinaceous; the two middle tail-feathers grey; the belly white; and legs red.

MELANOCEPHALA. Green; head somewhat cinereous; head blueish-ash; hind head black; chin and throat yellow; vent orange; six middle-tail-feathers green; the outer ones on each side fine crimson. *Columba melanocephala*, Zool. Ind. *Turvert*, Buff. *Tourterelle de Batavia*, Pl. Enl. *Black-capped pigeon*, Ind. Zool.

Found in the island of Java. The length is nine inches and a half; the bill black, short, and yellow at the tip; the tail is of a somewhat embeated form; and the legs are black.

JAVANICA. Green; head and neck vinaceous red; abdomen dusky; primary quill-feathers fuscous. *Columba javanica*, Gmel. *Le turvert*, Buff. *La tourterelle de java*, Buff. Pl. Enl. *Javan turtle*, Lath.

Length nine inches; the bill pale red; covered with a white cere; tail dusky beneath; legs red. Inhabits Java.

CERULEOCEPHALA. Green, beneath red; crown blue; wings and tail black-blue. *Columba ceruleocephala*, Lath. *Columba cyanocephala*, Gmel. *Blue-crowned turtle*, Lath. Syn.

Size of the last; it is an inhabitant of China, where it is called by the natives *Taupam*. Common also in the island of Cuba, where it is caught in traps, and brought to the markets in great numbers as an article of provision.

AFRA. Grisfous brown, beneath whitish; exterior tail-feathers, at the outer base, and the spot at the tip white; wing-coverts with violet-azure spots. *Columba afra*, Linn. Gmel. *La tourterelle du senegal*, Buff.

The length of this bird is eight inches. The bill is reddish; top of the head ash-coloured; hind part of the neck, back, wing-coverts, and rump grey-brown; throat whitish; fore part of the neck and breast pale vinaceous; the belly, sides, thighs, and under tail-coverts dirty white; the upper tail-coverts are grey-brown, with the tips blackish; quills brown, with the inner webs rufous; on the wings are some spots of green gold-colour, glossed with violet; the tail is two inches and three quarters in length; the two middle tail-feathers blackish brown, the rest grey-brown, with the ends blackish; the legs are red, with brown claws. This is a native of Senegal, and is the *Columba senegalensis* of Brisson, but not of Linnæus; the latter writer describes the next species under that name.

SENEGALENSIS. Reddish-brown, beneath white; neck beneath spotted with black; three outer tail-feathers white

on the lower half. *Columba senegalensis*, Linn. *Turtur guttata maculato senegalensis*, Brisson. *Tourterelle à gorge tachée de senegal*, Buff. *Senegal turtle*, Lath.

The length of this species is nearly ten inches; the bill is blackish, the head, neck, and breast vinaceous; upper part of the back brown, lower cinereous; the six middle feathers cinereous brown; the three others on each side dark-ash from the base to the middle, and from thence to the ends white; beneath the colours are half ash, and half black in the six middle feathers, and white in the three outer ones; the legs are red, the claws brown. This bird is found chiefly near the river Senegal.

VINACEA. Grey-brown, beneath white; on the upper part of the neck a black collar; wings fuscous, with the outer margin of the feathers whitish. *Columba vinacea*, Gmel. *Turtur torquatus senegalensis*, Brisson. *Tourterelle à collier du senegal*, Buff. *Collared senegal turtle*, Lath.

Size of the last, and inhabits the same country. The bill is blackish; head, neck, and breast claret-colour; upper part of the back brown, lower cinereous; belly white; six middle tail-feathers ash-coloured-brown; beneath from the base to the middle black, the rest cinereous.

CRUENTA. Grey; neck beneath white; nape violet; three greyish bands across the wings; on the breast a sanguineous spot. *Columba cruenta*, Gmel. *La tourterelle grise ensanglantée*, Sonner. *Red-breasted turtle*, Lath.

First described by Sonnerat; it inhabits Manila. The length of this bird is eight inches; the bill is black; the irides ferruginous; collar on the neck violet; glossed with green; the blood-coloured spot on the breast darkest in the middle; wings with three grey and two black transverse bands; quill-feathers black; tail grey at the base, and black at the end; legs blackish, and somewhat violet.

SANGUINEA. Body entirely white; spot on the breast, the bill and legs sanguineous. *Columba sanguinea*, Gmel. *Tourterelle blanche ensanglantée*, Sonner. *Sanguine turtle*, Lath.

This bird inhabits Manila, and was first described by Sonnerat. It is a species of great singularity, the whole of the plumage being white, except the spot on the breast, which is of a deep sanguineous colour; the bill and legs are red, the irides purplish.

PASERINA. Wings and tail dusky; body purplish; bill and legs yellow. *Columba passerina*, Linn. Gmel. *Turtur parvus americanus*, Brisson. *Columbus minimus*, Klein. *Turtur indicus*, or *Cocotzin*, Ray. *Cocotzin*, Buff. *Les petites tourterelles*, Pl. Enl. *Ground dove*, Cateby.

The ground dove is a native of the warmer parts of America, and the contiguous islands; and is observed as far north as Carolina, but more rarely. Willoughby says it is very common in Mexico, where it inhabits mountainous places. Bancroft observes, that it is the only kind of dove met with at Guiana. In the Caribbee islands it is very abundant, and is commonly eaten, being in much esteem for food; its haunts are flowery places under bushes. It is also common in Jamaica, where, as Sloane mentions, "they feed on the ground like partridges, and spring as they do, rising and flying for a short flight, and then light again on the ground." They subsist chiefly on grain and seeds of vegetables; and are taken in traps baited with the seeds of the *Ricinus*, or will cascada.

This is a small and elegant species, the length about six inches. The bill is pale red, with the tip blackish; the irides orange; upper part of the head and neck ash-colour; back, rump, and upper tail-coverts the same, but deeper; front vinaceous; throat and breast spotted with brown; two middle tail-feathers are deep ash-colour; the others blackish; legs

legs red, the claws blackish. The female differs in the general colour of the plumage being paler.

There are several varieties of this species, one of which, found at Carthagena in South America, is distinguished by having fewer brown spots than usual; another has the body more inclining to reddish, and the eyes chestnut; and a third with the feathers of the neck and breast of many colours.

MINUTA. Brown; wings with from five to seven iridescent spots; outermost tail-feathers white at the tip. *Columba minuta*, Linn. *Turtur parvus fuscus americanus*, Brisf. *Coccyzus alaud niger*, *halapalococuli*, Will. *Passerine turtle*, Lath.

It admits of some doubt whether this pigeon is distinct from the last, *C. passerina*. This kind inhabits America, and is five inches and a half in length. The upper parts of the body are brown, the under more or less rufous-white; wing-coverts rufous; two middle tail-feathers brown, the others ash-coloured at the base, black in the middle, and brown at the tip; the bill and legs are black.

MALACCENSIS. Undulated with black lines; above cinereous-grey; beneath cinereous; sides of the neck white; tail-feathers fuscous, sides near the tips white. *Columba malaccensis*, Gmel. *La petite tourterelle de queda*, Sommer. *Malacca turtle*, Lath.

This is a beautiful species, scarcely exceeding the size of the common house-sparrow; the bill is yellow, and in the middle black; the forehead and throat are light cinereous-grey; breast and belly vinaceous-grey; middle tail-feathers brown for two-thirds of their length, and from thence to the end white; thighs and under tail-coverts white; legs yellow. This species inhabits Malacca, and is esteemed a delicacy for the table.

VERREANS. Green; beneath yellowish; outer edges of the wings pale yellow. *Columba viridis philippinensis*, Brisf. *Pigeon vert des philippines*, Buff. *Columba verrans*, Gmel.

A native of the Philippine islands; the bill and legs are red, the breast azure.

SECTION *. *Tail long and cuneated, or wedge form.*

MIGRATORIA. Orbits naked; and sanguineous; body cinereous; breast rufous. *Columba migratoria*, Linn. *Borowk*. *Aenas Americana*, Brisf. *Palumbus carolinensis*, Klein. *Pigeon de passage*, Buff. *Passenger or migratory pigeon*, Phil. Transf. Kalm, &c.

Those birds inhabit North America, passing the summer in the higher latitudes, and retiring to the more southern provinces at the approach of winter. They build in trees, and lay two eggs. It is said these pigeons are so abundant in America, that at the period of their migration they are seen passing from one place to another in flocks of two or three miles in length, and a quarter of a mile in breadth, and which literally darken the air as they proceed. Frequently at such times we are told they alight on trees, and sometimes in such immense numbers as to break down pretty strong branches. They are esteemed excellent eating, and, during the time of migration, furnish the common people of America with abundance of food. About Philadelphia they sit on these birds from the tops of their houses, or knock them down in the evening from their roosting places. In Louisiana they adopt another mode of capture: a party of five or six go in the evening into the wood; and taking with them several dishes, or other fat vessels, they set fire to one or two of these under such trees as the birds commonly prefer to roost upon, the smoke and vapour of which ascending so rapidly the birds that they drop down from their roosting places, and are picked up and secured in sacks previously provided for that purpose. It is said such parties are often accompanied in those nocturnal rambles by the

ladies; this mode of taking pigeons being esteemed a delightful evening's amusement. The chief food of these birds are acorns, rice, corn, and other grain.

The passenger, or migratory pigeon of America, is about the size of the common domestic pigeon of this country. The bill is black, the space round the eyes crimson; irides orange; head, throat, and hind part of the neck, back, rump, and upper tail-coverts cinereous; wing-coverts the same, marked with dusky or black spots; the sides of the neck are glossy, variable purple; fore part of the neck vinaceous; belly, sides, and thighs, with the under tail-coverts, the same colour; paler, quills black brown, edged with white; the tail rather long, with the two middle feathers blackish brown, the rest hoary; legs red, with black claws.

A variety of this species is described by Gmelin. The colour is brownish above, beneath whitish-rufous; neck on the forepart somewhat vinaceous; lateral tail feathers with a round black spot in the middle on the under surface.

CAROLINENSIS. Body rufous-cinereous, beneath reddish; orbits blue. *Columba carolinensis*, Linn. *Turtur carolinensis*, Brisf. *Picacuroba*, Will. *Tourterelle de la Caroline*, Buff. Pl. Enl. *Carolina pigeon*, Arct. Zool. Lath.

Rather larger than the common turtle. The bill is blackish; irides black; front, throat, and breast rufous, with a green-gold and violet gloss. The hind part of the head and neck are brownish ash; the back, rump, upper tail, and wing-coverts ash-brown; on the wings, near the tip of the greater coverts, are a few black spots; quills blackish ash with whitish edges; tail-feathers unequal, the two middle ones four inches and an half in length; the outer ones very short; the two middle ones entirely ash-coloured brown; the next two on each side ash coloured, marked with black in the middle, the others light ash-colour, whitish at the end, with a black spot between the two colours; the legs are red, the claws black. The female is destitute of the glossy violet colour on the breast. Those birds inhabit Carolina, Brazil, and St. Domingo.

CANADENSIS. Body grey-brown, beneath whitish; primary quill feathers yellowish at the tip; tail feathers white at the apex. *Columba canadensis*, Linn. *Tourterelle de Canada*, Buff. *Canada turtle*, Arct. Zool.

Length thirteen inches; the bill blackish; upper part of the head, neck, back, and wings grey-brown; the lower part of the back, rump, and upper tail coverts ash-coloured; throat and fore part of the neck grey-brown tinged with yellowish; wing-coverts marked with blackish brown spots; tail ash-coloured, the feathers tipped with white, except the two middle ones; legs red; claws black. In the female most of the feathers are tipped with dirty white, which gives the plumage a striated appearance. The native place is Canada.

MARGINATA. Body above fuscous; beneath brown-grey; breast red; tail feathers black at the tip, the edges white. *Columba marginata*, Linn. *Turtur Americanus*, Brisf. *Tourterelle d'Amérique*, Buff. *Long tailed dove*, Edw. *Margined pigeon*, Lath.

Inhabits America. Length ten inches; the bill is hoary; irides rufous; lores white; front and chin reddish brown; hind head bluish ash; under the ears a black spot; upper part of the body brown; shoulders spotted with black; throat rosy; two middle tail feathers blackish, the rest cinereous.

AMBOINENSIS. Body rufous; neck waved with black. *Columba amboinensis*, Linn. *La tourterelle d'Amboine*, Buff. *Amboina turtle*, Lath.

Length fourteen inches; bill black; feathers of the

crown, neck, and breast with a blackish transverse bar near the tip; feathers of the upper part of the back, and wing-coverts brown tipped with rufous; wings brown; tail reddish-brown. A native of Amboina.

CAPENSIS. Body grey-brown, beneath white; primary quill feathers rufous on the inside. *Columba capensis*, Linn. *La tourterelle*, Buff. *Cape pigeon*, Lath.

Inhabits the southern parts of Africa. The length of this bird is nine inches and a half; the bill is red; body grey-brown; belly whitish; spot on the wing steely; secondary quill feathers brown, with the exterior edge grey; tail black beneath; lateral feathers at the base grey-brown, with the tips blackish; legs red, with the claws black. The female differs in having the throat and fore-part of the neck of the same colour as the rest of the head, and the greater wing-coverts not tipped with black. There are several varieties of the cape pigeon.

MACROURA. Body cinnamon colour, beneath whitish; tail whitish at the tip. *Columba macroura*, Gmel. *Le touroco*, Buff. *La tourterelle à large queue*, Pl. Enl. *Great tailed pigeon*, Lath.

The length of this bird is twelve inches, the bill red, with a white cere; tail as long as the body; legs red. A native of Senegal.

BANTAMENSIS. Orbits naked and fleshy coloured; neck, breast, and flanks waved with black and white. *Columba bantamensis*, Mus. Cur. f. 3. t. 67.

Common in the island of Java. The species is small, being about the size of the wry neck; the bill is black; body above hoary ash; beneath whitish; back, wings, and breast with lunate black spots; tail same length as the body, and consisting of fourteen feathers, the six middle of which are black, the rest white towards the tip; legs red.

MELANOPTERA. Body livid or bluish; wings black. Molin. Gmel. Described as a native of Chili. Vide Molin. Hist. Chili.

DOMINICENSIS. Body grey; sides of the head and collar beneath the nape white; spot on the crown; band under the eyes, and collar on the neck black. *Tourterelle de St. Domingue*, Pl. Enl. *Columba dominicensis*, Lath. Ind. Orn.

A native of St. Domingo; the length of this bird is eleven inches; the bill black; wings with a few blackish spots; breast vinaceous; front, chin, and vent white; tail grey; the outermost feathers white; legs red.

COLUMBA, *roenlandica*, a name given by authors, as Ray, Willughby, and Albin, to the black guillemot. See **COLUMBUS grylle**.

COLUMBA is also the name of a military order instituted by John I. of Castile, about the year 1379.

COLUMBA Nocchi, a small constellation in the southern hemisphere, consisting of ten stars. The longitudes, latitudes, &c. of which are given in Sharp's Catalogue.

COLUMBAC denotes that part of the agallochum, which is between the heart, and that part next to the bark.

COLUMBARIA, in *Ancient Geography*, an island of the Mediterranean on the coast of Etruria, according to Pliny. — Also, another island of the Mediterranean, near Drapanum in Sicily, called by the Greeks "Pelias."

COLUMBARIUM, a promontory of the isle of Sardinia, N. of Portu Olbianus, on the E. coast: the same with *Colymbarium*.

COLUMBATE of iron. See **COLUMBIUM**.

COLUMBIA, in *Geography*, a county of America, in New York, bounded N. by Rensselaer, S. by Dutchess, E. by the state of Massachusetts, and W. by Hudson river,

which divides it from the county of Albany. It is 32 miles long and 21 broad, and is divided into 8 towns, viz. of which Hudson, Claverack, and Kinderhook are the chief. It contained, in 1790, 27,732 inhabitants, and in 1796, 3560 electors.

COLUMBIA, a county of America, in the upper district of Georgia, bounded by the Savannah river on the E. and N.E., which separates it from the state of Carolina, and N.W. of Richmond county.

COLUMBIA, a township of Washington countv, in the district of Maine, on Pleasant river, adjoining Machios on the N.E., was incorporated in 1796.

COLUMBIA, a post-town of America, the capital of Kernshaw county, and the seat of government of S. Carolina. It is situated in Camden district, on the E. side of the Congaree river, just below the confluence of Saluda and Broad rivers. The streets are regular, and the town contains upwards of 70 houses. It lies 115 miles N.N.W. of Charlestown, 35 S.W. of Camden, and 678 S.W. of Philadelphia. N. lat. 34° 1'. W. long 81° 5'.

COLUMBIA, a flourishing town of Goodland county in the state of Virginia, on the side of James river, near its junction with the Rivanna, 45 miles from Richmond, and 35 miles from Charlottesville.

COLUMBIA, a town of America, in the county of Lancaster and state of Pennsylvania, seated on the N.E. bank of the Susquehanna river, 10 miles from Lancaster, and 76 W. by N. from Philadelphia.

COLUMBIA, a town of America, in the county of Hamilton and state of Ohio, seated at the confluence of the Little Miami with the Ohio, 6 miles above Cincinnati. The settlement began in 1789. N. lat. 39° 20'.

COLUMBIA College. See **COLLEGE**.

COLUMBIA, territory of. See **WASHINGTON**.

COLUMBIANA, a county of America, in the state of Ohio, bounded N. on the county of Trumbull, S. on Jefferson and Muskingum counties, E. on the state of Pennsylvania, and the Ohio, and W. on Muskingum river, and county.

COLUMBIC ACID, in *Chemistry*. See **COLUMBIUM**.

COLUMBIERS, in *Geography*, a town of France, in the department of the Aveyron, and district of Rhodes; 10 miles W. of it.

COLUMBINA, a name given by Aëturius, and some other medical writers, to the verberna, or common vervain.

COLUMBINA Marga. See **MARLE**.

COLUMBINE, in *Botany*. See **AQUILEGIA**.

COLUMBINE feathered. See **THALICTRUM aquilegifolium**.

COLUMBINE, a kind of violet-colour, called also dove-colour. See **DYEING**.

COLUMBIUM, in *Chemistry*, a new metal discovered by Mr. Hatchett, in the year 1802, in a mineral which he had from the British Museum. The mineral, it appears, had been sent with some specimens of iron ores from Massachusetts in America, to Sir Hans Sloane, in whose catalogue it is described as "a very heavy black stone, with golden streaks." By Mr. Hatchett it is described as of a dark brownish grey externally, and more inclining to an iron grey internally; he found the longitudinal fracture lamellated; and the cross fracture had a fine grain. Its lustre is vitreous, slightly inclining in some parts to metallic, moderately hard, and very brittle. The colour of the powder was dark chocolate brown; but the streaks were yellow mica. The particles were not attracted by the magnet. Its specific gravity, at the temperature of 65°,

was 5,918. A series of very accurate experiments made by Mr. Hatchett proves that this ore consists of iron combined with a new metallic acid: of 200 grains of the ore 42 were found to be the oxyd of iron, and 155 of acid. The mode which Mr. H. adopted to analyse this columbate of iron was this: he took one part of the ore reduced to powder, and mixed it with five times its weight of carbonate of potash, and fused them in a silver crucible. An effluence took place, which being sublimed, the whole was poured into a proper vessel, and suffered to cool. Boiling distilled water was then poured upon it, and the whole was transferred upon a filter. The insoluble residuum was repeatedly washed in distilled water. The filtered fluid was now supersaturated with nitric acid. The result of which was a white flocculent precipitate, which he denominated *columbic acid*. The insoluble residue was again fused with carbonate of potash, and treated as before, but scarcely any effect was produced, the alkali was therefore washed away, and the powder digested with muriatic acid, in order to get rid of the iron. The acid was then decanted, and the residuum washed in distilled water. It was again fused with carbonate of potash, dissolved, and precipitated with nitric acid. The residuum was repeatedly treated in a similar manner, till the whole was completely decomposed. By these means he obtained a precipitate of oxyd of iron which combined with the muriatic acid. The columbic acid is of a pure white colour, but not very heavy, and has scarcely any perceptible taste; it is not soluble in boiling water. When some of the powder is placed upon litmus paper, moistened with distilled water, the paper in a few minutes becomes red. When exposed to the blow-pipe, it is not fusible, but only becomes of a less brilliant white. Having found that this acid possessed properties different from all other acids, and that the base was metallic, Mr. H. gave to the metal the name of *columbium*. In the attempts which he made by heat to reduce it to the metallic state, the oxyd was found only in a state of black powder. From his experiments he found that the metal combines with oxygen in different proportions, and these oxyds are distinguished by different colours. It combines with some of the acids, and forms salts; thus we have the sulphate, muriate, &c. of columbium.

Sulphate of Columbium. Boiling sulphuric acid forms a transparent colourless solution with columbic acid. When water is added to this solution, it becomes turbid, assuming a milky appearance; and a white precipitate is gradually deposited, which cracks as it becomes dry upon the filter, and from white it changes to a lavender blue colour; and when completely dry, to a brownish grey. It is then insoluble in water, is semitransparent, and breaks with a vitreous fracture. This precipitate obtained from the sulphuric solution, by the addition of water, is a sulphate of columbium.

Muriate of Columbium. Columbic acid, when recently separated from potash is soluble in boiling muriatic acid. This solution may be considerably diluted with water, without any change being produced. When evaporated to dryness, it left a pale yellow substance, insoluble in water, and which is dissolved with great difficulty, when it is again digested with muriatic acid.

Phosphate of Columbium. A few drops of phosphoric acid being added to a part of the solution of columbium in concentrated sulphuric acid, at the end of 12 hours converted the whole into a white, opaque, stiff jelly, which was insoluble in water. When a small quantity of phosphoric acid was added to the muriatic solution of columbium, in a few hours a white flocculent precipitate was formed. Philosoph. Trans. 1802, part i.

COLUMBO, in *Geography*, the capital of the island of Ceylon, and the seat of government, is situated towards the S. W. part of the island, in about 7° N. lat. and 80° E. long. from London. It was captured from the Dutch by the British troops under general Stewart in 1766. At the conquest of Trincomator, on account of its situation and its more of greater consequence to the British nation to retain, yet Colombo is in every respect greatly superior. The number of its inhabitants is much greater; its fort and black town are much larger; the country in which it is situated much more fertile; and the rich district depending upon it much wider, being not less than 20 leagues in length and 10 in breadth. Colombo is commonly supposed to have been first fortified by the Portuguese; but captain Percival questions the truth of this statement, as Laurence de Almeyda, after his first treaty with the king of the island, found that the Moors and Malabars had a fortress here, on which some guns were planted, which had been procured from ships wrecked on this coast. That part of the fort, where these ancient works stood, is now strongly fortified, and shewn as the first works of the Portuguese. It is in a manner detached from the main body of the fort, being separated from it by an entrenchment and wall, with a fosse or ditch, now almost choked up. The fort is placed on a peninsula projecting into the sea, and it is thus exposed on all sides to the sea-breezes, by which the air is rendered temperate and healthy, though it lies so very near the equator. This fort is upwards of a mile in circumference; and is indebted for its strength both to nature and art. On the fourth side the surf runs so high, and the shore is so rocky, that it would be dangerous to approach it. On the west side of the bay, where the sea is smoother, and near the wharf or landing place, which at all seasons of the year is safe for boats, the only attempt could be made; but these quarters are so well defended by the batteries which command the harbour, that there is hardly any probability of its succeeding. On the west side of the fort, and facing the sea, are two very fine batteries, *en barbette*, intended for the security of the harbour. These stand on a part that projects a considerable way from the main body of the fort, from which they are separated by a high wall and ditch flanked with bastions, and have gates that communicate with the interior of the fort. Here the wharf or landing place is found; it consists of large piles of timber, extending several yards into the sea, and affords a very commodious station for loading and unloading sloops and large boats, which may be brought close alongside. At this end several store-houses, and barracks for half a regiment are erected. The ramparts of the fort are very strong, having eight principal bastions; and they have also a number of lesser ones, with curtains, banquets, and parapets, communicating with each other all round the fort, and fitted for troops to line and defend with musketry and field-pieces. The whole fort is surrounded by a road and deep oval ditch, over which draw-bridges are thrown at each of the gates. On the outides are some small magazines, with a powder-mill and a saw-mill attached to the fort. Adjoining to the covert-way, and at the foot of the plain, is a lake extending three or four miles into the country, in a N. E. direction. For near a mile on the outside of the fort, the neck of land which connects it with the country, is not above five or six hundred yards broad; and in the middle of this space lies the lake, leaving room on each side only for a narrow causeway. Near the plain an approach might be entirely cut off, by opening the sluices and cutting the road across, where the lake would be connected with the sea, and the garrison completely insulated. In the centre of the lake is an island, communicating with

a Sally-port on the east face, by a narrow causeway and draw-bridges. This is a pleasant spot, abounding with cocoa-nut trees, and was called by the Dutch "Slave Island," as it was the place whither they sent their sick slaves. A battalion of Malays is stationed here. This island is very convenient, as it lies contiguous to the fort, and opens the nearest way to the cinnamon gardens, which are close by it. The fort has three gates, the principal one, where the main-guard is stationed, which is called the Delph-gate, and leads into the "pittah," or black town. It has two draw-bridges to pass over the ditch, which here forms an angle. At each of the gates are guard-houses, with a subaltern's guard placed over them.

The plan of Colombo is regular. It is nearly divided into four equal quarters, by two principal streets, which cross each other, and extend the whole length of the town. To these smaller ones run parallel, with connecting lanes between them. At the foot of the ramparts, on the inside, is a broad street or way, which goes round the whole fort, and communicates with the battions and soldiers' barracks; and also affords, at the different angles, open spaces for their private parading. The grand parade is by no means sufficient for the garrison, as it can hardly contain one complete regiment. On one side of it are ranges of public offices for the civil and military departments, with the town or stadt-house in the centre of them, where the Dutch held their high court of justice. On the arrival of the British troops they found a rack, wheel, and many other implements of torture, which had been used for inflicting punishment on criminals, particularly slaves, but these savage modes of punishment were immediately abolished by the British government. On the other side of the grand parade stand the cinnamon store-houses, or "go-downs," as they are here called. At the upper end of the parade the Dutch had begun to erect a church, which has never been finished. The Dutch usually attended divine service at a spacious and handsome church in the black town, about a mile distant from the fort; and worship is still performed there for the English, either before or after that of the Dutch inhabitants. The government house, which faces the harbour, is a very long and capacious building, but more convenient than elegant: several offices are attached to it, where the business of government is transacted. Behind it is an excellent garden, intended for a "tank" or reservoir, in case of a siege; for though every house has a well plentifully supplied with water through the year, yet it is of a brackish quality, and not fit to drink. The Europeans, therefore, both of the civil and military establishment, are supplied with water from a spring, about a mile from the fort, which is brought by means of bullocks, in leathern bags, called here "puckally bags," a certain number of which is attached to every regiment and garrison in India.

Colombo is built more in the European style than any other garrison in India. The interior of the fort has also more the appearance of a regular town; the Dutch houses are all regularly built, though few are above one story high; and the windows have all glass-panes, after the European manner. Before each house, and connected with it, is a large open space, roofed in and supported on pillars of wood, called a "viranda," affording a shade from the sun, and exposed to the refreshing breeze of the sea. The houses are also agreeably shaded by a double row of thick foreading trees, planted on each side of the several streets. The walls of the houses are plastered over and white-washed with a very fine bright lime, made of burnt shells. This beautifully white colour may contribute to the coolness of the houses, but it throws an insupportable glare on the eyes of

the passengers along the streets. The houses are for the most part uniformly constructed, consisting of the hall in the front, with a chamber at each side, and another room in the back part, equal in length to the other three, and called the "back viranda." Behind these are one or two ranges of small buildings, proportioned to the size of the house and designed for the accommodation of servants, for cellars, and sometimes for sleeping rooms. The hontes are covered with indented tiles, which afford no security against rain. In the centre of the principal street is a very handsome and lofty house, which belonged to the Dutch governor, and has since been occupied by the commander of the British forces on the island. There is a few another very handsome and spacious house for the commandant of the garrison, with suitable offices and gardens. The hospital, designed for soldiers and sailors, is a roomy and convenient building. Three or four battalions are usually stationed as a garrison in the fort of Colombo.

The harbour of Colombo, which lies on the west side, is an open road, affording good and safe anchorage to ships for only four months of the year, from December to April, when the N.W. winds do not prevail to any great degree; but about May, when the monsoon sets in from the Malabar coast, and extends its ravages to the W. coast of Ceylon, the roads of Colombo no longer afford any protection. Hence it is, that Colombo is cut off from any intercourse by sea, with the other parts of the island, for two thirds of the year. For six months of the stormy season, this side of the island is subject to very heavy falls of rain, accompanied with dreadful thunder and lightning, and violent winds blowing in there. During this season the variations of the climate are very great. The heavy rains, predominating most by night, render the air damp and chill; and the excessive heat of the sun by day is almost insupportable. These transitions make the climate more unhealthy at this season than during the hot weather. During the rainy season, the Indians from the continent are very subject to fluxes, dysenteries, and fevers. They are also subject to another very extraordinary disease, called the "Berry berry," occasioned by low diet and hard water, which swells the body and legs of the patient to an enormous size, and generally carries him off in twenty-four hours. The cure is effected by rubbing the diseased person all over with cow-dung, oil, cinamon, lime juice, and other preparations from herbs, and then burying him up to the chin in hot sand. The British soldiers contract the bad effects of the air and water, by drinking plentifully of arrack and smoking tobacco. The "Pittah," or black town, of Colombo deserves particular notice, on account of its extent and superior structure, compared with other such towns attached to the forts of India. It is divided into two parts; that nearest the fort consists of one very large street, beginning at the esplanade near the walls, and running on till stopped by an old mud wall, and a gate called the "Kenman's port." In this division of the Pittah are most excellent houses, where many Dutch gentlemen and merchants reside. Through Kenman's port there is a narrow passage leading into the other division, which consists of a long straggling town, skirted on one side by the lake above described. Besides a principal street, there are several smaller ones running parallel to it, in one of which is a large well-constructed building, called the "Orphan seminary, or school," where the Dutch used to educate the children of their soldiers and the poorer Europeans, as well as those they had by the native women. Here the boys were educated at the public expence, till they were fit for trades; and the females were either settled in some comfortable situation, or married to persons of their own rank. This laudable institution is still maintained by
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the British government. Close by the esplanade, and adjoining the black town, is the burial ground of the garrison. The shops, bazars, and stalls, placed all along the streets, are replenished with various articles of merchandize, peculiarly in use among the natives of India; and the town, during the whole day, swarms with people of all descriptions. The boats or canoes used in the fisheries of Columbo are of a curious shape and construction. They are about fifteen feet long, and not more than two in breadth. They move with great speed, especially with the addition of a very large square sail; and, to prevent their oversetting, a log of wood is extended five or six feet from the end of the boat, by way of out-rigger; this log is fastened to the boat by two long and bent poles, and seems to serve at once for helm and ballast. A paddle, somewhat in the form of a shovel, is used to guide the boat's head. The body of the canoe is a large tree, hollowed out by fire, or scooped out by the carpenters. Along its sides boards are nailed to the height of about two feet, and in the form of a gun-wale, to prevent the water from getting in. When large burdens are to be carried inland by the canals or rivers, two or three of these canoes are lashed together without the out-riggers. Split canoes, bamboes, or betel tree, are then laid across them, so as to form a kind of raft; which, though ever so much loaded, will draw but very little water. Other flat-bottomed boats of a much greater breadth are also used by the natives. These are thatched with cocoa-tree leaves, like a house, and are large enough to hold couches. Near Columbo may be seen two or three hundred of these boats in regular rows, moored along the banks of the rivers, with entire families on board, who make them their habitations.

Columbo, for its size, is one of the most populous places in India: and its population consists of a great variety of nations. Besides Europeans and Cinglese, the proper natives of the island, you meet, scattered over the town, almost every race of Asiatics; Moors of every class, Malabars, Travancorians, Malays, Hindoos, Gentoos, Chincse, Persians, Arabians, Turks, Maldivians, Javians, and natives of all the Asiatic isles; Perfices, or worshippers of fire, who would rather have their houses burnt, and themselves perish in the flames, than employ any means to extinguish it. Here are also a number of Africans, Caffrees, Biganese, or a mixed race of Africans and Asiatics; besides the half-casts, people of colour, and other races which proceed from a mixture of the original ones. Each of these different classes of people has its own manners, customs and language. The language most generally spoken by both the Europeans and Asiatics, who resort to Columbo is the Portuguese of India, a base, corrupt dialect, altogether different from that spoken in Portugal.

Columbo, though difficult of access, is situated in a rich district, and furnishes a great variety of articles to commerce; and, therefore, it is much frequented both by Europeans and the natives of the different coasts of India. From this district large quantities of cinnamon and pepper, the staple spices of the island, are yearly transported to Europe in vessels that touch here on their voyage from Madras and Bengal. A great quantity of arrack is made in the neighbourhood of Columbo and the other districts along the west coast. A large quantity of Coya rope, or cordage is also manufactured here, for the supply of our ships on the various stations in those seas. The inferior articles, exported by the Moors and Malabars, who reside here for that purpose, are betel-leaf and aracca-nut, jaggory, or a sort of coarse blackish sugar, cocoa-nut, and oil, honey, bees-wax, cardamoms, coral, ivory, fruit, and a variety of other smaller articles. In return they import coarse wool-

len cloths, and calicoes, pieces of printed or painted cloths for women's apparel, coarse muslins, handkerchiefs, palampores, stockings, china-ware, tin, copper, and a variety of toys; also bonivelses, a species of fish peculiar to Bombay, and onions, from the same place, where they are remarkably good. Every year, generally towards February, a Portuguese or Chincse ship arrives from Macao with teas, sugar, candied sweetmeats, hams, silks, velvets, nankeens, umbrellas, straw-hats, all kinds of china-ware and toys; all which articles find a very ready sale, and are paid for in hard cash. The current coin at Columbo, as well as in the other European dominions on the island, consisted, on the arrival of the English, of six-dollars, a nominal coin, like one pound sterling, valued at a certain quantity of copper money. There were besides several small copper coins, called pice or flivers, half-pice, and dudies. Four pice or two dudies made a fanam, and seven fanams were equal to a six-dollar. New regulations have been adopted with regard to the coin since the island has belonged to the English. There is now current a new coinage of double and single pice and half-pice made by our East India Company. A pice is about a halfpenny sterling; four pice are equal to a fanam, and twelve fanams to a six-dollar, or, as it is usually called by our people, a copper rupee. This latter coin passes for about two shillings sterling; and four of these are equivalent to a star pagoda, a Madras gold coin worth eight shillings sterling, the fluctuation in the value of money in Ceylon is very great, and depends upon the plenty and scarcity of gold and silver there. The expence of coining at Columbo is more considerable than on the continent of India. Horses and servants are particularly expensive, vegetables are extremely scarce, and they form a great article of food in those warm climates. Such articles, however, as are the native produce of the island, are found in great abundance, and at a moderate price. Beef, fish, and fowl, in particular, are both cheap and plentiful. Mutton is excessively dear, as no sheep can be reared in the neighbourhood of Columbo, which some attribute to the noxiousness of the climate or pasture of the island, but which may be principally owing to their falling an easy prey to jackals, snakes, and other destructive animals, and also to certain poisonous herbs that occur in many places. Pigs and ducks are plentiful and cheap. Geese are rare, and turkeys are not to be had, except occasionally by importation from other parts of India.

The country round Columbo for several miles is flat and very rich. It is diversified with fields of rice and pasture, as well as a variety of groves, in which the cocoa-tree is conspicuous. The scene is embellished by a number of small rivers, lakes, and canals. The shady roads, which every where intersect the country, afford to the traveller an agreeable shelter; while the numerous country fairs and gardens which skirt them present his eye with a continual change of gratification. The river Mutwal extends itself here into a very broad channel, and by its numerous windings affords a most enchanting prospect from the road, which runs along its banks for many miles. Several temples of the natives are situated along the banks of this river and among the adjoining groves. One of the chief beauties in the vicinity of Columbo is the immense number of cinnamon trees, which produce the nicotia of the island. In the woods they grow wild in abundance, and in the gardens they are now regularly cultivated with the greatest success. Percival's Account of the Island of Ceylon, 1805.

COLUMBO, in the *Materia Medica*. This root was first brought from the town of Columbo, in the island of Ceylon,

in which country it had long been used as a valuable remedy in bilious fevers, and other disorders of the stomach and bowels. Our practitioners in the East Indies adopted the use of this root from them, and it is now deservedly in high reputation in most parts of Europe. The plant that yields it is not commonly known.

Columbo root comes to us in circular pieces about two inches in diameter, covered with a thick wrinkled bark of a dark brown externally, but a light yellow within. On paring off this bark the root is seen to consist of three distinct lamina. The whole is used indiscriminately in medicine.

Columbo root has an aromatic smell; the taste is bitter and nauseous. It gives no essential oil when distilled with water, and contains scarcely any volatile aromatic parts. When boiling water is poured on the powdered root a strong infusion is produced, which possesses all the sensible qualities and virtues of the plant, but it grows mouldy in a day or two. Spirit of wine also extracts the active qualities of this root very readily.

Columbo is employed with nearly equal advantage in substance in spirituous tincture or in watery infusion, and generally with the addition of cinnamon or some grateful aromatic. This root is of singular efficacy in strengthening the fibres of the stomach and bowels, either in chronic cases, or more particularly in cholera morbus, dysentery, and other violent disorders of the alimentary canal, where, after due evacuations, it may be employed with great success in checking the incessant vomiting action of the bowels that bring down the powers of life with such rapidity.

An extract and a tincture of Columbo are kept in the shops, the latter of which is by itself a very useful stomachic taken daily in very small doses.

COLUMBUS, CHRISTOPHER, in *Biography*, a subject of the republic of Genoa, celebrated in history as the discoverer of America. Neither the exact time nor place of his birth can be ascertained with any degree of certainty, but it is generally supposed that he was born in some part of the Genoese dominions about the year 1447. He is said to have descended from an honourable family, reduced by various misfortunes to a state of indigence. In whatever rank of society his parents moved, it is certain that they gave their son an education adapted to the bent of his genius; at school he acquired the elements of the Latin language, and made some proficiency in geometry and the other sciences which he was enabled in the future part of his life, to apply to the practical parts of navigation. At the age of fourteen he went to sea, and though his first voyages were confined to the Mediterranean, yet he very soon ventured out on the northern seas, and visited the coasts of Iceland, to which the English and other nations resorted on account of its fishery. About the year 1467 he entered into the service of a sea captain of his own name and family, and spent some years in a predatory warfare against the Mahometans and Venetians the rivals of his country in trade. In this situation he continued acquiring both wealth and reputation, till at length in an obstinate engagement with some Venetian vessels, off the coast of Portugal, the ship in which he served took fire, and he, with difficulty, preserved his life by throwing himself into the sea, and swimming a distance of two leagues to the shore. As soon as he had recovered strength for the journey he repaired to Lisbon, where his brother Bartholomew had settled, and where he found many of his countrymen, who, like himself, had embarked in the sea service. Here his merit and talents were soon appreciated; and here he married the daughter of Perestrele, one of the captains employed by prince Henry in his early navigations, and who, under his protection, had discovered and planted

the islands of Porto Santo, and Madeira. Columbus got possession of the journals and charts of this experienced navigator, and from them he learned the course which the Portuguese had held in making their discoveries, as well as the various circumstances which guided and encouraged them in their attempts. While he contemplated the labours of his father-in-law, and read the description of the countries which he had seen, his own impatience to visit them became irresistible. To indulge it he made a voyage to Madeira, and for several years traded with that island, with the Canaries, the Azores, the settlements in Guinea, and all other places which the Portuguese had discovered on the continent of Africa. He now began to think of extending the boundaries of nautical knowledge. He was satisfied, not only that there must be lands still further to the west, than those already explored, but that a shorter passage to the East Indies, than the great object of the Portuguese navigators, might be found by steering in that direction, than round the continent of Africa. When he had settled his plan, he was anxious to secure the patronage and support of some European power capable of undertaking so important an enterprise. With this view, he laid his scheme before the senate of Genoa, and, making his country, for which he bore a filial and sincere affection, the first tender of his service, offered to sail under the banners of that republic, in quest of new regions, which he expected would render illustrious his own name, and the nation which should enable him to realize his vast projects. Genoa rejected his offer: and Portugal, to whom he next applied, treated him with so much duplicity, that he went himself to Spain, while at the same time he sent his brother Bartholomew into England to make the like proposals to both courts. By both, his schemes were at first slighted, till by the interposition of some zealous friends at the court of Spain, a change was effected in his favour, and in the spring of 1472 a treaty was signed with Columbus, by which Ferdinand and Isabella, the sovereigns of Spain, appointed him their high admiral in all the seas he should discover, and their viceroy in all the islands and continents. They granted him and his heirs a tenth of all the profits that should accrue from the enterprize, with some other important advantages. As soon as the treaty was signed, Isabella, by her activity and attention, in forwarding the preparations for the voyage, endeavoured to make some reparation to Columbus for the time which he had lost in fruitless solicitation.

On the third of August 1492, Columbus set sail with three small ships and ninety men. The expense of which did not amount to more than 4000*l*. He had already, in the most public manner, implored the guidance and protection of heaven, and on the morning of his departure the shores were crowded with spectators, who sent up their supplications to the Almighty for the prosperous issue of the voyage. Columbus steered directly for the Canaries, where, on account of the ill condition of the ships, he was obliged to rest. Having supplied himself with fresh provisions, he sailed from Gomera, one of the most westerly of the Canary islands, on the sixth day of September. Here the voyage of discovery may be said to begin; for Columbus holding his course due west, left immediately the usual track of navigation, over a vast and unknown ocean, with no other guide, than well-founded hopes and rational conjectures. Scarcely had he lost sight of the Canaries, when several of his men exhibited signs of consternation bordering on despair. He comforted them with the vast wealth which was to be found in those regions whither he was conducting them, and in his own person he set such an example of patience and industry

as could not fail of exciting the admiration of those about him. Scarcely did he allow himself time for necessary refreshments; he regulated every thing; he superintended the execution of every order, and kept the deck with the sounding line or instrument for observation perpetually in his hand, and noting down every unusual appearance with the utmost accuracy and precision. Three weeks had they traversed the ocean, and had proceeded to a distance which Columbus thought it prudent to conceal, when his men became mutinous, and even threatened to throw their admiral overboard should he persist in an undertaking which they supposed must prove fatal to them all. He succeeded for the present in quieting their apprehensions, but in a few days they became more violent, declaring that nothing should induce them to proceed in so mad an enterprise; after trying every means of persuasion in vain, he at length promised to direct his course homewards within three days, should not land be discovered. This proposition did not appear unreasonable to the men, and to the commander it appeared sufficiently safe, for the pretexts of discovering land by the flight of birds, &c. were now so numerous and promising that he deemed them infallible. From a variety of symptoms Columbus was so confident of being near land, that on the evening of the 11th of October, after the usual invocations to heaven for success, he ordered the sails to be furled, and the ships to be to, keeping the strictest watch, lest they should be driven on shore. During this interval of suspense and expectation, no man shut his eyes, all kept upon deck, gazing intently towards that quarter where land was expected to be discovered. At ten o'clock Columbus, standing on the forecalk, observed a light at a distance: he pointed it out to another, and he again to a third person; all three saw it in motion, and at midnight there was heard from the foremost vessel the joyful sound of *land, land*. Having, however, been frequently deceived by false appearances, every man was slow of belief; and waited in all the anguish of uncertainty and impatience for the return of day. When the morning dawned their doubts were dispelled, and an island was seen about two leagues to the north, whose verdant fields, well stored with wood, and watered with many rivulets presented the aspect of a delightful country. Thanksgivings were instantly offered to heaven: never was gratitude more sincere, never were the expressions of joy more ardent, than those which proceeded from every tongue. Their duty to God was followed by an act of justice to their commander. They threw themselves at the feet of Columbus, with feelings of self-condemnation, mingled with reverence entreating pardon for their past conduct; and now they regarded as the favourite of heaven the man whom they lately reviled as a visionary and impostor. No sooner had the sun tinged with its rays the shores of the newly discovered island, than their boats were manned and armed. As they approached the coast with colours, music, and martial grandeur, they saw it covered with a multitude of people, whom the novelty of the spectacle had drawn together, whose attitudes and gestures expressed wonder and astonishment at the strange objects which presented themselves to their view. The land proved to be one of the Bahama islands, named afterwards by Columbus, San Salvador: he was the first European who set foot in the New World which he had discovered, and he took solemn possession of it for the crown of Castile and Leon, with all the formalities which the Portuguese were accustomed to observe in acts of this kind, in their new discoveries. The Spaniards, while thus employed, were surrounded by many innocent and unsuspecting natives, who gazed in silent and awful admiration upon actions which they could not comprehend, and of

which they could not foresee the direful consequences. Towards the evening Columbus returned to his ships accompanied with many of the islanders in their canoes. "Thus," says Dr. Robertson, "in the first interview between the inhabitants of the Old and New Worlds, every thing was conducted amicably, and to their mutual satisfaction. The former, enlightened and ambitious, formed already vast ideas with respect to the advantages which they might derive from the regions that began to open to their view. The latter simple and unfeeling had no forethought of the calamities and desolation which were approaching their country."

From San Salvador, Columbus proceeded on other discoveries; he saw several islands, and touched at three of the largest, on which he bestowed the names of St. Mary of the Conception, Ferdinando, and Isabella. He visited also Cuba and Hispaniola; wherever he went he inquired for gold, and having obtained a certain quantity of the precious metal, and made other arrangements, he took his departure homewards. He encountered a violent tempest, in which he had nearly lost his ships. While all on board were overwhelmed with a sense of personal danger, Columbus was only anxious for the means of preserving a record of his great discoveries. Retiring to his cabin, he wrote an account of what he had seen and done, which he covered with wax, enclosed in a tight case, and committed to the sea with a proper direction, hoping that it might be fortunately landed on some European shore. The storm, however ceased, and in a few days he found himself approaching the Azores. Here he obtained provisions, and renewed his voyage. When he was almost within sight of the Spanish coast, another storm arose, that forced him to take shelter in the Tagus, from whence he proceeded to Lisbon; where, in the presence of the king of Portugal, he narrated every thing that he had done and seen. Columbus remained at Lisbon but five days, and on the fifteenth of March he arrived in the port of Palos, seven months and eleven days from the time when he set out thence. As soon as his ship was discovered, the inhabitants ran eagerly to the shore, to welcome their relations and fellow-citizens, and to learn the tidings of their voyage. Columbus repaired to the court, then at Barcelona, where he was received with all the respect and honour due to his great achievements. Every mark of attention that gratitude or admiration could suggest was conferred upon him. All his stipulated privileges were confirmed, his family was ennobled, and, which was most satisfactory to his active mind, another armament was immediately fitted out for him. This consisted of 17 ships and about 1500 persons; of whom a large number were men of distinction, desirous to settle in the newly discovered countries.

On the 25th day of September 1493, Columbus sailed on his second voyage from Cadiz. He first reached the Caribbee or Leeward islands, which he visited, and then proceeded to Hispaniola, where he had left a small garrison of his own men, but who had been destroyed, probably from misconduct on their own parts, by the natives. Instead of wasting his time in punishing past wrongs, Columbus took precautions for preventing any future injury. With this view he built a small town, which he named Isabella, in honour of his royal patroness. While some were employed in the necessary operations of building, he sent others to explore the interior of the country, in the hope of finding gold. The hardships to which the Spaniards were obliged to submit, rendered them impatient of control, and it was with the utmost difficulty that Columbus could maintain any subordination. Signs of mutiny were every where exhibited; and to the commander was imputed the most unworthy motives, by persons from
 whose

whose rank in society better and more rational conduct might have been expected. Having, however, by prudence and vigour allayed the ferment, he left his brother Diego as governor of the settlement, and proceeded with a squadron in quest of new discoveries. During a tedious voyage of five months, in which he endured every hardship, he discovered only the island of Jamaica. But on his return to Hispaniola, he had the satisfaction of finding there his brother Bartholomew, whom he had not seen for a long period, and who had brought with him a large supply of provisions and men. About this period the native Indians perceiving that the yoke imposed upon them by the invaders would prove intolerable, resolved, if possible, to free themselves from so dreadful an evil. Hostilities were commenced, and much blood was shed on both sides; but in the event the Indians were completely defeated. The consternation with which the Indians were filled by the noise and havoc made by the firearms, by the impetuous force of the cavalry, and the fierce onset of twenty large dogs trained for the purpose, was so great, that they threw down their weapons, and fled, without attempting farther resistance. Many were slain, more were taken prisoners, and reduced to a state of the most humiliating servitude; a rigorous tax was imposed upon them of gold, which was the dearest object of European ambition, and which was now become necessary to plead the cause of Columbus in Spain, where numerous accusations had been laid against his conduct. Willing, however, to meet the charges in person, he invested his brother Bartholomew with full power of government during his absence, and then set sail. He arrived in Spain in 1496, and immediately appeared at court, with the modest but determined confidence of a man, conscious not only of his own integrity, but of having performed many very eminent services for the state, in whose employment he had embarked. The dignity of his conduct silenced his enemies; and, with the assistance of the gold and precious commodities which he had brought with him, he recovered the good opinion of his sovereigns. They resolved to make every exertion to render the new colony a permanent and complete establishment, by sending out such reinforcements as Columbus thought necessary for the purpose.

It was not, however, till late in the spring of 1498, that he was enabled to proceed on his third voyage; during which he discovered Trinidad, at the mouth of the Orinoco. The vast size of this river, though only ranking in the third or fourth magnitude of rivers in the New World, convinced him that it must have its rise in a great continent. He even touched upon various parts of the continent, without suspecting it, conceiving that they belonged to islands which he had not leisure to explore. Columbus arrived at Hispaniola in August, where he found that his brother had removed the colony to St. Domingo, on the opposite side of the island. During his absence, a mutiny had been excited, and some of his people had seceded from the main body. To calm the discontent, he gave them allotments of land, to which were annexed distributions of poor natives, that proved to them an intolerable source of oppression. New complaints were secretly transmitted to court against him and his brothers; and having no opportunity of vindicating his conduct, his powers were at first greatly abridged by a separate commission of discovery having been granted to Alphonso d'Ojeda; who was accompanied in his voyage by Amerigo Vesputci, after whom the whole New World has since been named. Columbus was then recalled, and Francis de Bovadilla appointed in his stead. By his unworthy and insolent successor, Columbus was thrown in chains, and treated with other indignities, which have for ever disgraced

the court that granted to him so much power. The captain of the ship, to whose charge Columbus was given, offered, in the most respectful manner, to liberate him, but he indignantly refused to suffer his irons to be removed, but by the express command of his sovereigns. On his arrival in Spain, he was instantly set at liberty, and treated with that civility and kindness from the king and queen which he had formerly experienced. Bovadilla was disgraced, but Columbus could not forget the injuries which he had sustained; he carried with him, wherever he went, the fetters he had worn, and ordered that they should be buried in the same grave with himself.

In 1502, he obtained permission to make a fourth voyage and on arriving off St. Domingo, he found eighteen ships richly laden ready to depart for Europe. His own experience led him to perceive an approaching storm; he accordingly requested permission to enter the harbour, and at the same time warned the fleet of the dangers to which it would infallibly be exposed by sailing at that juncture. His request and his warning were equally disregarded. The hurricane came on, and though, by proper precautions, he saved his own vessels, it fell upon the fleet with so much violence, that only two or three vessels escaped; and Bovadilla, with several others of his most inveterate enemies, perished with all their ill-gotten wealth. Among the vessels that weathered the storm, was that on which the wreck of Columbus's property was embarked. This, which, by some, was referred to the superintendance of providence, was, by others, imputed to certain magical arts exercised by Columbus himself. In pursuing his voyage, he traced the coast of Darien, in hopes of discovering a strait, which he fondly imagined would open a new tract to the East Indies. Although he was disappointed in his expectations, he was, nevertheless, so much delighted with the fertility of the country, and conceived such an idea of its wealth, from the specimens of gold produced by the natives, that he resolved to leave a small colony upon the river Belem, in the province of Veragua, under the command of his brother, and to return to Spain, to procure the means requisite for rendering the establishment permanent. On his voyage, he was driven back by a violent tempest from the coast of Cuba, his ships fell foul of one another, and were so much shattered by the shock, that with the utmost difficulty they reached Jamaica. Here he endured the greatest calamities, as well from the malicious dispositions of his own men, as from the suspicions of the natives, who refused to supply him with provisions, till, by his skill in astronomy, he predicted the event of an approaching eclipse, a circumstance that gave him an irresistible authority over their minds. From this time the superstitious natives venerated him as a god, and not only furnished him profusely with provisions, but cautiously avoided every thing that could give him offence. Columbus was at length delivered by a fleet sent from Hispaniola; and, after various difficulties, he arrived at St. Lucar in Spain in December 1504. Here, in addition to his other sufferings, he learned that his patroness, Isabella, was dead: from her alone he anticipated the redress of his wrongs, which he little expected from the king. To him, however, as the last resort, he applied, who amused him with promises, but, who, instead of granting his claims, insulted him with the proposal of renouncing them all for a pension. Disgusted with the ingratitude of a monarch whom he had served with fidelity and success; exhausted with the calamities which he had endured; and broken with the infirmities which these brought upon him, Columbus breathed his last at Valladolid, on the 20th of May 1506, in the 59th year of his age. In the closing scene he exhibited a dignity and composure

of mind suitable to the greatness of his character, and to those sentiments of piety which he had ever cherished in all the trials to which his life had been exposed. Ferdinand, who had slighted his well-founded claims when living, bestowed upon him funeral honours, and confirmed to his children their hereditary rights. Columbus was buried in the cathedral at Seville, and on his tomb was engraven an epitaph, in memory of his renowned actions and discovery of a New World, which in justice ought to have been denominated Columbia, in order that the name might for ever excite the remembrance of the hero who, in spite of every obstacle, succeeded in realizing a project, esteemed by his contemporaries as the chimera of a disturbed imagination. Robertson's *Hist. of America*.

Jullianus, in his curious edition of the P. yglot Pfalter, 1516, of which a beautiful copy is preserved in the Crache-rode collection in the British Museum, has introduced, by way of commentary on Pl. xix. 4, "their words are gone forth to the ends of the earth," a very curious sketch of the life of Columbus, an account of his discovery of America, and also a description of the inhabitants, particularly of the female native Americans.

COLUMBUS, *Congregation of St.*, is the name of a congregation of regular canons, formerly of great extent; having under it an hundred abbeys or monasteries, in the British islands. See CONGREGATION and CANON.

COLUMELLA, in *Anatomy*. See UVULA.

COLUMELLA, in *Botany*, is used by Linnæus for the central pillar of a capsule, to which the seeds are usually attached. Gærtner is content with the term receptacle for this part. See RECEPTACLE.

COLUMELLA, LUCIUS JUNIUS MODERATUS, in *Bio-graphy*, was born at Cadiz, and flourished at Rome in the time of the emperor Claudius. He is chiefly celebrated for a work which has come down to our own times, entitled "De Re Rustica," and which contains, in twelve books, rules concerning the culture of various vegetables, and the management of domestic animals. A separate book "De Arboribus," is annexed to these. They have gone through many editions, but the best and most accurate is that in Gelner's collection of the *Rei Rusticæ Scriptores*. Mori.

COLUMELLÆ *musculus teres*, a name given by Morgagni, and some others, to the muscle called by Albinus *axylgus uvulae*.

COLUMELLIA, in *Botany*, Willd. 1525. Jacq. Hort. Schoenb. 3. 28. tab. 301. Class and order, *syngenesia superflua*. Nat. Ord. *Compositæ*, Linn. *Corymbiferae*, Juss. Vent.

Eff. Ch. Receptacle naked, honey-combed. Down with a toothed margin. Common calyx cylindrical, imbricated. Rays of the florets undivided.

Sp. C. *biennis*. Root biennial. Stem cylindrical, pubescent, coriaceous at the top. Leaves an inch and a half long, sessile, linear, obtuse, hairy. Flowers both of the disk and ray yellow, sessile, solitary at the divisions of the branches. A native of the Cape of Good Hope.

COLUMN, in *Architecture*, *columna*, Latin, derived from *coluena*, a support. In a strictly architectural sense a column may be defined as an object consisting of a nearly cylindrical shaft with a capital, and either with or without a base. The column, as forming the principal part of an order of architecture, will be considered under the articles DORIC, IONIC, CORINTHIAN, TUSCAN, and COMPOSITE Orders, and in the present article we shall treat of columns according to their matter, construction, disposition, and use; under the first head may be placed

COLUMN, *moulded*, is that made by impaction of gra-

vel and flints of divers colours, which are bound together with a cement, which grows perfectly hard, and receives a polish like marble.

The secret of making these, it appears, the ancients were masters of, by the columns lately discovered near Algiers; which are, doubtless, the ruins of the ancient Julia Cæsarea; on all these is found the very same inscription in antique characters; the contours, accents, and even faults, being repeated in every shaft; an incontestible proof of their being moulded.

COLUMN, *sifible*. Under this term are comprehended, not only columns of various metals, and other sifible matters, as glass, &c. but also those of stone, said to have been cast; the secret of which some will have us believe to have been known to the ancients.

COLUMN, *transparent*. any column made of transparent matter; as were those of crystal in the theatre of Scæurus, mentioned by Pliny; and those of transparent alabaster, in the church of St. Mark, at Venice.

COLUMN, *water*, is a sort whose shaft is formed of a large jet d'eau; which spouting out water violently from the base drives it within the tambour of the capital, which is made hollow; whence, falling down again, it has the effect of a liquid crystal column. See FOUNTAIN.

An instance of this we have at Quinto d'Aviro, near Lisbon.

COLUMN, *hydraulic*, is that whose shaft appears to be of crystal; being formed by a number of little threads of water, falling from holes made in a girt of metal, at equal distances, by means of a pipe mounting through the middle thereof; as in the gardens at Versailles.

COLUMN, *hydraulic*, also denotes a column from whose top proceeds a jet d'eau, to which the capital serves as a basin; whence the water descends by a little pipe, which turns spirally around the shaft. Such are the Ionic columns of the cascade of the Belvidera at Fiescati; and those of the vineyard Matthei at Rome.

COLUMNS, *with regard to their Construction*.

COLUMN of *bands or tambours*, a column whose shaft is formed of several courses of stone or blocks of marble of less height than the diameter of the column, this is what Ulpian means by *columna struicilis*, or *adpacta*, which is opposite to the *columna solida*, or *integra*, i. e. of one piece. This method is only practised in very large columns, for instance as the Trajan column. Smaller columns are often composed of three or four pieces, and this method the French distinguish by a particular term, *colonne par tronçons*, of which we have no proper translation.

COLUMN of *Masonry*, is built of rough stones or compass bricks, and covered with stucco.

COLUMN, *geminated*, that whose shaft is formed by three similar and equal sides, or ribs of stone, fitted within one another; and fastened at bottom with iron pins, and at the top with cramp-irons. This is to be fluted, that the joints may be the less discernible.

COLUMN, *encrustated*, is made of several ribs, or thin shells of fine marble, or some other rare stone, cemented upon a mould of stone, brick, or the like. This is done with design both to save the precious matter, as oriental jasper, lapis lazuli, agate, &c. or to represent pieces of such stones, of an extraordinary size, by the neatness and closeness of the incrustation, which renders the joints imperceptible.

COLUMN, *banded*; a column whose shaft has several bands or circumsures either plain or ornamented, which project somewhat beyond the general line of the shaft.

Banded columns were first introduced by De Lorme at the Chapel de Villers-Coherets, and at the Thuilleries, who imagined

imagined this method of concealing the joints of the different blocks of stone forming the shafts.

COLUMN, fluted, called also *channeled*, and *fluted column*; that whose shaft is adorned with flutes or channellings; either from top to bottom, or only two thirds of its height.

COLUMN, cabled or rudented, is a fluted column, whose channels are filled in with astragals which generally reach one third of the height of the shaft from the base.

COLUMN, cylindrical, is that which has neither swelling nor diminution.

COLUMN, diminished, is that which has no swelling, but whose shaft is tapered in a straight line from the base to the capital. This is the method observed in, we believe, all the Grecian remains of architecture, and in many of the Roman, as in the portico of the Pantheon. The opposite practice of giving an entasis or swelling in the middle of the shaft is obscurely mentioned by Vitruvius, and has been generally followed by modern architects.

COLUMN, oval. There are a few instances of oval columns in the remains of antiquity. The Massini Palace at Rome, and the frontispiece of the church of the P. P. de la Merce at Paris offer some modern examples.

COLUMN, pastoral, that whose shaft is formed in imitation of the trunk of a tree, with bark and knots.

This kind of column, in the Tuscan proportion, may be used in the gates of parks and gardens; and in the decoration of pastoral scenes, &c.

COLUMN, polygonous; a column of which the horizontal section forms a polygon. There are various examples of this form in Egyptian architecture, it is also observed in the lower part of the columns of a portico on the island of Delos and at the temple of Cora.

COLUMN, twisted, a column whose shaft is twisted round in the manner of a screw with six circumvolutions. Vignola first discovered a method of drawing it by rule. The barbarous and ridiculous practice of twisting columns has been much used by modern architects, especially in the screens and altar-pieces of churches. The most celebrated instance is the Baldaquin of St. Peter's. Columns spirally fluted are seen in the temple of Spoleto, they are also not uncommon on the sarcophagi's and other ornamental works of the lower ages.

COLUMN, Corolitic, that adorned with foliage, or leaves and branches turned spirally around the shaft; or in form of crowns and festoons.

These were used by the ancients for erecting statues on; which hence took the denomination of *corolitic*. They are very suitable in triumphal arches, and decorations of theatres.

COLUMN, hermetic. See HERMA.

COLUMNS, denominated from their disposition.

COLUMN, inserted, or backed, is that let into a wall, a third or fourth part of its diameter.

COLUMN, niched, is that whose shaft enters, with half its diameter, into a wall, which is hollowed for its reception; with its plane parallel to the projection of the tore. Such is that in the portal of St. Peter at Rome.

COLUMN, angular, is an insulated column, placed in the corner of a portico; or inserted into the corner of a building; or even a column that flanks an angle, either acute or obtuse, of a figure of many sides.

COLUMNS, cantoned, are those engaged in the four corners of a square pillar, to support four springs of an arch.

COLUMNS, coupled, are those disposed, by two and two, so as almost to touch each other at their bases, and

capitals, as those in the peristile of the Louvre and at St. Paul's cathedral.

COLUMN, doubled, is an assemblage of two columns, joined in such a manner, as that the two shafts penetrate each other with a third of their diameter. Such are those of the four angles in the court of the Louvre.

COLUMN, flanked, according to M. Blondel, is a column engaged with one half, or at least one-third of its diameter, between two demi-pilasters.

COLUMNS, grouped, are those placed on the same pedestal, or socle; either by three and three, or by four and four.

COLUMN, insulated, is that standing free, and detached on all sides, from any other body.

COLUMNS, median. Vitruvius gives the name *columnæ medianæ* to the two columns in the middle of the porch, which have their intercolumniation larger than the rest: that if these last, for instance, be *pycnostie*, the *medianæ* are *eustyle*.

The term may also be applied to the middle row of columns, in a frontispiece adorned with three orders.

COLUMNS, denominated from their use.

COLUMN, astronomical, is a kind of observatory, in form of a very high tower; built hollow, and with a spiral ascent to an armillary sphere placed at the top, for observing the motions of the heavenly bodies.

Such is that, of the Doric order, erected at the Hotel de Soissons, at Paris, by Catherine De Medicis, for the observations of Orontius Fineus, a celebrated astronomer of that time.

COLUMN, chronological, that which bears some historical inscription, digested according to the order of time; as by lustris, olympiads, fasti, epochas, annals, &c. At Athens there were columns of this kind, whereon were inscribed the whole history of Greece digested into olympiads.

COLUMN, funeral, a column placed over a tomb, and bearing an urn, or some symbol or inscription relating to the deceased. See CIPPUS.

COLUMN, gnomonic, is a cylinder, whereon the hour of the day is represented by the shadow of a style.

Of these there are two kinds: in the one, the style is fixed, and the hour-lines are no more than the projection of a vertical dial on a cylindrical surface.

In the other, the style is moveable; and the hour-lines are drawn to the different heights of the sun, in the different seasons of the year. See DIAL.

COLUMN, indicative, that which serves to shew the tides, &c. along the sea-coasts. Of this kind, is the nilometer at Grand Cairo, whereon the overflowings of the Nile are expressed: by this they form a judgment of the succeeding season: when the water, for instance, ascends to twenty-three feet, it is a sign of great fertility in Egypt.

COLUMN, itinerary, a column with several faces, placed in the cross-ways in large roads; serving to shew the different routs, by the inscriptions thereupon.

COLUMN, lazarary, at Rome, according to Festus, was a column erected in the herb-market, which is now the place Montanara; which had a cavity in its pedestal, wherein young children, abandoned by their parents out of poverty or inhumanity, were exposed, to be brought up at the public expence.

COLUMN, legal. Among the Lacedæmonians there were columns raised in public places, whereon were engraven the fundamental laws of the state.

COLUMN, limitrophous, or boundary, is that which shews the

the limits of a kingdom, or country conquered. Such was that, which Pliny says Alexander the Great erected at the extremities of the Indies.

As to those of Hercules, ordinarily called his columns, or pillars; they are two very steep mountains in the streights of Gades, now Gibraltar.

COLUMN, manubriary, from the Latin *manubie*, *spoils of the enemy*; a column adorned with trophies, built in imitation of trees, whereon the spoils of enemies were anciently hung.

COLUMN, menian, any column which supports a balcony, or meniana. The origin of this kind of column, Suetonius and Afcenius refer to one Menias; who, having sold his house to Cato and Flæcius, consuls, to be converted into a public edifice, referred to himself the right of raising a column without-fee, to bear a balcony; whence he might see the shows.

COLUMN, military, was a column of marble, raised by order of Augustus, in the middle of the Roman Forum; from whence, as a centre, the distances of the several cities, &c. of the empire were reckoned, by other military columns disposed at equal distances, on all the grand roads. This column was of white marble; the same with that which is now seen on the balustrade of the staircase of the capitol at Rome. Its proportion is massive; being a short cylinder, supporting a symbol of the globe of the earth.

It was called *milliarium aureum*, as having been gilt, at least the ball, by order of Augustus. It was restored by the emperors Vespasian and Adrian; as appears by the inscriptions.

COLUMN, military, among the Romans, a column whereon was engraven a list of the forces in the Roman army, ranged by legions, in their proper order; with design to preserve the memory of the number of soldiers, and of the order preserved in any military expedition.

The Romans had another kind of military column, which they called *columna bellica*, standing before the temple of Janus; at the foot whereof the consul declared war, by throwing a javelin towards the enemies countries.

COLUMN, phosporical, a light house; or a hollow column, built on a rock or the tip of a mole, or other eminence, to serve as a lantern to a port.

COLUMN, symbolical, is a column representing some particular country, by the attributes proper thereto; as that of the French order, set with *feurs de lis*, in the front-piece of the Jesuits church at Rouen; or some memorable action; as the *Corvinian column*, on which was a crow; erected to Valerius Maximus, surnamed Corvinus, in memory of his defeat of a giant in the army of the Gauls, by the assistance of a crow.

Under the title of *symbolic columns*, may also be comprehended those that serve for symbols. Such is that on a medal of Nero, which expresses the stability of the Roman empire. See **SYMBOL**.

COLUMNS, historical, memorial, honorary, triumphal. Under this head may be placed various distinguished columns, which rank among the eminent works of art ancient and modern, and form the chief ornaments of the situation in which they are placed. The most celebrated of these is the triumphal column of Trajan at Rome. This monument was built by Apollodorus the most famous Roman architect in the Forum Romanum. The height of the column is 106 feet, with a diameter of nearly 13 feet; it is placed on a pedestal of 10 feet high; upon the capital there is a crowning which formerly supported a statue of the emperor, but, at present, a bronze statue of St. Peter, about 14

feet in height. The base and capital are of the Tuscan order. The column, with the crowning, is composed of 24 tambours or blocks of white marble, and the shaft is adorned, mounting spirally from top to bottom, representing the victories of Trajan over the Dacæ. Four eagles at the corners of the pedestal support, in their beaks, festoons of laurel, and the sides of the pedestal are richly ornamented with a variety of military weapons. The inside of the column contains a staircase, which ascends to the capital, and as each block of stone forms the whole diameter of the shaft, the steps are wrought out of the solid.

The Antonine column, though inferior in design, and the beauty of sculpture to the last mentioned, is one of the most considerable monuments of ancient Rome. It was erected by Marcus Aurelius, and consecrated by him to Antoninus Pius, whose statue was placed upon the summit, on the shaft however are represented the action of Marcus in the Marcoman war. The column is 96½ feet in height, with a diameter of 11½, raised upon a pedestal of 26½ feet. The construction of this column is exactly similar to that of Trajan; its base and capital have Doric profile.

At Alexandria there is a remarkable column, which is commonly called Pompey's pillar. It is a column of the Corinthian order raised upon a short pedestal. The shaft is 67 feet long, and nearly nine feet in diameter, at the bottom of a single piece of granite. The whole height of the column and pedestal is about 94 feet.

At Constantinople there were two triumphal columns similar to those of Trajan and Antoninus; the column of Constantine is entirely destroyed, and of the other erected to Arcadius by Theodosius, only the pedestal and the first course of the shaft remains.

Lastly, may be mentioned the monument of London, which is the largest column in existence, being fifteen feet in diameter, and 202 feet high, including the pedestal and crowning. This column was erected in memorial of the great fire of London; its architect was Sir C. Wren.

COLUMN, rostral, a triumphal column adorned with the beaks or prows of galleys, in memorial of a naval victory. The first rostral column was erected in the capitol, on occasion of the defeat of the Carthaginians by C. Duilius. Augustus constructed four with the prows of the ships taken from Cleopatra.

COLUMN, Scenography of. See **SCENOGRAPHY**.

COLUMNS, in French *Colonne*. Column has been very erroneously defined by many writers on military subjects to be a long deep file of troops or baggage. This definition, confining a column to a file of troops, so far from giving a true idea of it, conveys one totally erroneous. For a column consists both of ranks and files. A column may, therefore, be defined to be a corps or body of men with ranks and files in the form either of a square or rectangle, who march in time, or with one and the same movement, leaving a sufficient interval between every two of the said ranks and files, in order to avoid confusion. A column may be in the form of a square, having its front equal to its depth; or it may be of a rectangular form, having either its front equal to one of the shortest sides of the rectangle, and its depth equal to one of the longest, or its front equal to one of the longest sides of the rectangle, and its depth equal to one of the shortest.

In marching troops in columns, particularly towards the enemy, great care should be taken, that they advance as nearly as possible alike, and not one before another, that they may, if attacked, be able to afford mutual aid and assistance to one another, and that as they approach the field of battle they preserve their distances with so much

accuracy, that when they wheel and form there may be neither too much nor too little ground for each squadron and battalion. This is a nice point, and an operation that is seldom executed correctly.

The most disadvantageous order of march is that which compels an army to move in one column. The more columns it is divid'd into, and the smaller their depth, the more easily and expeditiously are the troops composing them formed in order of battle. And the most advantageous method of marching an army is that which makes it move in order of battle, without dividing it into columns at all. But open level, and unembarras'd ground of sufficient extent for this purpose is rarely to be met with.

COLUMN, *Class.*, a solid compact column, with very little space or interval between the divisions composing it.

COLUMN, *Opera*, a column with intervals between the the divisions equal commonly to their respective fronts.

COLUMN, among *Prætoris*, is half a page, when the page is divided into two parts, from top to bottom. See *PRINTING*.

COLUMNA, *Fabius*, in *Biography*, a learned botanist, was born at Naples in 1567. He attached himself early to the study of natural history, particularly to acquire a knowledge of the properties of plants, in which he became eminent. He excelled also in the knowledge of languages, of music, of mathematics, and in drawing, of which he is said to have made much use, the greater part of the engravings in his works being taken from his own designs. He was led to study the works of Dioscorides, Boerhaave says, in order to find a remedy for eiptic fits, to which he was subject. That he was not successful in his search is probable, as he is said to have received the greatest benefit, having previously tried numerous medicines, by the application of a caustic to one of his thighs. The operation was performed by Severinus in the year 1630. He died in 1651, aged 83 years, and is said to have totally out-lived his faculty's. Haller gives him great credit as a reviver and improver of the study of botany, for the light he threw on many obscure passages in Dioscorides, and for the number of plants he described not before known. The figures of the plants he has given, which he generally assisted in executing, are among the earliest copper-plate engravings in that part of natural history. His first work, which was published when he was only 24 years of age, "Plantarum aliquot historia, in qua describuntur plantæ rarioræ, antiquarum delineationibus respondentes." Neap. anno 1592, 4to. far exceeding what had been before done in that line. The engravings also are more accurate than had been before seen. "In p̄bu (the wild valerian) charactrem exacte expressit." Haller says, it is the plant, the root of which, Dioscorides recommended in his complaint. He took of it for a long time with advantage, he says, but it did not effect a cure. The works were republished in 1744, 4to. by James Plaucus, with observations by the Lyncei, a society of naturalists, to which Fabius had belonged. Annexed is a short history of his life. "Minus cogitarum rariorumque nostris celo orientium sibi, cephalis: quæ non paucæ ab antiquioribus descriptæ disquuntur, et declarantur." Rome, 4to. This was prepared for the press in the year 1606. The dedication was written in the year 1612, but it did not appear until the year 1616. He now delineated the flowers, fruits, and seeds of the plants, and began to arrange them from the similitudes of those parts. A second part of this work soon followed. In 1617, his "Adnotationes, et additiones ad opus Francisci Hernandez, et Nautii Antonii Recchi" appeared. In this he makes further advances in the classification of plants,

from the resemblance of the petals. "Stylum et flamma novit." In his work appear the first dawning of the system, by which Linnæus, more than a century afterwards, became immortalized. He was a member of the illustrious academy of the Lyncei, established at Rome, which rendered great services to the republic of letters as long as it subsisted. Columna invented a musical instrument, which he called "Sambuca Lyncia;" from the name of his academy; it was composed of 500 strings of different lengths, and the tone of each was divided in four parts, according to the method of Aristoxenus, to include all the genera, diatonic, chromatic, and enharmonic. He published his invention in a work likewise entitled "Sambuca Lyncia," printed at Naples in 1618. Some later editions were published under the title, "Dell'istrumento perfetto." We make no reflections on the excellence of this instrument, having never seen it; but conjecture, that from the belly being loaded with so great number of strings, the tone must be very feeble; it must likewise have been difficult to tune for all the three genera, and still more difficult to keep in tune. Haller Bib. Botan. Eloy. Diet. Hist.

COLUMNA nafi, is used by some writers of anatomy, for the fleshy end of the nose, jutting out over the upper lip.

COLUMNA oris, is sometimes used for the uvula.

COLUMNA regia, in *Ancient Geography*, a place of Italy, over-against Sicily, on the bank of the frait, and near Regium Julium. It is mentioned in the Itinerary of Antonine.

COLUMNÆ, a name given by Ephorus, cited by Pliny, to a small island on the route from the Red Sea to the island of Cerne. G. Hardonin thought they were the Mascarenhas isles.

COLUMNÆ albæ, or white columns, called by Herodotus (l. v. c. 118.) λευκὰ στῆλαι, a place of Asia Minor, to the south of the river Mæstias, and very near it.

COLUMNÆ carnæ, in *Anatomy*, called also *lacertæ*, and *coluææ cordis*, are several small muscles in the ventricles of the heart; derived, and, as it were, detached from the parietes of those ventricles, and connected by tendinous extremities to the valves of the heart.

These little columns, or pillars, being fastened to the parietes of the heart on one side, and the tricuspid and mitral valves on the other, do, by the contraction in the systole of the heart, draw out the valves; and by that means not only fill the orifices of the veins, but more exactly close the ventricles in their systole.

COLUMNA herculis, the columns of Hercules, in *Ancient Geography*, the name given to the frait of Gibraltar, called also *Fretum Gaditanum* and *Fretum Herculeum*. These columns of Hercules were properly the two mountains of Calpe in Europe, and of Abyla in Africa. Some have supposed that Hercules called them by his name; but others consider Hercules as an imaginary hero, whose name is formed of the Phœnician "Harokel," signifying a merchant or voyager. Hence, they say, it is not astonishing, that this frait should be called "the Strait of Voyagers;" and that its name should be derived from the Phœnician language, since the Phœnician navigators had made it known, and continually sailed through it.

COLUMNAR Marble. See *BASALTES*.

COLUMNAR strata, a mineralogical term for the strata into which different strata of the earth are sometimes found split or divided, generally in a direction perpendicular to the lamina of the strata or nearly; these most commonly occur in basalt or trap, those of Stople in Saxony, exceed 300 feet in length, without any articulation or division. Dolomien observed columnar basalt in the strata of mount

Etua.

Etna. At Cleton in Derbyshire, Mr. Mawe observed an irregular column in the Toad stone or trap (Mawe's *D. rb.* p. 40 and 51). Porphyry is often found in a columnar form. (See 2 B. *rg. Journ.* 1790, 325, and Haiding, 48. Sandstone in the east and north parts of Bohemia, are often split into columns, resembling basalts, 2 *Berg. Journ.* 1792, 70. Limestone is sometimes found rent into polygonal pillars of 4, 5, &c. sides like balais, as at Rhoms and Ridon in the Vivarais, and in Saxony. Charpentier 49. See **BASALT TRAP** and **PRISMATIC COLUMNARS**.

COLUMNARIS, in *Botany*, a name given by some to the tall, milky bell flower; the *campanula lactescens*, Ger. Emac. Ind. 2.

COLUMNARIUM, in *Roman Antiquity*, a heavy tribute, demanded for every pillar of a house. It was first laid on by Julius Cæsar, in order to put a stop to the extravagant expences laid out on sumptuous buildings.

COLUMNÆA, in *Botany*. (So named by Plumier in honour of Fabius Columna, or Fabio Colonna, of the noble family of Colonna in Italy.) *Linn. Gen.* 792. Schreb. 1064. Willd. 1210. Plum. 33. Juss. 121. Clafs and order, *dichynania angiosperma*. *Nat. Ord. Personate*, *Linn. Scrophulariæ*, Juss.

Gen. Ch. Cal. One-leaved, deeply five-cleft, generally somewhat swelling at the base, permanent; segments erect, equal, lanceolate. *Cor.* monopetalous, much longer than the calyx, labiate; upper lip erect; lower lip two or three-cleft. *Stam.* Filaments four free; anthers joined together. *Pist.* Germ superior, egg-shaped; style filiform, the length of the upper lip; style bifid, obtuse. *Peric.* Capsule globular, one or two-celled. *Seeds* numerous, small, attached to a large receptacle.

Essen. Ch. Calyx five-cleft. Corolla labiate; upper lip erect, emarginate; lower lip three-cleft. Anthers connected. Capsule, one or two-celled. *Seeds* bedded in the receptacle.

Sp. 1. C. Scandens. *Linn. Sp. Pl.* Mart. 1. Lam. 1. Willd. 1. Jacq. Hort. vol. iii. tab. 48. Amer. Picé. 88. tab. 170. Plum. Gen. 28. ic. tab. 89. fig. 1. Lam. Ill. tab. 524. fig. 1. "Leaves egg-shaped, acute, entire or slightly crested, somewhat villous; calyx pubescent; segments entire; corolla pubescent; upper lip undivided." *Root* perennial. *Stem* slender, very long, pale green, slightly villous, either creeping on the ground, or attaching itself to the trunks of trees, by small lateral roots. *Leaves* opposite, petioled, resembling those of *Parietaria*. *Flowers* blood-red, two inches long, axillary, solitary, villous on the outside, on short peduncles, a little curved. *Capsule* globular, white, softish, resembling a berry, but opening, about the size of a nut, one-celled. A native of South America, and the West Indies. There is a femial variety with yellowish flowers. 2. *C. longifolia.* *Linn. Mant.* 90. Mart. 2. Lam. 3. (*Achimenes selsoides*; Vahl. *Symb.* 2. 71. Willd. 1190. Babel. Tibuli. Rheed. Mal. 9. tab. 87. *Selamum javanicum*; Burm. Ind. 133.) "Leaves lanceolate, very long, somewhat ferrated, smooth." *Stem* about two feet high, herbaceous, quadrangular, smooth, branched. *Leaves* three inches long, opposite, nearly sessile. *Flowers* red, opposite; in simple, long, erect, terminal racemes; border of the corolla four-cleft; upper lip large, oblong, entire; lower lip trifid; anthers divided at the base into two diverging lobes, connected, and forming a cross. *Capsule* egg-shaped, two-celled, two-valved. *Seeds* numerous, fixed in a globular receptacle. A native of the East Indies. 3. *C. hirsuta.* Mart. 3. Willd. 2. Hort. Kew. 2. 366. Lam. Ill. tab. 524. fig. 2. Swartz. Prod.

94. Flor. Ind. occ. 2. 1080. (*Achimenes major*; Brown. Jam. 270. tab. 30. fig. 3. *Rapunculus pinnatus*; Sloan. Jam. 58. Hort. 1. tab. 100. fig. 1.) "Leaves egg-shaped; acuminate, ferrated, rough, with hairs on the upper surface, segments of the calyx tooth ferrated, hirsute; corolla hirsute; upper lip bifid." *Root* perennial. Whole plant succulent. *Stem* thick, throwing its branches to the height of four or five feet when supported. *Leaves* opposite, alternately larger. *Flowers* large, beautifully variegated; segments of the calyx almost pinnated like those of the rose. A native of the cooler mountains of Jamaica; introduced in 1780, by the marquis of Rockingham; flowering in November. 4. *C. hispida.* Mart. 4. Willd. 4. Swartz. Prod. 94. Flor. Ind. occ. 2. 1083. "Leaves egg-shaped, obtuse, slightly toothed, hirsute hirsute; segments of the calyx entire, hairy; stem hairy, scabrous." A native of Jamaica. 5. *C. natalans.* Mart. 5. Willd. 3. Swartz. Prod. 94. Flor. Ind. occ. 2. 1083. "Leaves ovate-lanceolate, slightly toothed, rather scabrous, hirsute and coloured underneath; calyx villous; segments lacinated; corollas villous." A native of Jamaica, in shady woods, attached to the trunks of trees. 6. *C. stellata.* Willd. 6. Lour. Cochin. 384. "Leaves sessile; flowers solitary; stem creeping." *Stem* herbaceous, perennial, cylindrical, slender, whitish. *Branches* somewhat erect, four inches long, very tender. *Leaves* egg-shaped, three lines long, serrated, stellate in threes, pale green, odoriferous, petioled. *Flowers* white, striped with red, axillary, hirsute, peduncled; tube of the corolla scarcely gibbous; upper lip arched, trifid; lower bifid; anthers egg-shaped, connected, separated with difficulty. *Capsule* awl-shaped, two-celled. The whole plant, except the capsule, hairy. A native of Cochin-china. It is an aquatic, of a very pleasant appearance and smell, and being emollient and cooling, is used as a wash by the women, for which purpose it is cultivated in pots or tubs filled with water, having earth at the bottom.

COLUMNÆA erecta; Lam. See **CYRILLA pubescella**.

Propagation and Culture. All the species require the heat of a stove. They are propagated by seeds, and should be treated like other tender exotics.

COLUMNELLA, *little columnæa*, denotes the substance that passes through the capsule, and connects the several partitions and seeds.

COLUMNIA POMPEI, in *Ancient Geography*, a place of Thrace, at the entrance of the Thracian Bosphorus, on the coast of the Euxine sea.

COLUMNATED winding stairs. See **STAIRS**.

COLUMNIFERE, in *Botany*, the thirty fourth natural order in the "Philosophia Botanica," of Linnæus, and the thirty-seventh of "Prælectiones." In the "Philosophia Botanica," it contains the following genera; *camellia*, *xylo*, *gossypium*, *ureva*, *hibiscus*, *turnera*, *malope*, *lavatera*, *althæa*, *alcea*, *malva*, *melochia*, *sida*, *nappa*, *waltheria*, *mentzelia*, *hermannia*, *helictes*, and *stewartia*. In the *Prælectiones* all these are connected, except *mentzelia*, which is removed to the *calycanthææ*; and *xylo*, which was suppressed as a distinct genus by Linnæus himself, and its species placed under *bombax*. The following are added by Linnæus, *triumfetta*, *bixa*, *corechora*, *theobroma*, *græwia*, *montingia*, *tilia*, all of which originally formed part of the now suppressed order *columniææ*; and beside these, *mala-chra*? *pentapetes*, *bombax*, *adanfonia*, *heliocarpus*, *antichorus*, *maiernia*, *kleinovia*, *ayenia*, *microcos*, *thea*, *kigg-claria*. *Stewartia* is placed by Linnæus under both the *columniferæ* and the *tricoceæ*. In the "Philosophia Botanica" it had been placed among the latter, and when it was afterwards

wards removed to the former, it was most probably left in its original station, merely through inadvertence. The following have since been added; but Giske acknowledges himself in doubt whether the arrangement would in all cases have been approved by Linnæus. *Symplocos*, Linn., and *terstroemia*, Linn., referred to this order by Swartz.; *palavia*, Cav.; *anoda*, Cav.; *ruizia*, Cav.; *alfonia*, Cav.; *dombera*, Cav.; *ochroma*, Swart.; *paronia*, Cav.; *achania*, Sol. Swart.; (*malvavifens*, Dill. Cav.) *Lagunera*, Cav.; *cinifogofia*, Cav.; *myrodia*, Swart. (*Quararuba*, Aubl. Cav.), *auletia*, Schreb. (*Aceiba*, margr. Aubl. Swart.) *Marila*, Swart.; *hubroma*, Schreb.; *malacodendron*, Mitch. Cav. *eroteum*, Swart.

Linnæus confiders that the essential character of the order is not to be understood from the name, which properly belongs only to some of the more remarkable genera. In all of them the root is fibrous; in none bulbous or tuberous. The stem in most is herbaceous, but some are large trees; it is amongst the latter only, that thorns are to be found; and prickles only in some hibiscif. Scarcely any plant in the whole order is smooth. All have stipules in pairs. The leaves are never opposite, most commonly petioled; the foetation, as far as Linnæus could recollect, always pinnate, and many have glanduliferous pores under the rib. There are no tendrils in any plant of the order. The inflorescence is various. The calyx in many is simple and five-cleft; in some double. The petals in most are five; but since the filaments are united, and in most genera adhere to them, the corolla falls off all together, as if it consisted only of one petal. Their claws, by converging often, constitute the nectary. The pills, or at least the stamens, are equal in number to the parts of the fruit. The fruit is always superior, but various in other respects. None of the foecies are poisonous or fetid; they are generally more or less mucilaginous; and the flowers of most are beautiful.

COLUMNATENSIS, in *Ancient Geography*, an episcopal see in Africa in Mauritania Cæsariensis, according to the conference of Carthage.

COLUPPA, in *Botany*, Rheed. See *ILLECEBRUM f. f. f.*

COLURES, in *Geography* and *Astronomy*, are two great circles, imagined to intersect each other at right angles in the poles of the world.

The word is derived from *κόρος*, *mutilus*, or *truncatus*, and *οψα*, *tail*; q. d. *appearing with the tail cut off*; because never seen entire above the horizon.

The colures pass one of them through the solstitial, and the other through the equinoctial point of the ecliptic; whence the first is denominated the *solstitial*, and the second *equinoctial colure*.

The equinoctial colure determines the equinoxes; and the solstitial, the solstices.

By thus dividing the ecliptic into four equal parts, they also mark the four seasons of the year.

It is disputed over what part of the back of Aries the equinoctial colure passed in the time of Hipparchus. Sir Isaac Newton, in his *Chronology*, takes it to have been over the middle of the constellation. Father Soucier insists on its having passed over the dodæcatemorian of Aries, or midway between the rump and first of the tail. We have some observations in the Philosophical Transactions, N° 466, concerning the position of this colure in the ancient sphere, from a draught of the constellation Aries, in the *Aratæa* published at Leyden and Amsterdam, 1652, which seem to confirm Sir Isaac's opinion; but the antiquity and authority of the original draught may still remain in question. See *CHRONOLOGY*.

COLURI, in *Geography*, an island in the gulf of Egeia, near the coast of Livadia, about seven miles long and two wide; 10 miles W. of Athens. N. lat. 38°. E. long. 23° 36'.

COLUSITANUS, in *Ancient Geography*, an episcopal see in the proconsular Africa, according to the conference of Carthage; supposed to be the same with *Calcutanensis*.

COLUSSA, a Greek town of Paphlagonia.

COLUTEA, in *Botany*, (*Κολούτις*), the name of a plant in Theophrastus. Tourn. Clafs 22. fect. 3. Gen. 2. Linn. G. n. 80. Schreb. 1196. Willd. 1365. Gært. 488. Juss. 359. Vent. 3. 412. Bagnewandier; Encyc. Clafs and order, *diadelphia decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss. Vent.

Gen. Ch. Cal. Perianth one-leaved, bell-shaped, five-cleft, erect, permanent. Cor. Papilionaceous. Standard, wings and keel differing in different species with respect to number and proportion. Stam. Filaments nine united; one separate; anthers simple. Pissl. Germ. superior, oblong, compressed peduncled; style ascending; stigma bearded on the lower side. Peric. Legume very large, membranous, transparent, generally inflated, appearing almost empty, perfectly one-celled. Seeds small, kidney-shaped, attached to the two edges of the upper suture.

Ess. Ch. Calyx five-cleft. Stigma bearded on one side. Legume peduncled, membranous, inflated or compressed, one-celled.

Obs. This species is nearly allied to *atragalus* and *phaca*. The total want of a partition in the legume is its only certain generic distinction. The atragali are completely two-celled. The phacæ have a partial partition, which extends the whole length, but only half the breadth of the legume, making it semi-bilocular.

Sp. 1. *C. arborefens*. Common bladder-fenna. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Gært. tab. 154. fig. 4. Lam. 11. 624. fig. 2. Bot. mag. tab. 81. (C. vesicaria; Bauh. Pin. 206. Tourn. 649. C. hirsuta; Roth. Germ. 1. 305. II. 168.) "Leaflets inversely heart-shaped." Linn. "Leaflets oval-obcordate; standard gibbous, abbreviated." Hort. Kew. A shrub. Stems several, woody, twelve or fourteen feet high; branches numerous, woody. Leaves alternate, winged, terminated by an odd one; leaflets nine or eleven, green and smooth above, glaucous underneath. Flowers yellow, with a reddish curved line at the base of the standard, in a short raceme, consisting of three or four flowers; wings only a little shorter than the keel. Legume closed at the tip. Seeds twenty or more. A native of the warmer parts of Europe; observed by Mr. Ray, in the ascent to the crater of mount Vesuvius, where there are scarcely any other plants. It flowers with us in the early part of June, and sometimes again in the month of August, continuing till October. Both leaves and legumes are purgative, and may be substituted for the officinal fenna, (cassia fenna), but must be taken in larger doses. They have an acid, nauseous taste. The seeds, in the quantity of a dram or two excite vomiting; but notwithstanding these qualities, the plant is said by Haller and Ray to afford a food grateful to cattle. 2. *C. cruenta*. Oriental bladder fenna. Mart. 2. Willd. 2. L'Heretier Stimp. nov. 2. tab. 41. Hort Kew. 3. 55. Lam. 11. tab. 624. fig. 3. (C. orientalis, flore, sanguinei coloris, luteâ maculâ notata. Tourn. Cor. 44. C. fanguinea. Pel. r. off. 1. 88. C. orientalis. Lam. 2. C. humilis. Scop. influr. 2. 23. tab. 12.) "Shrubby; leaflets wedge-shaped, inversely heart-shaped; standard gibbous, obtuse, very small." Stem woody; branches seven or eight feet high. Leaves pinnated; leaflets eleven or thirteen, small, smooth, glaucous, more fleshy than those of the preceding species.

Flowers

Flowers deep red, with two yellow spots on the standard, small; wings considerably shorter than the keel; keel erect, appearing cut off at the end. *Legume* opening beneath the tip into a wide hole. Discovered by Tournfort in the Levant; cultivated by Miller in 1752. 3. *C. poccockii*. Poccock's bladder-fenna. Mart. 3. Willd. 3. Hort. Kew. 3. 55. (*C. procumbens*; L'Heretier Stirp. nov. 2. tab. 42. *C. halepica*; Lam. 3.) "Shrubby; leaflets roundish-elliptical, very obtuse, mucronate; standard gibbous, elongated, ascending." A lower shrub than the preceding. *Branches* slender, spreading. *Leaflets* thirteen or fifteen, very small, entire, of a cinereous-green colour underneath. *Flowers* bright yellow, larger than those of *C. arboreascens*, opening a month earlier, and continuing in succession till late in the autumn; peduncles shorter than the leaves, axillary, solitary, one or two-flowered. The seeds were first brought to England from Turkey, by Dr. Poccocke, and are said by Dr. Ruffell to be very common about Aleppo. 4. *C. frutescens*. Scarlet bladder-fenna. Linn. Sp. Pl. 2. Mart. 4. Lam. 4. Willd. 4. Bot. Mag. tab. 181. "Leaflets oblong, retuse, hoary underneath; branches silky-tomentous." A shrub, from two to four feet high; branches erect. *Leaflets* from twenty-one to twenty-five, green and smooth on their upper surface. *Flowers* bright scarlet large; peduncles axillary, from three to five-flowered; keel considerably longer than the standard; wings very small. *Legumes* very large. A native of the Cape of Good Hope, and other parts of Africa. 5. *C. americana*. Mart. 8. Houft. MSS. "Shrubby; leaflets egg-shaped, emarginate; legumes oblong, compressed, acuminate." *Stem* twelve or fourteen feet high, much branched; leaflets seven, light green. *Flowers* bright yellow, two or three upon each peduncle. *Legumes* near four inches long, compressed, winged, ending in long points. Sent to Miller in 1730, by Dr. Houlton, from Vera Cruz in New Spain. 6. *C. galegifolia*. Bot. Mag. tab. 792. "Shrubby; leaflets oval, emarginate, in about nine pairs, with a terminal one; legumes on longish pedicels." *Stem* low, zig-zag; branches herbaceous, angular. *Stipules* two, egg-shaped, small, embracing the common petiole, but distinct from it. *Flowers* dull red, inclining to orange, in a many-flowered raceme; common peduncles longer than the leaves, axillary; pedicels alternate, short, curved; bracte under each flower, single, small, egg-shaped; calyx-teeth wide at the base, with white villous margins; standard roundish, somewhat reflexed, marked at the base with a greenish yellow spot; wings smaller than the keel; keel one-petailed, when folded nearly orbicular; style hairy on the upper surface of its whole length. *Legume* inflated, membranous, veined, oblong, oval, beaked, on a pedicel four times longer than the calyx. *Seeds* many, shining, kidney-shaped. A native of New South Wales. 7. *C. procumbens*. Mart. 9. "Stems trailing; leaflets oblong, egg-shaped, tomentous; flowers axillary, on very long peduncles." *Stems* several, woody, slender, much branched; branches not much more than a foot long; leaflets twenty-five or twenty-seven, small, narrow. *Flowers* purple, small; peduncles with three or four flowers. *Legumes* little more than half an inch long, but like a sickle, compressed. *Seeds* kidney-shaped. A native of the Cape of Good Hope. Cultivated by Miller in 1753. 8. *C. rigida*. Willd. 5. Thunb. prod. 134. "Shrubby; leaflets lanceolate, smooth; stem erect, smooth. A native of the Cape of Good Hope. 9. *C. obtusata*. Willd. 6. Thunb. prod. 134. "Shrubby; leaflets linear; stem erect; flowers in racemes, reflexed." A native of the Cape of Good Hope. 10. *C. linearis*. Willd. 7. Thunb. prod. 135. "Herbaceous; leaflets linear, acute; stem erect; racemes terminal, incurved." A native of the Cape of Good Hope.

11. *C. herbacea*. Linn. Sp. Pl. 2. Mart. 6. Lam. 5. Willd. 8. Gart. tab. 154. fig. 2. "Leaflets linear, emarginate, smooth; stem herbaceous; racemes axillary." *Stems* annual or triennial. *Stems* near a foot and half high, clothed with very short hairs, branched. *Leaflets* fifteen or seventeen, greenish. *Flowers* dark blood-red, small; standard striated, the length of the wings and keel. *Legumes* imbricated, membranous, somewhat transparent, very thin, compressed, egg shaped, obliquely mucronate, two-valved, pitted. *Seeds* two or four, rather large, kidney-shaped, compressed, of a dull chestnut colour. A native of the Cape of Good Hope; cultivated by Miller in 1731. 12. *C. perennans*. Mart. 5. Willd. 9. Hort. Kew. 3. 56 Jacq. Hort. 3. tab. 3. (*C. fistulosa*; Retz. Obs. 3. 40. Mart. 7.) "Herbaceous; leaflets oblong, pubescent; stem erect; racemes terminal." *Root* perennial. Whole plant slightly pubescent. *Stem* cylindrical, striated, pale green, annual, simple, or with almost barren branchlets. *Leaves* alternate, neat together, spreading; leaflets from thirteen to seventeen, entire, obtuse, on very short petioles. *Flowers* flesh-coloured, small, without scent; standard wide, roundish, emarginate, marked with deep purple streaks; wings shorter than the keel, oblong, obtuse; keel dark purple, ascending at the end, almost as long as the standard; style smooth; stigma obtuse, with white villous hairs, but bearded only at the tip. *Legume* ovate-roundish, acuminate at both ends, compressed, flat, little inflated, smooth, membranous, somewhat pellicid, not opening of itself. *Seeds* few, compressed black. A native of the Cape of Good Hope; introduced by Dr. Jacquin in 1776. 13. *C. prostrata*. Willd. 10. Thunb. prod. 134. "Leaflets lanceolate, villous; stem herbaceous, diffuse; peduncles axillary, with about two flowers." A native of the Cape of Good Hope. We should have supposed this to be *C. procumbens* taken up by professor Martyn from Miller, if Miller had not expressly asserted that his plant has woody stems. 14. *C. excisa*. Willd. 11. Thunb. prod. 134. "Leaflets egg-shaped, cut; stem herbaceous, decumbent; racemes terminal." A native of the Cape of Good Hope. 15. *C. vesicaria*. Willd. 12. Thunb. prod. 134. "Leaflets egg-shaped; stem herbaceous, decumbent villous; legumes orbicular, inflated." A native of the Cape of Good Hope. 16. *C. tomentosa*. Willd. 13. Thunb. prod. 135. "Leaflets egg-shaped, hoary; stem herbaceous, tomentous; flowers in racemes. A native of the Cape of Good Hope. 17. *C. alpina*. Lam. 6. (*Phaca alpina*; Linn. P. leguminibus pendulis femiovatis; Gmel. Sib. 4. 35. tab. 14. *Astragalus*; Hall. Helv. n. 401. *Astragaloides elatior*, erecta, vicie foliis, siliquis pendulis. Amon. Ruth. 148.) "Herbaceous, much branched; leaflets oblong, elliptical, hairy underneath; flowers pale yellow." *Root* perennial. *Stems* near a foot and half long, weak, sometimes quite upright, sometimes half decumbent and diffuse. *Leaflets* nineteen or twenty-one, green and smooth above, diminishing in size towards the top. *Flowers* yellowish, in peduncled spikes, situated in the axils of the upper leaves; calyx beset with a few short blackish hairs. *Legumes* vesicular, perfectly one-celled, pedicelled in their calyx, demi-oval, or a little crescent-shaped, acute, pendulous on the common peduncle. *Seeds* from four to six, small, kidney-shaped. A native of the mountains of Dauphiné, Switzerland, Lapland, and Siberia. 18. *C. australis*. Lam. 7. (*Phaca australis*, Linn.; *astragalus*. Hall, Helv. p. 403. *Astragaloides alpina supina glabra*, Till. Hort. Pin. 19. tab. 14. fig. 1.) "Herbaceous, diffuse; leaflets lanceolate, nearly smooth; peduncles longer than the leaf." *Root* perennial. *Stems* from five to seven inches long, slender, weak, commonly procumbent, almost smooth, branched. *Leaflets* thirteen or fifteen, acute.

acnte. *Stipules* two, embracing the stem, oval-obtusely. *Flowers* yellowish white, with a tint of violet at the extremity of the keel, sessile, in axillary spikes. *Legumes* vesicular, demi-oval, pedicelled in their calyx, terminated by a short bent thread, perfectly one-celled, smooth, not pendulous. *Seeds* five or six, small. A native of the mountains of Provence, Italy, and Switzerland. After some hesitation, we have placed the last two species under this genus, in concurrence with La Marck, although that botanist has not, in this particular, been hitherto followed by any other author. Gartner has even figured the legume of this species alone, to illustrate the genus phaca. As far, however, as the partition is concerned, he completely gives up the point, acknowledging the legume to be absolutely one-celled, without a vestige of a partition. He has accordingly introduced *aur. rarius unicolor*, into his generic character, and has founded the essential distinction between *colutea* and *phaca* on the form of the flowers. To us the entire want of a partition appears decisive. Jacquin, indeed, has attributed to his alpina a half two-celled legume; but he seems to refer to a different plant. There is much confusion in authors with respect to the synonyms of *phaca-alpina*; and that with the kindred species, stands in need of further investigation.

COLUTEA argentea cretica; Tournef. See CORONILLA *argentea*.

COLUTEA caule geniste junqoso; Bauh. Hist. See CORONILLA *juncea*.

COLUTEA encaphyllum filiquosa ind. orient.; Pluk. Alm. See INDIGOFERA *encaphyllum*.

COLUTEA esatica angustifolia; Pluk. Alm. See CORONILLA *aculeata*.

COLUTEA indica humilis, ex qua indigo; Burm. Zeyl. See INDIGOFERA *tinctoria*.

COLUTEA minima dispersos; Pluk. Phyt. See INDIGOFERA *encaphyllum*.

COLUTEA filiquosa glabra ternis quinifex maderaspatanus; Pluk. Alm. See INDIGOFERA *glabra*.

COLUTEA filiquosa sive scorpioides major et minor; Bauh. Pin. See CORONILLA *emerus*.

COLUTEA scorpioides; Cam. Epit. See CORONILLA *emerus*.

COLUTEA scorpioides maritima glauca folio; Bauh. Pin. See CORONILLA *glauca*.

COLUTEA scorpioides minor coronata; Bauh. Pin. See CORONILLA *coronata*.

COLUTEA scorpioides odorata; Alp. Exot. See CORONILLA *argentea*.

COLUTEA secunda; Clus. See CORONILLA *coronata*.

COLUTEA zeylanica argentea tota; Herm. Lugdb. Rai. Hist. See SOPHORA *tonensis*.

COLUTHUS, in *Biography*, a Greek poet, a native of Lycopolis, lived under the emperor Anastasius in the beginning of the sixth century. His only work that has come down to us is upon the "Rape of Helen," which, though of inferior merit, has been frequently edited, and was translated into French by M. du Molard in 1742. Moreri.

COLVIUS, ANDREW, was born at Dort in Holland, in the year 1574, where he officiated during a considerable part of his life as pastor of the Walloon church. In 1620, he was chaplain to the embassy at Venice, and cultivated an intimate friendship with the celebrated father Paul, whose treatise on the inquisition he translated from the Italian into the Latin language. Colvius was intimately acquainted with many literary characters of his own age, and was himself a philosopher and poet of eminence, but he is chiefly

known as a collector of rarities of every description, of which, in the year 1655, he published a catalogue intitled "Catalogus Musei And. Colvii." He died at Dort in 1671. Moreri.

COLYBA, or **COLYBUS**, a term in the *Greek Liturgy*, signifying an offering of corn and boiled pulse, made in honour of the saints, and for the sake of the dead.

Balfamon, P. Guar, Leo Allatius, and others, have written on the subject of *colyba*: the substance of what they have said, is as follows:

The Greeks boil a quantity of wheat, and lay it in little heaps on a plate; adding beaten peas, nuts cut small, and grape-stones, which they divide into several compartments, separated from each other by leaves of parsley. A little heap of wheat, thus seasoned, they call *colyba*.

They have a particular formula for the benediction of the *colyba*: wherein, praying that the children of Babylon may be fed with pulse, and that they may be in better condition than other people, they desire God to bless those fruits, and those who eat them, because offered to his glory, to the honour of such a saint, and in memory of the faithful deceased. Balfamon refers the institution of this ceremony to St. Athanasius; but the Greek Synaxary to the time of Julian the Apostate.

Many of the Latin divines having spoken injuriously of this ceremony, Gabriel archbishop of Philadelphia, has written a discourse in its vindication: wherein he endeavours to shew that the design of the *colyba* is only to represent the resurrection of the dead, and to confirm the faithful in the belief thereof. The *colyba*, he says, are symbols of a general resurrection; and the several ingredients added to the wheat, signify so many different virtues.

COLYBRASSENSIS, in *Ancient Geography, an episcopal see of Africa, in Pamphylia, according to the acts of the council of Constantinople, held in the year 381.*

COLYMBIS, in *Ornithology*. Bellonius describes the tufted duck *anas fuligula* of modern writers under the name of *colymbis*.

COLYMBUS, a genus of the *anseræ*, having the bill toothless, subulate, straight, and pointed; throat denticulated; nostrils linear, and situated at the base of the bill; legs fettered.

Linnaeus includes in the *colymbus* genus three families of birds; the guillemot, the divers, and the grebes, each of which, in the opinion of most ornithologists, ought to be considered generically distinct. The guillemots live chiefly aloft to the sea, and inhabit rocks; they have a slender tongue the size of the bill, and the bill itself of a compressed form, with the upper mandible a little bent, and the base covered with short feathers: they are principally distinguished by having the feet three-toed. The divers have a strong bill, less pointed, cylindrical, the edges of the mandible turned in, the upper one longest; nostrils divided in the middle by a membrane tongue long, sharp, serrated at the base each side; legs slender; tail-feathers twenty in number; the chief character of these consist in the feet being furnished with four toes, and palmate; they frequent fresh waters. The grebes are without a tail, have a strong bill; lores naked; tongue a little cleft at the tip; body depressed, and thickly covered with soft shining plumage; wings short, and the legs compressed; the principal characteristic of this family are the lobate feet; consisting of four toes each. Those last mentioned birds frequent meres, and other inland water places.

* *Feet three-toed*, Guillemot.

MARMORATUS. Above streaked with chestnut and brown; beneath

beneath waved with dusky and white; legs tawny; bill, tail, wings, and claws black. *Colymbus marmoratus*, Gmel. *Marbled guillemot*, Lath. Syn. *Uria marmorata*, Lath. Ind. Orn.

Inhabits the western parts of America and Kamtschatka. This bird is ten inches in length; the crown is dusky; some of the greater quill-feathers edged with white; chin dusky, with white stripes.

LACTEOLUS. Snowy; bill and legs brownish flesh-colour. *Colymbus lacteus*, Gmel. *Cephus lacteus*, Pallas Spic. *White guillemot*, Lath. Gen. Syn. *Uria lactea*, Lath. Ind. Orn.

Lives on the sea-coasts, and chiefly inhabits the Northern lands. A variety of this bird is described by writers (Sander Naturf. &c.) that has a black spot on each side behind the eyes; interscapulars and area of the wings black; upper mandible black, the lower yellowish.

GRYLLE. Body deep black; wing-coverts white. *Colymbus grylle*, Linn. Gmel. *Colymbus groenlandicus*, Klein. *Uria minor nigra*, Briff. &c. *Greenland dove, sea turtle*, Albin. *Black guillemot*, Lat. Donov. Brit. Birds, &c.

A general inhabitant of Europe and America, frequenting the sea-coast, and preying on fish; it builds its nest on the ground, the eggs are whitish, and spotted with black. This species is liable to some variation in the disposition of its spots, and appearance of plumage. One variety found at Anonahika is of a sooty black colour, with a double white band. Another is streaked above; beneath white, banded with cinereous; upper wing-coverts varied with white and black; this is the *uria balltica* of Brunnich, and inhabits Greenland. A second variety mentioned by the same author has the back, wings, and tail black; head, neck, and body beneath, with the spot on the wings white. Dr. Latham describes a variety from Kamtschatka of a black colour, with the crown clouded; the greater wing-coverts, and under side of the body, varied with white and black; throat entirely white; and lastly, the *uria gryllodes* of Brunnich is considered by some as a variety of this species; the upper part of the plumage of this bird is spotted white and black, the colour beneath white.

TROILE. Body black; breast and abdomen snowy; secondary wing-feathers white at the tip. *Colymbus troile*, Linn. *Lomvia boieri*, Ray. *Le guillemot*, Buff. *Lumme*, Marten Spitz. *Foolish guillemot*, Penn. Donov. Brit. Birds, &c.

This bird inhabits Europe and America, and is found in maritime frictions, as its principal food consists of sea-fish; its usual resorts are the steep and most inaccessible cliffs on the sea-coast, and in such places is seen in vast numbers on our own coasts during the summer, in which season they breed. The places most celebrated as the resort of these birds are the ile of Prielholm, in Beaumaris bay, between Caernarvonshire and the island of Anglesea; on a rock called Godreve, not far from St. Ives, Cornwall; the Farn island, near the coast of Northumberland; and the cliffs about Scarborough, Yorkshire. They are silly birds, and so stupid, that having once attained access to their haunts, they may be knocked down in any numbers with a stick, for though they see their companions killed before them, they never attempt to quit the rocks. In many parts they are killed by the inhabitants both for the sake of their flesh and skin; the former is, however, not remarkable for its delicacy, and has a strong fishy taste. The natives of Greenland and Kamtschatka make garments of their skins. Like the auk, this bird lays but a single egg; the eggs are in more esteem for the table than the flesh. The length of this

bird is seventeen inches. There are several varieties of this species.

We have followed the example of Linnæus and Gmelin in considering the four above-mentioned birds as appertaining to the *colymbus* genus, but it should be at the same time observed, that Brunnich constitutes a distinct genus of them under the title of *uria*, and that this genus is adopted by Dr. Latham, in his "Index Ornithologicus," though he adheres to the Linnæan method in his "General Synopsis."

* * * Feet four-toed, palmated, Diver.

GLACIALIS. Head and neck violaceous black; a white interrupted band on the chin and upper part of the neck. *Colymbus glacialis*, Linn. *Colymbus torquatus*, Brun. *Mergus nevius*, Briff. *Colymbus maximus caudatus*, Ray. *L'Imbrina*, Buff. *Greatish speckled diver or loon*, Albin. *Northern diver*, Penn. Donov. Brit. Birds.

This is a large bird, measuring about three feet in length; the upper part of the body with the bill, legs, and tail are black; the back and upper part of the wings is marked with a number of white spots disposed in rows. Inhabits the Northern seas, and is rare in England. The specimen in the London Museum.

In Iceland and Greenland, where these birds breed, they are very frequent. It is also abundant on the shores of Norway, and along the Arctic coasts as far as the river Obey, in the dominions of Russia. It is seldom seen on land, except in the breeding season, being, for the most part, in the open sea, where it is continually diving for fish, which it does with the greatest address. Among the northern maritime nations, the skins of these birds are prepared by the natives, and manufactured with the feathers on them into caps and other articles of dress. Garments, we are told, made of these skins are warm, and never imbibe the least moisture, and are also more durable in wear than might be imagined. The bird is likewise met with among the lakes of Hudson's bay, where the natives adorn their heads with ciclets of their feathers.

IMMER. Body above blackish, undulated with white; beneath entirely white. *Colymbus immer*, Linn. *Mergus major*, Briff. *Le grand plongeon*, Buff. *Ember goose*, Sibbald. *Imber diver*, Penn. Donov. Brit. Birds.

The length of this bird is two feet; the feathers of the back, wings, and tail are edged with white; in the male bird the front and sides of the head and neck are spotted with brown. This species inhabits the Arctic ocean; it ranks as a British species, but is rarely taken in our country.

STELLATUS. Cinereous-brown or dusky, spotted with white; throat pale ash, beneath white. *Colymbus stellatus*, Brun. Gmel. *Mergus minor*, Briff. *Colymbus caudatus stellatus*, Will. *Le petit plongeon*, Buff. *Speckled diver, or loon*, Lath.

Observed in plenty about the shores of the Baltic, and white sea, and in America. They occasionally migrate in flocks, pursuing the same course as the shoals of herrings and sprats, the latter in particular, and it is for this reason known in many parts by the name of *sprat loon*. These birds are more common in the temperate, or southern parts of Europe, than any other of the diver tribe. The length is twenty-seven inches, the bill horn colour; legs brown. It builds no nest, but lays its eggs, which are two in number, in the grass on the borders of lakes contiguous to the sea-coast; these eggs are dusky, spotted with black.

ARCTICUS. Head hoary; neck beneath violaceous, black, with an interrupted white band. *Colymbus arcticus*, Linn. *Mergus gutturo nigro*, Briss. *Black-throated diver*, Lath.

Length two feet; inhabits the north of Europe, Asia, and America.

SEPTENTRIONALIS. Body above blackish, beneath white; neck beneath with a shield-like spot. *Colymbus septentrionalis*, Linn. *Mergus gutturo rubro*, Briss. *Le plongeon à gorge rouge*, Buff. *Red throated diver*, Lath. *Donov. Brit. Birds*, &c.

Inhabits Europe, Asia, and America, frequenting lakes, and oftentimes the open sea in quest of prey, which consists of fish, marine insects, and crabs. The body is brown above, with minute white spots, beneath white; bill black, head and chin cinereous, spotted with brown; neck above with small white and brown lines; the legs dusky. Length about thirty inches. These birds lay their eggs in June, the young are hatched and ready to fly before the end of August, and undertake their annual migrations with the parent birds in September. They breed chiefly in America.

BOREALIS. Body above blackish, with numerous white stellated spots; beneath white; neck on the fore-part rufous. *Colymbus borealis*, Brun.

This bird was shot near Copenhagen; it resembles in size and appearance *colymbus stellatus*, and is, perhaps, a variety of that bird. Brunnich considers it as a distinct species.

STRIATUS. Blackish, beneath white; head and neck grey, lined with black. *Colymbus striatus*, Gmel. *Striped diver*, Lath.

Inhabits North America, where it frequents lakes; it is represented as a noisy clamorous bird, and one continually in motion or on the wing, flying backwards and forwards. The bill of this species is dusky, or black, and strong; the cheeks white.

SINENSIS. Greenish-brown, with deeper spots; breast and belly reddish-white, spotted with rufous; wings and tail blackish. *Colymbus sinensis*, Gmel. *Chinese diver*, Lath.

This species inhabits China, and is supposed to be one of those kinds of aquatic birds which are trained up, and employed by the Chinese for catching fish. The bill is dusky; and the irides and legs cinereous.

*** *Feet four-toed, and lobed.* Grebe.

CRISTATUS. Fuscous, beneath white; head rufous; collar black; secondary quill-feathers white. *Colymbus cristatus*, Linn. *Colymbus cornutus*, Briss. *Le grebe cornu*, Buff. *Crested grebe*, Lath.

Length of this species twenty-three inches; bill flesh-colour, with the tip brown, beneath white; head tumid, varies in colour by age, and has been described in the first, second, and third years' plumage, as three distinct species.

Like the rest of the grebe tribe, these birds form a floating nest, composed of grass and flags, interwoven with the roots and stalks of other aquatic plants. The female lays four eggs, which are of a white colour, and sits in the nest half immersed in water till the eggs are hatched. It preys on eels and fish, which it procures with great facility, by diving into the water. The flesh is rank, but the skins, which are prepared with the beautiful silken and silvery white plumage on them are in high request for muffs and tippets. Many of the grebes are taken on the lakes of

Geneva for that purpose. In England, those birds frequent the meres of Shropshire and Cheshire, and the great fens of Lincolnshire, in all which places they are known to breed. The tippet grebe is said to be the young of this species.

CAYANUS. Blackish brown, beneath white; under side of the neck rufous. *Colymbus cayennensis*, Gmel. *Le grande grebe*, Buff. *Grebe de Cayenne*, Pl. Enl. *Cayenne grebe*, Lath.

A native of Cayenne. This bird is nineteen inches and a half in length; the bill and legs are dusky; and the lower mandible yellow at the base.

AURITUS. Blackish-fuscous, beneath white; neck beneath rufous. *Colymbus auritus*, Linn. *Le petit grebe*, Buff. *Dusky grebe*, Penn. *Donov. Brit. Birds*.

Inhabits sunny places in Europe and America. Length eleven inches. The bill is black, and red at the sides; irides and lores purple; upper edge of the wings white; legs flesh-colour, inclining to purple.

CORNUTUS. Head glossy-green, and tumid; neck beneath, and breast fulvous; through the eyes a yellow tufted band. *Colymbus cornutus*, Gmel. *Horned grebe*, Arct. Zool.

An inhabitant of Hudson's bay; length twelve inches. Dr. Latham describes the little horned grebe, *le petit grebe cornu* of Buffon as a variety of this species.

RUBRICOLLIS. Somewhat crested; chin, checks, and regions of the ears ash-coloured; neck beneath, and breast rusty red; belly and secondary quill feathers white. *Colymbus rubricollis*, Gmel. *Colymbus subcristatus*, Jacq. *Le grebe à joues grises jongris*, Buff. *Red necked grebe*, Lath. *Donov. Brit. Birds*.

The length of this bird is eighteen inches; the bill is dusky, and at the sides at the base tawny; the legs dusky. This is a British species; the male is very rare, the female scarcely known; both sexes are preferred in the London Museum.

CASPIUS. Head smooth; body above dark brown, beneath silvery; bill lead colour; chin and cheeks white; wing-coverts brown. S. G. Gmel. Inhabits near the Caspian sea.

THOMENSIS. Fuscous; beneath white, spotted with grey; quill-feathers pale rufous; breast with a black spot. *Colymbus thomensis*, Gmel. *Le grebe du laart*, Buff. *Black-breasted grebe*, Lath.

Less than the common hen; the bill is black, with the tip pale; irides and spot between the bill and eyes white; legs dusky. Inhabits St. Thomas's island in America.

MINOR. Fulvous brown; beneath, spot on the quill-feathers, and lower part of the rump; silvery white; neck beneath tawny grey. *Colymbus minor*, Gmel. *Podiceps minor*, Ray. *Little grebe*, Lath. *Donov. Brit. Birds*.

This bird inhabits Europe and America, is ten inches in length, and feeds on worms, small fish, and aquatic insects. Buffon describes a variety of it under the title of "Le Castagneux des Philippines;" it is larger than the former, the plumage above purple brown; and the cheeks and sides of the neck reddish. Found in the Philippine isles.

DOMINICUS. Head smooth; body beneath thickly spotted. *Colymbus dominicus*, Linn. *Le castagneux de St. Domingue*, Buff. *White winged grebe*, Lath.

Inhabits the Antilles and Surinam. Its length is eight inches; the bill is black; body dusky, beneath silvery grey; quill-feathers cinereous white; legs brown.

HEBRIDICUS. Head smooth; body blackish; chin black;

black; throat sub-ferruginous; belly cinereous, mixed with filvery. *Colymbus hybridicus*, Gmel. *Black-chin grebe*, Lath.

A small and rare species, found chiefly in Three, one of the islands of the Hebrides.

PODICERS. Body fuscous; bill olive, dusky at the base, with a transverse black band in the middle. *Colymbus podiceps*, Linn. *Le colagnens à bec circlé*, Buff. *Pied bill grebe*, Lath.

A native of North America; length fourteen inches; irides white; chin black, surrounded with white; body beneath silvery; breast waved with cinereous; secondary quill-feathers black at the tip. The female has no black mark on the bill.

LUDOVICIANUS. Fuscous; sides of the neck and body ferruginous; beneath white, with transverse blackish spots. *Colymbus ludovicianus*, Gmel. *Le grebe de la Louisiane*, Buff. *Louisiane grebe*.

Inhabits Louisiana. The head is smooth; legs dusky; middle of the belly silvery white.

COLYTON, or CULLTON, in Geography, is a small but ancient market town in Devonshire, England. It is called by Rifeon, a "borough of reputation;" the housekeepers of a small district, called the borough, annually chose a portreeve at the lord's court. At the Norman conquest, Colyton was the king's demefne; and king John granted the inhabitants a fair, to continue eight days. The houses are in general built with flints and mostly thatched. The parish church is a spacious stone fabric, with a tower rising above the chancel, the upper part of which is octagonal. On the fourth side of the chancel is an inclosed burial-place, belonging to the De la Pole family, containing various effigies, and other monumental decorations: and in a small aisle adjoining, is the figure of a girl, apparently about five years of age, under a canopy of flaxe; she is said to have been the grand-daughter of Edward IV., and to have been choked by a fish-bone; over her are the royal and Courtenay arms. Colyton arms is situated 153 miles S.W. from London: the number of houses is 289; of inhabitants 1641.

COLYTTUS, or COLYTUS, in Ancient Geography, the name of a quarter of the city of Athens, belonging to the Egeide tribe, and adjoining to that called Melitos.

COM, or KOM, in Geography, one of the oldest, and formerly of the largest towns of Persia in the province of Irak Aghem. It has suffered greatly by the civil wars with which the Persian empire has been so often distracted, but is still a very populous place; 60 miles S. of Calbin, and 150 N. of Ispahan. It is celebrated for its silk manufactures, chiefly velvet. N. lat. 34°. E. long. 50°.

COMA. See **COMO.**

COMA, in Medicine, a preternatural propensity to sleep, though the patient frequently does not sleep, or if he does, awakes without relief. If sleep ensues, the disease is called *coma somnolentum*; in this case the patient continues in a profound sleep, and when awaked, immediately relapses, without being able to keep open his eyes. If he does not sleep, but is continually awakened with frightful dreams, it is called *coma vigil*: in this case he appears to sleep, having his eyes constantly shut. Coma is produced by debility, by the want of food, exercise, &c. See **APoplexy**.

COMA, in Botany, from *κῆρυξ*, a head of hair, is applied to a leafy crown, whether of the proper leaves of the plant, or of bractes, rising above the frutification. In the pineapple and crown imperial it is of the former kind; in *Salvia herbimona*, or purple topped clary, of the latter, being moreover elegantly coloured with pink or purple. See **COMOSER**.

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COMA aurea, africana frutescens foliis angustissimis trifidis, Burm. See **ATHANASIA eritimbifolia**.

COMA africana frutescens, foliis inferioribus incisfis, Comm. See **ATHANASIA dentata**.

COMA africana fruticans erica folio, Comm. See **CHRYSOCOMA ciliaris**.

COMA africana fruticans, foliis eritimbini marini, Comm. See **ATHANASIA eritimbifolia**.

COMA africana fruticans foliis glaucis & in extremitatibus trifidis, Comm. See **ATHANASIA trifurcata**.

COMA africana fruticans foliis linearis, major, Comm. See **CHRYSOCOMA cernua**.

COMA africana frutescens omnium maxima, Comm. See **ATHANASIA pubescens**.

COMA foliis multifidis glaucis, Burm. See **ATHANASIA parvisifolia**.

COMA Berenices, Berenice's Hair, in Astronomy, a modern constellation of the northern hemisphere; composed of unformed stars between the Lion's tail and Boetes.

This constellation is said to have been formed by CONON, an astronomer, in order to console the queen of Ptolemy Evergetes, for the loss of a lock of her hair, which was stolen out of the temple of Venus, where she had dedicated it on account of a victory obtained by her husband. Ricciol. Alm. lib. vi. cap. 4.

The stars in the constellation Coma Berenices, in Tycho's Catalogue, are 14; in Hevelius's, 21; and in the Britannic Catalogue, 42.

COMACENUS LACUS, in Ancient Geography, the lake of *Como*, which see.

COMACHIO, in Geography, a small town of Italy, the see of a bishop, in the Ferrarese, surrounded by salt marshes, which render the air insalubrious, and inhabited chiefly by fishermen; 33 miles S. E. of Ferrara. N. lat. 44° 32'. E. long. 12° 6'.

COMACLUM, in Ancient Geography, a town of Venetia.

COMAGENA. See **COMMAGENE**.

COMAGENE, a place of NORICA, distant, according to Antonine's Itinerary, 24 miles from mount Cetus.

COMANA, a town of Pontus, seated on the river Iris, towards the mountain of Paryadræ, on the south. It was famous for a temple of Bellona. The town and territory depended on a pontiff, who, on solemn days, wore a diadem, and possessed a kind of sovereignty. Venus also was worshipped in this city; her feast was celebrated with great magnificence, and she had many courtizans.

COMANA, a town of Asia, in the greater Cappadocia, seated on the river Sarus, in Cataonia. It was also called *Chryse*, and bore the appellation of Cappadocian.

COMANA, or BOCANA, a town of the island of Taprobana, according to Ptolemy.

COMANA, or Commacus, a town of Asia, in Pisidia.—Also, another town in Phrygia. Ptolemy.

COMANA, in Geography, a town of South America, in the northern division of Terra Firma. It lies on the north-eastermost part of the sea-coast.

COMANCHES, or HIETANS, a tribe of Indians in Louisiana in America, who have no fixed place of residence, and who have neither towns nor villages. They are divided into so many hordes, that they have scarcely any knowledge of one another. They never continue in the same place for more than a few days, but follow the buffalo, the flesh of which is their principal food. Some of them purchase of the Panis or Towaches, another tribe, corn, beans, and pumpkins; but their number is so great, that these articles furnish a small quantity of their food. Their tents are made

of skins neatly dressed, and fashioned in the form of a con-
affording room for a family of 10 or 12 persons; those of
the chiefs are capable of accommodating 50 or 60 persons.
When they pitch their tents, they form regular streets and
squares, exhibiting a sort of town suddenly raised, as it were
by enchantment, and at a signal for march, they are as sud-
denly struck: to every tent are allotted two horses or mules,
one for carrying the tent, and another for removing the
poles or sticks, which are neatly made of red cedar; they all
travel on horseback. Their horses are tied for grazing with
a long halter, and they are so numerous as to require fre-
quent change of place. Their horses are so managed, as to
be remarkably docile and gentle. It is their practice to
hunt the buffalo on horseback; and they kill this
animal with the bow, or a sharp stick like a spear,
which they carry in their hands. They are generally at war
with the Spaniards, committing frequent depredation upon
the inhabitants of Santa Fé and St. Antoine; but they have
been always friendly and civil to any French or Americans
who have been amongst them. With regard to their per-
sons, they are strong and athletic, and, in advanced life, cor-
pulent. As savages, they are uncommonly clean: the dresses
of their women is a long loose robe, reaching from the chin
to the ground, tied round with a fancy sash or girdle, all
neatly made of dressed leather, on which they paint figures
of different colours and significations; the dresses of the men
consist of close leather pantaloons, and a hunting shirt, or
froek of the same. Their continuance in the same place does
not admit of their making any plantation; but the small
Cayenne pepper grows spontaneously in the country, and
with this, together with some wild herbs and fruits, particu-
larly a bean that grows plentifully on a small tree, resembling
a willow, called Masketo, the women cook their buffalo beef
in a manner that renders it grateful food. They alternately
occupy the immense space of country from the Trinity and
Braces, crossing the Red river, to the heads of Arkansas and
Missouri, to river Grand, and beyond it, about Santa Fé,
and over the dividing ridge on the waters of the Western
Ocean, where, as they say, they have seen vessels, which
they describe as ships, with sails and rigging. Their native
language differs from that of any other nation; but they
have a mode of making themselves understood to all the In-
dians by signs. Among them are many Spanish men and
women, who are slaves, and who were made prisoners by
them in their youth.

COMANI, in *Ancient Geography*, a people of Asia, prob-
ably of Scythia, who inhabited the country Comania, men-
tioned by Ptolemy. They were probably the same with the
Comi of Ptolemy, and the Comari and Coamani, placed by
Pomponius Mela in the vicinity of the Paropamisians.

COMANIA, a country of Asia, according to Xenophon.
See COMANI.

COMANIA, also called *Daghestan*, a country in the north-
ern part of Turkey in Asia, south from Little Tartary, and
north from Georgia bounded on the east by the Caspian sea,
W. by the Caucasus, N. by Circassia, and S. by Skirvan.
Its inhabitants are known by the name of Comoucks. See
DAGHESTAN.

COMANNA, an inland country of Africa, on the
Slave coast, bounded on the east by Infoko, on the south
by Lobadde and Ningo, two provinces of Aquimboe; its
northern limit is unknown. Little is known of the country,
except that its natives bring great quantities of gold to the
markets of Akkaradi, a kingdom touching it on the west,
who afterwards carry it to Aboni, and thence to the negroes
of the sea-coast. Beyond Comanna, in regular succession
from E. to W. but with unascertained boundaries to S. and

N., are the kingdoms of Iatabi, Equca, Bonu, situated
far north; Tasiu, Quaka, Aboni, Sarkuz, Aqua, and
Achem, all supposed to be rich in gold; but more espe-
cially Quak.

COMARCHIOS, in *Antiquity*, the name of a particu-
lar air, or tune, designed to be sung at entertainments.

COMARGO, in *Geography*, a town of North Amer-
ica, in New Leon, situate on the south side of Rio
Bravo, which empties itself into the gulf of Mexico on the
west side.

COMARIA PROMONTORIUM, in *Ancient Geography*, a
maritime place of India, at the extremity of the peninsula,
on this side of the Ganges. Ptol. See CAPE COMORIN.

COMARIS, in *Lithology*, a name given by the Greek
writers to the *selenites*, or *apophelene*.

COMAROIDES, in *Botany*, *alpina argentum*; See
See POTENTILLA nitida.

COMARTCH, in *Geography*, a river of South Wales,
in the county of Brecknock, which runs into the Yrwon,
eight miles W. of Buith.

COMARUM, in *Botany*, (*Κομαρρις*, a name given by
Theophrastus to an evergreen tree, supposed to be an arbutus.)
Linn. Gen. 638. Schreb. 869. Willd. 1004. Gart.
451. Vent. 3. 347. (Pentaphylloides; Tourn.) Clafs and
order, *jocandrius polygynia*. Nat. Ord. *Senticofa*, Linn.
Rofacea, Juss. Vent.

Gen. Ch. Cal. Perianth one-leaved, ten cleft, very
large, spreading, coloured, permanent; alternate segments
smaller, inferior. Cor. Petals five, oblong, acuminate, in-
serted on the calyx, much smaller. Stam. Filaments about
twenty, awl-shaped, inserted into the calyx, length of the
corolla, permanent; anthers crescent-shaped, deciduous.
Pist. Germs numerous, roundish, very small, collected into a
head; styles simple, short, from the inside of the germ;
stigmas simple. Peric. none. Seeds naked, even-surfaced;
attached to a large, egg-shaped, spongy, villous, persisting
receptacle.

Eff. Ch. Calyx ten-cleft, inferior. Petals five, less than
the calyx. Receptacle egg shaped, spongy, villous, per-
sisting. Seeds even-surfaced.

Sp. C. *palustre*. Marth cinquefoil. Linn. Sp. Pl. Mart.
Willd. Flor. Dan. tab. 636. Lam. Ill. tab. 444. Eng.
Bot. tab. 172. (Quinquiflorum rubrum; Bauh. Pin. 3. 6.
Pentaphyllum palustre; Cord. Hist. 96. 1. Fragaria,
Hall. Helv. n. 1128. Potentilla; Scop. Carn. n. 617.)
Root creeping. Stems decumbent at the base, cylindrical,
leafy, smooth. Leaves on long petioles, quinate-pinnate;
leaflets on short petioles, oblong, serrated, hoary under-
neath; stipules embracing the stem. Flowers dark purple,
somewhat panicle; peduncles one-flowered, bracts two,
lanceolate; stamens, anthers, style, and receptacle, nearly
black. A native of England, and most other parts of Eu-
rope in boggy ground, and by the sides of ponds. There
is a variety with thicker and more villous leaves, but Miller
assures us that after one year's growth in a garden it is not
to be distinguished from the common fort.

COMARUS PORTUS, in *Ancient Geography*, a name
given by Dion Cassius to a port of Epirus, which he places
in the gulf of Ambracia. Strabo calls it Comarus Sinus,
and maketh it a small gulf of Epirus.

COMAYUAGUA, or VALLADOLID, in *Geography*, a
large town of the province of Honduras, in Old Mexico,
or New Spain, in North America, on a river which falls
into the gulf of Honduras. It is the see of a bishop, and
has rich silver mines in its neighbourhood; 90 miles S.E. of
Truxillo. E. long. 88° 4'. N. lat. 14° 30'.

COMB,

COMB, an instrument made of horn, ivory, tortoise-shell, box, or holly-wood, &c. and useful for separating and adjusting the hair, &c.

Comb making. Combs are not only made for the purpose of cleaning the hair, but for ornament: they are sometimes set with brilliant stones, pearls, and even diamonds; some again are studded with cut steel; these are of different shapes, and are used to fasten up the hair when ladies dress without caps. Combs may of course be had of all prices, from the value of a few pence to almost any sum. They are generally made of the horns of bullocks or of elephants, and sea-horke's teeth, and some are made of tortoise-shell and ivory, others of box or holly-wood. The horns of bullocks are thus prepared for this manufactory: the tips are first sawn off; they are then held in the flame of a wood fire, this is called roasting, by which they become nearly as soft as leather. While in that state they are fit open on one side, and pressed in a machine between two iron plates; they are then plunged into a trough of water, from which they come out hard and flat; they are then sawn into lengths, according to the size wanted. To cut the teeth, each piece is fixed into a tool called a claw. The maker sits on a triangular sort of a stool to his work, and under him is placed the claw that holds the horn, ivory, &c. that is to be formed into a comb. The teeth are cut with a fine saw, or rather a pair of saws, and they are finished with a file. A coarser file, called a rasp, is used to reduce the horn, &c. to a proper thickness; and when they are completely made they are polished with charcoal and water, and receive their last finish with powder of rotten stone. The process used for making ivory combs is nearly the same as that already described, except that the ivory is first sawed into thin slices. The best ivory comes from the island of Ceylon and Achen in the East Indies, as it possesses the property of never turning yellow; it is consequently much dearer than any other kind.

Tortoise-shell combs are much esteemed; and there are methods of staining horn, so as to imitate it, of which the following is one: the horn to be dyed is first to be pressed into a flat form, and then done over with a paste, made of two parts of quick-lime and one of litharge, brought into a proper consistence with soap-lye. This paste must be put over all the parts of the horn, except such as are proper to be left transparent, to give it a nearer resemblance to tortoise-shell. The horn must remain in this state till the paste be quite dry, when it is to be brushed off. It requires taste and judgment to dispose the paste, as to form a variety of transparent parts, of different magnitudes and figures, to look like nature. Some parts should also be semi-transparent, which may be effected by mixing whitening with a part of the paste. By this means spots of a reddish brown will be produced, so as greatly to increase the beauty of the work. Horn thus dyed is manufactured into combs, and these are frequently sold for real tortoise-shell. The wages of journeymen in this business are from 21s. to 31s. per week.

In *Plate XV. of Mechanics* is represented a machine for cutting combs, for which Mr. Wilham Bundy, of Pratt Place Camden Town, took out a patent in the year 1756, and the same is described in the *Repository of Arts*. The frame A A. *fig. 3* of the machine, is like a common lathe, containing a spindle, with a crank and fly-wheel, D, upon it, turned by the alternate motion of the treadle, B, which is moved by the workman's foot; E is a wheel fixed on the crank spindle, carrying a line in its groove, crossing between the cheeks of the lathe, and passing over the pulley, F, which turns on a centre fixed in the puppet, G; it has two holes in it to receive the horned catch, *h*, *fig. 2*, screwed on the end of an arbor, *b*, about seven inches in length, and half an

inch in diameter; this arbor is mounted between two circular brass plates, H, I, *fig. 1*, connected by three pillars, it carries as many circular steel cutters, or saws, K, *fig. 4*, as the comb to be cut is to have teeth. M, *fig. 5*, represents another arbor, which is fixed in the frame-plates, *fig. 1*, by its ends; it is triangular, and has a piece of steel, L, *fig. 4* (called a guide), fitted on it between each saw, on the arbor, *b*. These parts are put together by first putting the end of the arbor, *b*, *fig. 2*, through the hole in the centre of the frame-plate, I, and screwing on the catch, *a*; the end of the arbor *fig. 5*, is put into a square hole made in the plate, I, to receive it, and is fixed by a screw: a guide, L, *fig. 4*, is then put on the arbor, M, close against the shoulder, *d*; next a cutter, K, is put on the arbor, *b*, touching its shoulder, *e*; a piece of steel plate, N, called a guide-washer, is then put on the arbor, M, and another guide, L, close to it; the guide-washer is a little thicker than the cutter opposite it, so that the cutters each turn between two guides without touching them. These being in their places, a small washer, O, *fig. 4*, is put on the arbor, *b*, and a cutter, then a guide-washer and guide, on the arbor, M, and so on alternately, till the right number of cutters are put on; the sliding shoulder, *f*, *fig. 2*, is then taken, and with the octagonal nut, *g*, screwed fast up against the last cutter, put on the arbor, *b*, this will pinch all the cutters and washers between the shoulders, *e* and *f*, and hold them fast. The same is done to the arbor of the guides, *l*, and, lastly, the frame-plate, H, is put on the ends of the pillars, and screwed fast; the whole forming the resemblance shewn in *fig. 1*. The frame plates with the arbors, as in *fig. 1*, are now to be put in their place in the machine, *fig. 3*, the horns of the catch, *a*, going into two holes in the pulley, F, and the other end of the arbor, *b*, into a centre that goes up with a screw in the puppet, Q; the screws, *h*, *h*, are designed to steady the frame-plate (which hold the arbor of the guides) against the dove-tail, P P, supported by brackets projecting from the front of the cheeks, sufficiently to let the block, *i*, which slides in the dove-tail, and holds the comb, be drawn forwards to give room for the hand to put in or take out the combs clear of the cutter. To the base of the dove-tail is screwed a plate, holding one of the centres for a worm-wheel, *k*, whose axis is made of steel, and has its end cut with a deep thread-screw; the screw-end of this axis works in a centre, fixed to the base of the dove-tail, and the block, *i*, is cut away to pass clear over it and the threads of the screws, without touching them. The worm-wheel, *k*, is turned by an endless screw, on the arbor of the wheel, *r*, which receives its motion from the pulley, *z*, by an endless line. The block, *i*, which holds the comb, moves in the dove-tail, and is to carry the comb towards the cutters while cutting. As the screw on the axis of the wheel, K, is to carry the block up in lieu of a nut; a knife-edge, fastened to a small lever, *l*, moveable on a centre in the face of the block, is applied to it, and kept down (so that the knife-edge may take into the threads of the screw) by a catch similar to the latch of a door, which is released by pushing in a thumb-stud, and allows the spring, *o*, to throw up the lever, *l*, and disengage the screw, so that the block may be brought forwards in the dove-tail. The piece of ivory intended to be cut into a comb, is put under a plate, *p*, and held down by two screws to the face of the block, which is in the same plane with the arbor of the cutters; the workman then puts down the knife-edge, and the catch keeps it so; he then turns the machine by his foot, and pushes the block towards the cutters (the comb being close on the guides) till the knife-edge take the first thread of the screw, which turns round as before described, and pushes the block and comb up to the cutters, as far as

the screw extends, and the cutters saw the teeth in the comb; the thumb-end is then pushed in, and the spring, *s*, throws the knife-edge up, so that the block can be brought back by hand, and the comb taken out. The distance which the comb projects from the face of the block towards the cutters, and consequently the length of the teeth, is regulated by a straight edge of metal on the top of the block, *i*, under the plate, *p*, against which the back of the comb rests; it can be moved parallel to itself across the top of the block by two screws, (which are seen at the upper corners of the face of the blocks), for combs of longer or shorter teeth. The spindle of the crank has a wheel, *R*, on it, turning an arbor, *S*, by a line, which carries a set of cutters for pointing the comb. The arbor is shewn separately in *fig. 6*, and a cutter in *fig. 7*; it is made up in the same manner as the former one, and fastened by a screw, *T*; the ends of the teeth of the comb are applied to this cutter by hand, first on one side, and then on the other, till the points are made. This is performed to one comb, while the teeth are cutting in another.

COMB, or *Coomb*, in *Husbandry*, a measure of corn, consisting of 2 long strikes = 4 Winchester bushels = 16 pecks = 32 dry gallons = 128 dry quarts = 256 dry pints = 8601.6 cubic inches = 4.57 cubic feet = 1.843621 cubic yards = 17.32142 cubic links: in some places the bush l contains eight gallons and a quart.

COMB, *Coomb*, or *Carnook*, of wheat, according to the 6th and 5th Henry III. 12th Henry VII., &c., was 256lb. troy = 210.6614lb. avoirdupoise = 2 strikes = 16 pecks = 32 gallons = 256 pints or pounds.

COMB, in *Ornithology*, the crest, or red fleshy tuft growing on the head of a cock.

COMB, in a *ship*, a little piece of timber, set under the lower part of the beak-head near the middle: it has two holes in it, and supplies to the fore-tacks, what the chest-trees do to the main-tacks; that is to bring the main-tacks aboard.

COMB, in the *Manufacture of Tapestry*. See **TAPESTRY**.

COMB-MARTIN, in *Geography*, a town of England, on the north coast of Devonshire, in the Brillol channel, with a small creek for boats; near it are silver-mines, which formerly yielded a considerable quantity of ore; 59 miles W. of Bridgewater, and 176 W. of London.

COMBA, in *Ancient Geography*, a town of Asia Minor, in the interior of Lycia, and in the vicinity of mount Cragus. Ptolemy.—Also, a marsh of Greece, in Macedonia, near mount Athos, mentioned by Athenæus.

COMBAHEE, in *Geography*, a considerable river of South Carolina, which enters St. Helena Sound, between Coosa and Ahepoo rivers. The ferry of the same name on this river is distant 17 miles from Jackson's borough; 15 from Pocotaligo, and 52 from Charleston.

COMBAM, or **COMBAMA**, a town of Hindoostan, in the country of Cuddapah; 65 miles N. of Cuddapah. Combam is reckoned 25 colles from Inaconda, and 32 from Onzole, or about 51 geographical miles from the latter. Tavernier calls it Kaman.

COMBAMET, a town of Hindoostan, in the country of Golconda; 68 miles E. of Hydrabad.

COMBANA, or **NOMMANA**, in *Ancient Geography*, a town of Asia, in Carmania, situated near the sea.

CAMBARONES, in *Antiquity*, the fellow-barons or commonly of the Cique-Pais.

COMBAT, in a general sense, denotes an engagement; or a difference decided by means of arms.

Authors sometimes distinguish in an army, between a combat and a battle; the latter expressing the general ac-

tion of the whole army; the former only a particular skirmish, or engagement of a single part; so that the combat is properly a part of a battle.

COMBAT, in *Law*, or *single combat*, denotes a formal trial, between two champions, of some doubtful cause or quarrel, by the sword or batons.

This form of proceeding was anciently very frequent, particularly among the barbarous nations in their original settlements; and obtained, not only in criminal, but also in civil causes; being built on a presumption, that God would never grant the victory but to him who had the best right. It was originally permitted, in order to determine points respecting the reputation of individuals, but afterwards became much more extensive. See **DUEL**. The form and ceremony of the combat are described in the grand Coutumier of Normandy. The accuser, first, swore to the truth of his accusation; the accused gave him the lie: upon which, each threw down a gage, or pledge of battle; and the parties were committed prisoners to the day of combat. See **CHAMPION**.

Historians tell us, that Alphonfus, king of Castile, in the eleventh century, desiring to abolish the Mosarabic liturgy, and to introduce the Roman office; the people opposing it, it was agreed to terminate the difference by combat, and leave the cause to the decision of Heaven. One of the earliest restrictions of this practice that occurs in the history of Europe, is that of Henry I. of England; which was afterwards followed by an edict of Louis VII. of France to the same effect. Robertson's Hist. of Charles V. vol. i. p. 61, &c. and 350, &c. 8vo.

COMBAT is also used for the solemn games of the ancient Greeks and Romans, performed in honour of their gods; as the Olympic games, Pythian, Isthmian, and Nemean games; the Iudi Aetiaci, Circenses, &c. which see in their places, **OLYMPIC**, **ISTHMIAN**, &c.

The combats here celebrated, were *running, wrestling, boxing, equestrian*, &c. The combatants, who were called *athletes*, prepared themselves for it from their youth, by constant exercise, and a very rigid regimen: they only eat certain things, and at certain hours; drank no wine; had no commerce with women; and both their labour and their rest were regulated.

COMBATANT, in *Heraldry*, termed by the French *heralds confronté*, when two animals are borne in coat armour in a fighting posture, erect on their hind feet, and facing each other.

COMBATANT, in *Ornithology*, the name given by French writers to the Linnæan *tringa pugnax*, the bird known in this country by the name of *Ruffs* and *Reeves*, the male being called the Ruff, the female Reeve. See **TRINGA PUGNAX**.

COMBEAUFONTAINE, a small town of France, in the department of Upper Saone, chief place of a canton, in the district of Vesoul. It contains 583 and the canton 7596 inhabitants. The territory includes 190 kilometres and 17 communes.

COMBESIS, FRANCIS, in *Biography*, a learned French monk, was born at Guienne, in the year 1605. He pursued his studies first under the Jesuits at Bourdeaux and afterwards at Paris. He devoted himself principally to the pursuit of Greek literature, and was employed in editing new editions of the Greek fathers, for which he received a very handsome remuneration. He likewise published a collection of the lives of different fathers, popes, and martyrs; some additions to the "Bibliotheca Græcorum Patrum," in Greek and Latin, in three volumes folio; "Hætoræ Byzantius Scriptores, post Theophaum," undertaken by command

command of the celebrated Colbert. He died in 1679 of the stone, a disease to which studious and sedentary men are peculiarly liable. *Nouv. Dict. Hist.*

COMBANY, in *Geography*, a river of South Wales, in Carmarthenshire, which discharges itself into the Loughor, 5 miles N.E. of L'analhy.

COMBER, THOMAS, in *Biography*, was born at Westerham in Kent, in the year 1645, where he received the rudiments of a learned education; from thence he was admitted in Sydney college Cambridge. He was remarkable for diligence in his studies, and took his degrees of bachelor of arts in 1662, and of master of arts in 1666. Some years afterwards he was created doctor of divinity, probably by a diploma from Lambeth. After this he attained to considerable rank in the church, and was preferred to the precentorship of York, the deanery of Durham, to be chaplain to their majesties, and other posts of emolument and honour. Dr. Comber maintained a correspondence with Tillotson, Burnet, and other most eminent divines of the age in which he flourished. The excellence of his character, and his zeal for the church of which he was a member, were the causes that led him to that distinction to which he attained, and which was a true earnest and pledge of still greater preferment if he had lived, but he died in November 1699, in the 55th year of his age, and was buried at Stonegrave in Yorkshire, of which he was rector. He was author of many learned works relating principally to the Common Prayer, and to the offices of the Church of England.

There was also another Dr. Thomas Comber, born in Suffex, Jan. 1575, who was educated in Trinity college Cambridge, and afterwards made dean of Carlisle. In 1642 he was imprisoned, plundered, and deprived of all his preferments, and died at Cambridge in 1653. He is known as the author of "An Historical Vindication of the Divine Right of Tythes," &c. written in answer to "Selden's History of Tythes." *Biog. Brit.*

COMBER, in *Ichthyology*, a species of wrasse or old-wife fish, found sometimes on the coast of Cornwall, and which is described under this name in Ray's Synopsis, No. 163. See **LABRUS Comber**.

COMBER-MERE, in *Geography*, a lake of England in the county of Chester, on the borders of Shropshire; five miles S. of Nantwich.

COMBINATION, is properly understood of an assemblage of several things by two and two; but is more particularly used in *Mathematics*, to denote the variation, or alternation of any number of quantities, letters, sounds, or the like, in all the different manners possible.

P. Merenne gives us the combination of all the notes and sounds in music, as far as sixty-four; the sum whereof amounts to ninety figures, or places.

The number of possible combinations of the twenty-four letters of the alphabet, taken first two by two, then three by three, &c. according to Mr. Pretet's calculation, amounts to 139172428887252999425128493402200.

The words in the following verse may be combined a thousand and twenty-two several ways.

Tot tili sunt dotes, virgo, quot sidera celo.

F. Truchet, in the Memoirs of the French Academy, shews, that two square pieces, each divided diagonally into two colours, may be arranged and combined sixty-four different ways, so as to form so many different kinds of chequer work, which appears surprising enough, when one considers that two letters, or figures, can only be combined twice. This note may be of use to masons, paviours, &c. See **PAYEMENT**, and **CHANGES**.

COMBINATION, doctrine of.—Any number of quantities being given, together with the number in each combination; to find the number of combinations.

One quantity, we observe, admits of no combination; two, *a* and *b*, of one, viz. *ab*; of three, *a, b, c*, there are three combinations, viz. *ab, ac, bc*; of four, six, *ab, ac, bc, ad, bd, cd*; of five, ten, *ab, ac, bc, ad, bd, cd, ac, bc, ce, ce, de*.

Whence it appears, that the number of combinations proceed as, 1, 3, 6, 10, &c. which are triangular numbers, whose side differs by unity from the number of given quantities, or which are produced by the continual addition of the ordinal series, 0, 1, 2, 3, 4, 5, &c. Hence if the number of things to be combined be *q*, the side of the number of combinations will be *q-1*; and therefore the number of combinations $\frac{q-1 \times q-0}{1 \times 2}$. See **TRIANGULAR number**.

If three quantities are to be combined, and the number in each combination be three, there will be only one combination, *abc*, if a fourth be added, the combinations will be found *abc, abd, bcd, acd*; if a fifth, ten, *abc, abd, bcd, acd, ade, bde, bec, ace, ade, cde*; if a sixth, twenty, &c. The numbers of combinations, therefore, proceed, as 1, 4, 10, 20; i. e. they are the first pyramidal triangular numbers, whose sides differ by two units fr the number of given quantities. See **PYRAMIDAL number**.

Hence, if the number of given quantities be *q*, the side will be *q-2*; and therefore, the number of combinations $\frac{q-2 \times q-1 \times q-0}{1 \times 2 \times 3}$.

Hence is easily deduced a general rule for determining the number of combinations in any case; for, suppose the number of quantities to be combined, *q*, the exponent of the combination *n*, the number of combinations will be $\frac{q-n+1 \times q-n+2 \times q-n+3 \times q-n+4 \times q-n+5}{1 \times 2 \times 3 \times 4 \times 5}$ &c. till the number to be added be equal to *n*.

Suppose, v. gr. the number of quantities to be combined = 6; the exponent of the combination 4; the number of combinations will be $\frac{6-4+1 \times 6-4+2 \times 6-4+3 \times 6-4+4}{1 \times 2 \times 3 \times 4} = \frac{6-4+4}{1} \times \frac{6-2}{2} \times \frac{6-1}{2} \times \frac{6-0}{4} = \frac{2}{1} \times \frac{2}{2} \times \frac{5}{2} \times \frac{6}{4} = 15$.

Coroll. If it be desired to have all the possible combinations of the given quantities beginning with the combinations of the several twos, proceeding to threes, &c. there must be added $\frac{q-1 \times q-0}{1 \times 2}, \frac{q-2 \times q-1 \times q-0}{1 \times 2 \times 3}, \frac{q-3 \times q-2 \times q-1 \times q-0}{1 \times 2 \times 3 \times 4},$ &c.

Whence the number of combinations possible will be $\frac{q \times q-1}{1 \times 2} + \frac{q \times q-1 \times q-2}{1 \times 2 \times 3} + \frac{q \times q-1 \times q-2 \times q-3}{1 \times 2 \times 3 \times 4} + \frac{q \times q-1 \times q-2 \times q-3 \times q-4}{1 \times 2 \times 3 \times 4 \times 5},$ &c. which is the sum of the unciæ of the binomial, raised to the power *q*, and abridged of the exponent of the power increased by unity, *q+1*. Wherefore, if 1 + 1 = 2 represent the binomial to which these unciæ belong, 2^q - *q* - 1 is the number of all the possible combinations. V. gr. If the number of quantities be 5, the number of possible combinations will be 2⁵ - 6 = 32 - 6 = 26.

2. Any number of quantities being given, to find the number of changes and alterations, which these quantities, combined in all the manners possible, can undergo.

Suppose two quantities, a and b , their variations will be 2; consequently, as each of those may be combined, even with itself, to these there must be added two variations. The whole number, therefore, will be $2 + 2 = 4$. If there were three quantities, and the exponent of the variations were 2, the combination will be 3, and the changes 3; to which if the three combinations of each quantity with itself aa, bb, cc , be added, we shall have the number of changes, $3 + 3 + 3 = 9$.

In like manner it is evident, if the given quantities were 4, and the exponent 2, the number of changes would be 10; if 5, 25, &c. in general, if n, n^n .

Suppose the quantities 3, and the exponent of variation 3; the number of changes is found $27 = 3^3$; viz. $aaa, aab, aba, baa, abb, aac, aca, caa, abc, bac, bca, acb, cab, cba, acc, cac, cca, bba, bab, bbb, bbc, cbb, bcb, cbc, ccb, ccc$.

After the same manner, it will appear, if the quantities were 4, and the exponent 3; the number of changes would be $64 = 4^3$; and, in general, if the number of quantities be n , and the exponent 3, the number of changes will be n^3 . By thus proceeding, it will be found that if the number of quantities be n , and the exponent n , the number of changes will be n^n ; wherefore, if all the antecedents be added, where the exponent is less, the number of possible changes will be found $n^n + n^{n-1} + n^{n-2} + n^{n-3} + n^{n-4} + n^{n-5} + n^{n-6}$, &c. Till at length, the number subtracted from n leaves 1; because the beginning is from single quantities taken once.

Since then the number of possible changes is in a geometrical progression, whose first or smallest term is n^1 , the greatest n^n , and the ratio n ; it will be $= \frac{n^{n+1} - n}{n - 1}$.

Suppose, v. gr. $n = 4$, the number of possible changes $\frac{4^{4+1} - 4}{4 - 1} = \frac{1020}{3} = 340$. Suppose, again, $n = 24$, the

number of possible changes will be $\frac{24^{25} - 24}{24 - 1} = \frac{24^{25} - 24}{23} = 3200975864440681898677795534827600$. In so many various manners, therefore, may the twenty-four letters of the alphabet be varied and combined among themselves.

COMBINATION, in *Chemistry*, denotes the union of two bodies of different natures, from which a new compound body results. An acid united with an alkali furnishes an instance of combination. See AFFINITY.

COMBINATIONS, in *Law* Combinations to do unlawful acts, are punishable before the unlawful acts are executed; this is to prevent the consequences of combination and conspiracies, &c. 9 Rep. 57.

COMBINATION, in *Military Science*. One ought to regard combination as forming a part of military science. A general, who has an enterprise in contemplation, should, before he risks the execution of it, combine well in his mind all the ideas, that can lead to its success; and he ought not always to rely on his own solution of the case. But when his ideas on the subject are pretty well fixed, he should lay them before the general officers, who are under his orders or command, for their opinion and concurrence.

COMBINATORY *distillation*. See DISTILLATION.

COMBINATORY *music*, *Musica combinatoria*, that part of music which teaches the manner of combining sounds va-

riously; that is, of changing their place and figure in different manners. See MUSIC.

COMBING of *wool*, in *Commerce*, the drawing of wool across the teeth of a kind of card, calculated to dispose it for spinning. See CARDING and SCRIBBLING.

COMBLEAN. *Cologne*, which serves for changing and discharging the pieces of artillery, for mounting them on their carriages, and for raising other great weights by means of a crane.

COMPLEMENT des *Fossés*, the filling of the ditches. When the besiegers have advanced so far as to be masters of the covert-way, they exert themselves by every possible means to fill up the ditches by cutting off the galleries to put their workmen under cover, in order to be able to conduct the miner with security to his operations, and to retrench themselves there at the same time, to secure themselves against the sallies and assaults of the besieged.

COMBLES, in *Geography*, a town of France, in the department of the Somme, chief place of a canton, in the district of Péronne. It contains 1579, and the canton 12196 inhabitants. The territorial extent is of 155 kilometres, and it includes 23 communes.

COMBOURG, a small town of France, in the department of Ille and Vilaine, chief place of a canton, in the district of St. Malo, 18 miles S. of St. Malo. The place contains 4170, and the canton 12,151 inhabitants; the territory includes 217½ kilometres and 10 communes.

COMBRAILLE, formerly a subdivision of the bishopric of Limoges, in France, now a department of Creute. It was a barony belonging to the ducal house of Orleans.

COMBREA, in *Ancient Geography*, a town of Greece, situated to the north of Pallene, on the Theraic gulf. Herodotus calls the country in which it lay *Croffia*, between Lipaxos and Lisie.

COMBRETE in *Geography*, a town of France, in the department of the Mayne and Loire, and chief place of a canton in the district of Saillé; 7 miles W. of Saillé.

COMBRET, a town of France, in the department of the Aveyron: 8 leagues E. of Alby.

COMBRETUM, in *Botany*, (the name of a plant in Plin.) Linn. Gen. 475. Schreb. 641. Gert. 212. Juss. 320. (Chigomier, Lam. Encyc.) Class and order, *ombrovia monocotyled.* Nat. Ord. *Calycanthem.* Linn. *Onagra*, Juss.

Gen. Ch. Cal. Perianth superior, one-leaved, bell-shaped, four or five-toothed, caducous. Cor. Petals four or five, egg shaped, about the length of the calyx, and placed between its teeth. Stam. Filaments eight or ten, generally very long, inserted into the calyx; anthers egg-shaped or oblong. Pist. Germ inferior, linear; style bristle-shaped, about the length of the stamens; stigma acute. Peric. none. Seed single, with four or five thin membranous wings. (Capsule with four or five wings. Seed linear, small, with four or five angles, Lam.)

Eff. Ch. Calyx four or five-toothed, bell-shaped, superior, corolla four or five-petaled, inserted into the calyx. Stamens generally very long. Seed single, with four or five membranous angles.

Sp. 1. *C. laxum*. Linn. Sp. Pl. 1. Mart. 7. Lam. 7. Willd. 1. Jacq. Amer. 104. Gert. tab. 136? Aubl. Guian. 1. 350. tab. 137? Lam. II. nst. tab. 282, fig. 1? L'eph. It. 308. Swartz. Obs. 143. (Guara fruticosa, Less. It. 248?) "Flowers octandrous; spikes lax, quite simple." Lam. "Leaves opposite; racemes lax, without bracts; calyx villous within." Willd. A shrub. Branches cylindrical, climbing, younger ones bracteate. Leaves three inches long or more, petioled, acuminate, sometimes obtuse, entire,

entire, smooth. *Flowers* yellowish or whitish; in simple, axillary, and terminal spikes, or rather racemes; filaments more than an inch long. A native of Guiana and the West Indies. 2. *C. secundum*. Linn. Sp. Pl. 2. Mart. 2. Lam 2. Willd. 2. Jacq. Amer. 103. tab. 176. fig. 30. Swartz. Obs. 144. "Flowers octandrous; spikes compound, panicle-pinnate." Lam. "Leaves opposite; racemes unilateral, without bractes; calyces smooth." Willd. A shrub, or small tree, ten or twelve feet high. *Branches* cylindrical, very long, supporting themselves by the neighbouring trees and shrubs. *Leaves* three or four inches long, on short petioles, ovate-oblong, acuminate, entire, smooth, veined underneath. *Flowers* very numerous, whitish or yellowish, in several spikes or racemes, which form a kind of panicle at the summit of the branches; anthers red. The flowers, and not the racemes, are often unilateral. Lam. A native of South America, in Guiana, and about the neighbourhood of Carthagen. The synonyms of these two species are very confused and uncertain. Jacquin supposes Aniblets and Leoffing's plants to be the same, and to constitute a third species. 3. *C. purpureum*. Mart. 3. Willd. 3. Vahl. Symb. iii. 51. (*C. coccineum*, Lam 3. Ill. tab. 283. fig. 2. *Cristaria coccinea*, Sinnerat. It. ii. 247. tab. 140.) "Flowers decandrous; spikes lax, panicle-1." Lam. "Leaves opposite, egg-shaped, acute; racemes unilateral, bracteate; bractes shorter than the peduncle; flowers decandrous." Willd. A very smooth furmentous shrub, with cylindrical brachiote branches. *Leaves* three inches long, petioled, quite entire, somewhat coriaceous. *Flowers* bright red, in terminal panicle racemes; bractes solitary, at the base of each pedicel bristle-shaped. A native of the island of Madagascar. 4. *C. decandrum*. Willd. 4. Roxb. Coroman. i. 45. tab. 59. "Leaves opposite, oblong, acuminate; racemes lax, bractes longer than the flower; flowers decandrous, in two rows." *Flowers* white, in panicle racemes; bractes lanceolate; filaments alternately shorter, a little longer than the corolla. A native of woody mountains in the East Indies. 5. *C. alternifolium*. Willd. 5. Jacq. Amer. 104. Plst. 53. tab. 262. fig. 27. (*C. decandrum*, Mart. 4.) "Leaves alternate; flowers decandrous." A weak climbing shrub, twenty feet high; older branches prickly. *Leaves* two or three inches long, oval-oblong, ending in a blunt, channelled, cartilaginous, quite entire, shining, petioled. *Spikes* lax, half a foot long, about ten on one common peduncle, near the end of the little branches, which are often continued weak and leafless, six feet beyond the flowers. *Flowers* small, usually coming out before the leaves on very short pedicels. A native of South America, about Carthazena.

COMBRONDES, in *Geography*, a town of France, in the department of Puy de Dôme, chief place of a canton, in the district of Riom, containing 1568 inhabitants. The territorial extent is of 125 kilometres, with a population of 7580 individuals distributed in 12 communes.

COMBS OF Bees. See *Honey-comb*.

COMBURENDO HERETICO. See *HERETICO*.

COMBUST, in *Astronomy*. When a planet is in conjunction with the sun, or not distant from it above half their disk; it is said to be combust, or in combustion.

According to Argol, a planet is combust or in combustion, when not above eight degrees and thirty minutes distant from the sun, either before or after him.

COMBUSTA, in *Ancient Geography*, a town of Gallia Narbonensis, marked in the Itinerary of Antonine, on the route that leads from Narbonne to the passage of the Pyrenées.

COMBUSTIO pecunie, the ancient way of trying mixed and corrupt money, by melting it down, upon payments into the Exchequer. In the time of king Henry II. a constitution was made, called the trial by combustion; the practice of which differed little or nothing from the present method of assaying silver. But whether this examination of money by combustion was to reduce an equation of money only of sterling, viz. a due proportion of alloy with copper, or to reduce it to pure fine silver, does not appear. On making the constitution of trial it was considered that though the money did answer *numero et pondere*, it might be deficient in value; because mixed with copper or brass, &c. Vide Lowndes's Essay upon Coin, p. 5.

COMBUSTION, a fire, a burning, denotes the decomposition of certain substances, which are thereby called combustibles; accompanied with heat and light. The process of combustion, the various phenomena it exhibits, its astonishing effects, its infinite uses, and its devastations, have at all times rendered it the principal object of human attention in all the various stages of life. The whole extent of civil economy, the preparation of food, as well as of almost all the articles of necessity and of luxury, most of the arts of more essential use to mankind, such as the manufactures of metals, of glass, of pharmacy, &c. depend almost entirely upon combustion. The inclemencies of the weather, and the dismal darkness of night, are removed by means of combustion. The most active instruments of destruction depend upon combustion. The greatest scenes of wonder, admiration, and terror, like the conflagration of towns, and the eruptions of volcanos, are those in which combustion is the sole actor.

Whilst the wants and the economy of the multitude, have at all times called forth their industry in devising easy methods of lighting and warming their apartments, of cooking their victuals, &c.; the calm contemplations of philosophers have endeavoured to investigate the cause or causes, the commencement, the progress, the various intensity, and the products of combustion. It is natural to suppose that their first ideas must have been extremely fanciful and incoherent; since the present theory, which rests upon the foundation of innumerable experiments and strict reasoning, is vastly different from any sort of hypothesis, which even the wisest philosopher would have been led to form, without the light of those experiments.

The first plausible theory of combustion was formed by Stahl, an eminent chemist. The striking difference between bodies combustible and incombustible; that is, between bodies that are, and those that are not susceptible of combustion, induced him to suppose that the combustibles were endowed with a peculiar principle of inflammability, which the incombustibles had not, and to this supposed principle he gave the name of *phlogiston*. According to this supposition, when combustibles were heated to a certain degree, they began to part with this phlogiston, and continued to burn as long as they had phlogiston to lose; after which, they remained in a state of incombustibility; hence, in the former state, those bodies were said to be phlogisticated, and in the latter they were said to be dephlogisticated. With certain bodies the combustion was attended with a separation of other components, so that afterwards they could not be brought back to their former state by the mere addition of phlogiston; but with other bodies, as for instance, with the metals, the processes of dephlogistication and phlogistication might be repeated without end. Thus, a piece of zinc in the metallic state was supposed to be loaded with phlogiston, therefore, when exposed to a sufficient degree of heat, it would burn, viz. it would part with its phlogiston, and would thereby be reduced into the
state

state of a calx, destitute of phlogiston, and of the metallic appearance; but by placing this calx in contact with bodies which contained abundance of phlogiston, in a proper situation, the calx would thereby be enabled to recover its phlogiston, and with it its metallic state and combustibility. It might then be burnt again, and so forth. This plausible theory was no sooner made known, than it was eagerly adopted by philosophers and chemists; so that for a long period it remained the most prevailing theory of combustion. But though the theory was universally adopted, the existence of the principle upon which it was established could not be proved. There was no exhibiting the phlogiston by itself; and it was merely a supposition that a body acquired or lost its inflammability, according as it was combined with, or deprived of, its phlogiston. A supposition which, on a closer examination of facts, was found inadequate to the explanation of the concomitant phenomena. For instance, when a piece of zinc (and such was also the case with other combustibles as far as they might be subjected to experiments) of a determinate weight, was burnt and reduced to a calx, the weight of the calx was found to exceed the original weight of the zinc. It was, therefore, evident that it had acquired something ponderable, and this was utterly repugnant to the phlogistic theory, for by the loss of phlogiston it ought rather to have lost part of its original weight. In answer to this, a strange idea was suggested, namely, that the phlogiston was a principle of lightness; so that bodies became lighter by the addition of phlogiston and *vice versa*. But this supposition, so singular and so repugnant to the general laws of gravitation, was soon abandoned by philosophers when a variety of decisive experiments, the concurrence of recent discoveries in other branches of philosophy, and a strict mode of reasoning, introduced a new theory of combustion, which is both supported by accurate experiments, and sufficient to account for the phenomena. One of the principal labours in the experimental investigation, and the full establishment of this new and rational theory, was the unfortunate Lavoisier, to whose genius, and to whose persevering industry, the scientific world must ever think itself indebted.

In order to render this theory more easily understood by the reader, we shall prefix the following experiment. Take a glass vessel of a cylindrical shape, having a stopple capable of excluding the entrance or exit of any air, and let the outside of this vessel be graduated, so as to divide its capacity into pretty small portions. Put into this vessel, first of common air, a piece of dry phosphorus of a determinate weight; close the vessel tight, and heat gradually that part of it in which the piece of phosphorus stands, by means of the flame of a candle. As soon as the phosphorus has been heated to a certain degree, it takes fire of itself, burning with a flame and thick white smoke; but it soon ceases to burn. Suffer the vessel to cool, and the smoke will fall in the form of flakes, if the vessel and the air contained in it were quite dry, otherwise these flakes will melt in the moisture. If, in this experiment, the vessel be weighed before and after the combustion, it will be found precisely of the same weight. When the vessel is cooled to the actual temperature of the atmosphere plunge the aperture of it under water, and in that situation remove the stopple. You will find that the water rises in it, which shews that a portion of the air has been destroyed or absorbed; and that it has disappeared. By measuring the height of the water risen within the vessel, which is indicated by the graduation on the outside of it; in general, it will be found that about one quarter of the original quantity of air has

disappeared; and the remaining air will be found unfit for the combustion of phosphorus or of any other combustible; and is likewise unfit for the respiration of animals, so that if a bird, a mouse, or any other animal be confined in it, death will soon ensue. If the water which has rushed into the vessel be examined, it will be found to have contracted a sour taste indicating that an acid has been generated. If the vessel, instead of being opened in water be inverted and opened in quicksilver, then the flakes which in the preceding experiment were dissolved by the water, will now remain on the surface of the quicksilver. This is the acid of phosphorus, and if it be carefully gathered and weighed, it will be found together with the remaining phosphorus (if part of it remains unburned), equal to the weight of the original quantity of phosphorus together with the weight of the air that has disappeared. Therefore it is evident that the whole process of combustion consists in a decomposition of the purest part of respirable or atmospherical air; the pure part of it, which is about a quarter of the whole, is decomposed, its base is absorbed by the combustible, and generally communicates to it acid properties, in consequence of which that portion of the atmospherical fluid has been called oxygen gas, from the Greek; meaning the acidifying principle. Therefore, in combustion, the decomposition of the oxygen gas is effected by the burning body, when this body has been heated to a certain degree, which degree varies with the nature of the body. The base of the oxygen gas is also bad and fixed by the burning body, which has thereby its weight increased, and its nature changed; whilst the caloric being disengaged, passes off in the state of sensible heat, and sometimes with such a portion of light as gives the appearance of red or white heat. Acids in general are formed from the absorption of oxygen during combustion. See OXYGEN GAS.

When the combustion is accompanied with red heat, but not with flame, it is called *ignition*. But ignition may also be applied to inconcombustible substances, for these may be rendered red or white hot, without suffering any decomposition. When a vapour arising from the heated body burns over it, it is then called *inflammation*; and when the inflammation is rapid and attended with noise, it is called *detonation*. Having now compendiously stated the new theory of combustion, it is necessary to add several necessary remarks respecting every part of it, which could not be intermixed with the theory without rendering it confused and less intelligible.

In the first place, since the process of combustion consists in a decomposition of oxygen gas, the generalizing spirit of modern philosophy includes every process, in which oxygen gas is decomposed, under the general name of combustion; thus, animal respiration, in which this gas is decomposed, its base absorbed, and heat evolved, may be reckoned amongst the processes of slow combustion. See RESPIRATION. The gradual absorption of oxygen by metallic bodies may also be reckoned amongst these processes.

Since combustion consists in a decomposition of oxygen gas, it naturally follows that without oxygen no combustion can take place. The oxygen, however, may be contained in other substances, in consequence of which those substances become capable of assisting combustion. Now there are seven of those substances, which, from their containing oxygen, are called *supporters* of combustion; and these are oxygen gas, atmospheric air, nitrous oxyd, nitric oxyd (which is prepared by digesting copper and mercury in diluted nitrous acid, and collecting the gas which is extricated), nitric acid, oxygenized muriatic

riatic acid, and hyperoxygenized muriatic acid. See the nature of those substances under the article GAS. It also follows that with a given combustible, the quickness of the decomposition is proportionate to the supply of oxygen, which shews the reason why a fire is increased by blowing common air, and much more by blowing oxygen gas upon it. But cæteris paribus with different combustibles, the fire is strongest when the combustible has the strongest attraction for oxygen. The flame of hydrogen gas urged by oxygen gas is reckoned to produce the most intense heat.

A combustible body, though exposed to oxygen, generally requires to be heated to a certain degree before the combustion commences. That degree varies with the nature of the body, and the purity of the oxygen; so much so that some of them, though not many, take fire immediately on being exposed to some of the above-mentioned supporters of combustion in the common temperature of the atmosphere, whilst others must be heated to a red and even to a white heat, before the decomposition takes place.

When the combustion has once commenced, the heat or caloric, in the form of sensible heat, which is extricated from the oxygen gas, raises the temperature of the adjacent parts of the combustible to that degree which is necessary for its combustion, and the heat evolved by the burning of this part heats the next and so on. But this is not the case with all sorts of combustibles; for some there are which must be kept up at a given high temperature in order to effect their combustion, and a diamond is of this sort. However the nature of combustibles in this respect varies according to the purity and quantity of oxygen. For instance, if a slender steel wire be exposed to the flame of a candle in common air, that part of it only will burn, which is acted upon immediately by the flame: but if the same wire be lighted by means of a bit of tinder, and then be plunged in a vessel full of oxygen gas, it will burn successively to the very end, like a slip of paper; exhibiting a remarkable bright light, and very considerable heat.

Of the simple bodies of nature, the chemists reckon three combustible ones, and two that are incombustible. The former are sulphur, phosphorus, and hydrogen; and the latter are azote and muriatic acid; but amongst the compound bodies, the combustibles are much more numerous. Such are oils, acids, and a vast variety of others which being of a fluctuating nature need not be particularly specified.

A variety of experiments, which may be found under the article GAS, prove that gasses owe their elastic nature to a considerable quantity of caloric, which must necessarily combine with their base, in order to assume the aerial form. Therefore, when, in consequence of the superior affinity of the combustible for oxygen, the oxygen gas is decomposed, and its base condensed, the caloric, which was necessary to its aerial form, being set at liberty, appears in the form of sensible heat; hence the heat which accompanies combustion is naturally supposed to proceed from the oxygen gas; and the quantity of it varies according to the rapidity of the process, so much so that in certain processes like the decomposition of oxygen effected by metallic substances in common air, it is not attended with any sensible degree of heat; for the heat evolved, being very slight, is instantly dissipated among the surrounding bodies.

With certain combustible bodies a peculiar process takes place. It is a remarkable slow process of spontaneous combustion. The body, by attracting oxygen from the atmosphere, becomes thereby gently heated, in consequence of which its affinity to oxygen is increased, a greater decomposition of the latter ensues, more heat is evolved, and thus the process is gradually accelerated until flame and

visible combustion take place. Such is sometimes the case with hay, the saw-dust of certain woods, and various other substances. The well known mixture of iron filings and sulphur moistened with a little water, is an instance of this sort; for if this mixture be buried a little below the surface of the ground, it will of itself, after the lapse of several hours, burst forth in a state of ignition. This experiment has been generally called the *artificial volcano*.

Though heat in combustion is derived from the oxygen gas, the derivation of light is not so evident. It has been for a long time supposed that this element also was one of the components of oxygen gas; but the observations made respecting the light yielded by several bodies when they are slightly heated, or even spontaneously, and that some of them yield much more light than others, seem to prove, that light forms a component principle of most bodies, and that it is evolved from the combustible. It is likely, however, that part of it may be derived from the oxygen also.

The following list of bodies subject to spontaneous inflammation is given by professor Bartholdi; meaning the inflammation occasioned by different bodies acting upon each other, without the aid of another body previously in a state of combustion.

1. Friction. Thus pieces of wood rubbed against each other are thereby inflamed. The best for this purpose are box-wood rubbed against mulberry, or Laurel against poplar, or against ivy, &c. It is in consequence of friction that the wheels and axletrees of carriages sometimes take fire, when they are not sufficiently greased. In turning aloft, pieces of wood sometimes take fire.

2. The action of the sun's rays concentrated by lenses, or concave reflectors, or even by plane reflectors, provided their reflections be thrown upon the same spot. See BURNING-GLASS, and REFLECTORS.

3. The sudden flacking of quicklime has sometimes been known to produce the combustion of adjacent bodies.

4. The fermentation of animal and vegetable substances. Thus great accumulations of hay, turf, or flax, and hemp, heaps of linen rags in paper mills, &c. take fire, provided they are not quite dry; for without moisture, fermentation and the consequent evolution of heat cannot take place.

5. The accumulation of animal and vegetable substances covered with an oil, especially when the oil is of a drying quality. Thus lamp-black mixed with linseed oil is apt to take fire, and an earth of a brown colour, called the *black sand of Derbyshire*, sprinkled over with a little linseed oil, takes fire and appears red-hot like burning small coal, in about an hour's time.

6. There are several substances, which have the property of inflaming spontaneously, increased by torrefaction. Coffee, French beans, lentils, &c. are of this nature.

7. Sulphurated and phosphorated hydrogen gas. The cause of subterraneous fires and volcanoes in general, is attributed to the decomposition of pyrites, or metallic sulphurets, buried in the interior of the earth. These pyritous masses are decomposed by the contact and concurrence of water and air, and the decomposition is always accompanied with a great extrication of caloric, and a disengagement of a very inflammable gas, called *sulphurated hydrogen gas*. This gas inflames at an elevated temperature, and communicates the inflammation to the sulphur of the pyrites, to the coal and other bituminous matters, which generally accompany it.

8. Sulphuret and phosphuret of lime and of potash, formed in the combustion of several vegetables.

9. Phosphorus sometimes contained in charcoal.

The last particulars which we need take notice of, concerning the theory of combustion, are its products. But these must not be mistaken for those bodies which existed in certain combustible, and have been left by themselves when the other components of the combustible have been separated, such as earthy particles, &c. The real products of combustion are those which did not exist before, and these, upon a strict examination, will be found to be either water, or an oxide, or an acid. Water consists of oxygen and hydrogen. See WATER. An oxide is a compound of the combustible with oxygen, but not such as to possess decided acid properties, (and the process is called *oxidation*), or an acid, which consists of the acidifiable part of the combustible, combined with oxygen sufficiently to give it decided acid properties. Thus, the combination of carbon and oxygen forms the carbonic acid gas, and this is produced in almost every combustion, also in respiration, &c.

COMCHE, in *Geography*, a town of Persia, where the caravans rest in their way from Ispahan to Ormus.

COME, in *Biography*. See CESSAR.

COME. The hull, fibres or tails of malt, upon its first shooting forth, are thus called.

COMES IN. Soldiers are said to come in as recruits, volunteers, &c. when they come to join any particular corps or standard.

COME-OVER. When men desert from one army and join another opposed to it, they are said to come over to the one, which they join or go over to.

To come in *to*, to join, to bring aid or assistance.

To come up *with*, to overtake. To come up *with* an enemy, is a military phrase much made use of.

COME *sopra*, in the *Italian Music*, literally signifies as above, and is used when any foregoing part is to be repeated.

COMEA, in *Ancient Geography*, a place of European Myfia, which was an episcopal see, called by the council of Nice *Comensis*.

COMEDÆ, a people of Scythia, comprised by Ptolemy under the general name of Saces.

COMEDONES, a name given to a species of worm, with which the children of Misina, and some other countries, are terribly afflicted; and of which Hoffman, in his "Treatise of Endemial Diseases," gives this account; children in the country are frequently tormented with a sort of tabs, which so destroys their flesh, that they appear merely like shadows. The common people generally suppose these children to be under the influence of witchcraft; but such as have inquired more narrowly into the distemper, have found that it is owing to certain worms, resembling black hairs or cords, lodged under the skin. When the skin is rubbed with honey, in a bath, or any warm place, they will appear and come out; but when it is contracted by cold, they keep concealed within. See AFFECTIO *bovina*, and DRACUNCULI.

COMEDY, in its proper sense, signifies an allegorical representation of some characteristic transaction in private life. The drama, under its various forms, has in all ages and countries been cultivated, not only as a rational and polite amusement, but as a serious art, affecting the moral conduct of men, and influencing the condition of society. According to the field it occupies, whether the lighter train of incidental character, or the important events of life, it assumes the form of tragedy or comedy. The first commands awe; the last excites more pleasurable and exhilarating sensations. The first exhibits the fall of a hero; the last conducts the fortunes of lovers to the goal of marriage, and sets down the eccentricities of every character it meets with on the way. If therefore tragedy is more exalted, comedy

comes closer to the heart, and appeals more powerfully to the experience of man. The stronger passions, the virtues, the crimes, the sufferings of mankind are the theme of the one; our humours, our follies, the effervescence of youth, or the severity of years the topics of the other. Terror and pity are the instruments of pleasure in the first case, but ridicule in the last.

It is therefore very easy to discriminate the general spirit and strain of comedy from that of tragedy. Neither is it less moral or less useful, when considered as a satirical exhibition of human life, with all its improprieties and absurdities. There is nothing in the nature of these compositions, in either kind, which militates against good morals; though a French author endeavoured to affix the imputation of a profane and antichristian spirit on the great Corneille. The improvement of manners, the regulation of social intercourse, the subjection of vicious conduct to the lash of infamy, are among the benefits resulting from this species of poetry. Ridicule often succeeds where argument fails. Yet is it a dangerous weapon, when unskillfully wielded. For it is by no means the test of truth. It may be applied to mislead and seduce, instead of reforming; and the blended colour of ridicule are sometimes more difficult to separate, than the strong lights and shades of truth and error. Cicero quotes some lines of a comedy, where love is represented as the greatest of the deities. On the strength of this sentiment, he exclaims loudly against comic poetry as a corrector of morals; contending at the same time, that the art could not exist, if it had not vanity or villainy to feed upon. Besides this, it happens too frequently, that the ridicule falls where it is least deserved. This however is the fault of the writer, and not to be imputed to the nature of his subject. It depends on the combatant, whether the sword shall be drawn in a good cause, or in a bad one. The success of tragic representations gave rise to the ancient comedy at Athens. In the latter, as well as in the former, the unity of action and subject is absolutely requisite, and those of time and place should be as nearly as possible preserved. By this is meant, that the time of action should be reduced to moderate limits, and the pace never changed but with the termination of the act. The scenes of conversation must be united in a natural succession, and the stage should be perpetually occupied during the continuance of the act. The audience should likewise be made to perceive the necessity of the various personages appearing and disappearing just as they do. By these means, the imitation is allied to probability, and pleases in proportion. Probability is indeed more indispensably necessary in comedy, which descends to ordinary life, than in tragedy. Nature, whether in the management of the incidents, or the delineation of character and sentiment, is the only solid foundation for this species of writing. The scene and subject of comedy should be laid in the country and time, where and when it is to be represented. The little proprieties or indecorums of character and behaviour vary with the moment, and become uninteresting or unintelligible, except where they are seen and known in real life.

The various personages in a well managed comedy ought to be distinctly marked, without the assistance of contrasting them by pairs. Ordinary writers may seem to acquire a strong light and shadow by quaint artifices like these; but a matter looks no further than real life, and represents it as it is. The diction should be easy, natural, and polished, on a level with the conversation of gentlemen in the higher walks, but above the grossness of the vulgar in the lower. Perhaps there is nothing in the art so difficult, as to support a spirit of and happy dialogue. The parade of misplaced wit has spoiled almost as many comedies as actual dulness.

The feast of Bacchus, Sufarion on his stage, and Thephis in his cart, are the humble origin usually ascribed to the drama. Sufarion represented his first pieces towards the year 580 B. C. Thephis made his first attempts in tragedy, and acted his *Alecltis* in 536 B. C. The former attacked the vices and absurdities of his time; and the latter treated more noble subjects, which he took from history. See **DRAMA** and **THEATRE**. Comedy had three flags among the Greeks. The ancients indulged in the licence, not only of dramatising actual and well-known occurrences, but of identifying them with living persons. The name even of Socrates was not withheld from theatrical ridicule; and the philosopher was among the number of the audience. This licence in process of time was interdicted by the authority of the magistrates. The players no longer at liberty to sport with real names, contrived masks to resemble the features of those whom they meant to attack: this was the middle comedy. This latter abuse was scarcely less offensive than the former; and was at length prohibited. Deprived of masks as well as of names, the new comedy confined itself within those modest and moral bounds, which Menander set to its irregularities in the time of Alexander the Great. On this model, Plautus and Terence formed their style, without taking the trouble of transcribing the scene to their own country. This species of entertainment was then scarcely naturalized among the Romans; and their performances were rather translations than originals. In the course of time, Rome distinguished its comedy, founded on native manners, by the name of *Comædia Togata*, and that which was borrowed from the Greeks, was distinguished as the *Comædia Palliata*.

Before the introduction of modern comedy, a species of dramatic representation was in vogue, taken from the stories in the Old and New Testament, the Martyrdoms of the Saints, and other religious subjects. They were called *mysteries*: as the *mystery* or *Play* of the Passion, the *mystery* of the Acts of the Apostles, the *mystery* of the Apocalypse, &c. These entertainments were at first given in the churches, and made a part of the ecclesiastical ceremonies. Afterwards the *mysteries* were played on a public stage. On the entrance of Charles VII. into Paris in the year 1437, scaffolds were erected all along the great street, St. Denis's, on which were acted, with splendid and appropriate decorations, the Annunciation of the Blessed Virgin, the Nativity, our Lord's Passion, his Resurrection, the day of Pentecost, and the last Judgment. In the year 1486, the chapter of the cathedral at Lyons voted sixty livres to the performers in the *mystery* of Jesus Christ's passion. About 1549, the same city exhibited on Sundays and holidays, for the space of three or four years, the greater part of the historical facts in the Old and New Testament, succeeded by a farce, in the same manners in our theatres. The popular name of the play-house was *Paradise*. These sacred comedies were much in fashion in France under Francis I. who patronized them, and attended their representation. One of those, which attracted his approbation, was entitled the *mystery* of the passion of our Lord and Saviour Jesus Christ. It is said in the title page to have been performed "triumphantly at Angiers;" and indeed for it must have been; for there were one hundred and forty-one characters in the dramatic personæ. The date of it is 1541. But the abuses to which these religious performances gave rise occasioned at length a very severe law throughout the kingdom, against the exhibition of "Our Lord's Passion," and other similar subjects. Many of these pieces are still extant in print.

One of the first objects in modern comedy, is the Spanish theatre, fertile as it has been in dramatic productions. Lopez de Vega, Gullin, and Calderon, are the principal comic writers of Spain. The best of these, and the most celebrated, is said to have written above a thousand plays. But our surprise at their number is lessened when we become acquainted with their nature. Neither the numbers, nor any other rules of dramatic writing are in any degree observed. One piece often contains the life of a man, nor is the scene limited to one quarter of the globe. They are for the most part tragicomedies, taken from Spanish history; where war and heroism are coarsely mixed up with ridicule and buffonery. Allegorical and psychological characters, the Pætheon and the sacred *mysteries*, contribute their joint stock to these extravagant and unique performances. Yet are they not without strong traits of genius, and much splendour of imagination. The characters are sometimes well drawn, and the situations happy. To this writer, more than any other, are the public indebted for that taste for the surprising, which so strongly pervades the modern drama. It is plain from his own apologies, that Lopez de Vega complied with the whimsical fancies of his countrymen; and that had he been at liberty to have led the taste of his times, instead of following it, his efforts would have been more natural, his intrigues more skillfully entangled and unavailed, and his characters more consistently preserved.

The French comic theatre is in general an excellent school of manners; correct, chaste, and decent. It may well boast of such writers as Regnard, Dufresny, Dancourt, and Marivaux; but Moliere is the glory of their stage. No writer in any department rose to a higher reputation, in the brilliant age of Louis XIV. It may indeed be questioned, whether any comic writer has ever appeared with so many excellencies and so few defects. Vice and folly are the only objects of his satire. Though his characters are often peculiar to his own country and times, the ridicule is applied so justly as scarcely to have lost its force with foreigners or with posterity. His mirth is not indulged at the expense of good morals. The "*Misanthrope*," and "*Tartuffe*," are in verse; they therefore rise into greater dignity, and assume the style of elegant satire. In his prose comedies he is more ludicrous. His excellence consists more in the strength of his characters, than in the conduct of his plots. He is occasionally too farcical in his prose, and too prolix in his verse. "*Tartuffe*," in the grave comedy, and his "*Avare*," in the lighter, are usually considered as his master-pieces.

English comedy abounds more in original characters, than the comedy of any other modern nation. Humour is a leading feature in the character of the people. The freedom of our government and manners affords a wider scope to the comic muse, than she is allowed in the despotic courts of the continent. This boldness has, however, too often degenerated into a licence almost bordering on the immorality of the ancient Greek comedy. But this error has, however, been corrected in later times, and the stage has conformed to the more decent manners of an age which is rapidly discarding the grossness of vice from public view.

It now only remains to give a character of some of our most eminent comic writers.

Shakspeare decidedly takes the lead in each department of the drama; but his excellencies are so universally felt and understood that it would be superfluous to enter into a criticism of his productions. Of Jonson it will only be necessary to notice a few leading pieces. "Every Man in his Humour" is a play which places this writer scarcely lower

than the highest, whether we advert to the variety of its characters or the energy of its composition. It is to the credit of the present taste, that it regained possession of the stage, in defiance of its obsolete allusions, and antiquated garb. "Every Man out of his Humour" has much less to recommend it than the preceding comedy, though strongly marked in point of character. It has undergone the usual fate of personal satire, to die with the individuals at whom it glances.

"Cynthia's Revels" and the "Poetaster" are chiefly to be remembered, as having been acted by the children of queen Elizabeth's chapel; a relic of theatrical entertainment after the mode of its ancient institution, when the sacred mysteries were represented by the choir of the church or manatory.

Volpone is perhaps the best of this author's comedies. The language and character are wrought up to the highest finish, and the poet exhibits an originality of plot, conception, and execution, which proves that he could throw aside the trammels of the student, and lay claim to the honours of an undebated thinker, as well as those of a successful imitator. The pictures of Volpone and Mosca are finely imagined, and their circumstances most happily delineated. His "Epicure" is exceeded by few comedies in the English language. If to these two we add the "Alchymist," the merits of which are universally allowed, though the object of its satire has given place to other errors and other follies, we shall form such a constellation of comic genius, as will outline all competition but that of his illustrious contemporaries. His later pieces, consisting of his "Bartholomew Fair," "Staple of News," "New Inn," "Magical Lady," and "Tale of a Tub," rather detract from his reputation than augment it; and prove, what many other dramatic writers would have done well to consider, that faculties devoted to the entertainment of the public will at length be exhausted, without some sources of replenishment from change of scene or circumstances.

The triumvirate, such as was never equalled, before or since, in the republic of letters, was completed by John Fletcher, whose merits are closely blended with those of his associate Beaumont. His genius rather assimilates with Shakspeare than with Jonson, to whom he is confessedly inferior in propriety and precision, while he surpasses him in creative powers and poetical fecundity.

The next writer that obtained a large portion of the public favour and attention was Davenant, whose propensity to poetry is said to have appeared sufficiently early in life to attract the favourable notice of Shakspeare, though the great bard died when this young rhymer was only ten years old. What is commonly considered as Davenant's first play was produced in 1629, though he had attempted dramatic composition two or three years before. It is not worth while to enumerate the order or titles of his plays and masques; which were in general well received, and procured his promotion to the laurel, vacant by the death of Jonson, as a reward for the assiduity with which he directed the diversions of the court, as long as the troubles of the times permitted it to have any. It was to his address, that the people were indebted for the gradual restoration of the muses, after an interregnum of severity and gloom. At first he prevailed on men of taste and learning to countenance a healthy species of dramatic melange, which was allowed because it was bad, by the ignorant bigots who held the reins of empire, while rational and regular plays were absolutely prohibited. But he imperceptibly enlarged his sphere of composition, and after the restoration

obtained the patent of the theatre in Lincoln's Inn Fields. The stage is not perhaps more deeply indebted to any man than to Davenant, for the convenience and aptitude of its arrangements in the manager's department. Besides many less material improvements, it owes to him the introduction of female performers, and painted scenery; and from his revival of "Macbeth" and the "Tempest" may be dated that devotion to embellishment, which has ever since inundated the English stage, and, in the judgment of severer critics, overwhelmed the sense and discernment of the audience. His irregular entertainments, resorted to in the first instance only as substitutes for better things, may indeed be considered as the root of all that theatrical evil, we so gravely condemn, but at the same time so freely encourage. Yet he had the praise of bringing forward to the public eye scenery, women, and Betterton.

Mallinger was also among the sterling supports of the English drama; of which he may justly be reputed one of the fathers. His style was rough, manly, and vigorous; he pressed upon his subject with a severe but matterly hand; his wit was caustic, and his serious dialogue, according to its subject, stern and impressive, or natural, easy, and interesting.

Dryden did not commence his career as a writer for the theatre, till the thirty-second year of his age; but from that period he kept possession of it, and produced eight and twenty dramas, not indeed without competition or censure, but with a large share of predominant reputation. His first production was the "Wild Gallant;" a comedy, which met with so indifferent a reception, that had Dryden been a man of fortune, the stage had never again been benefited by his assistance. He was associated with Davenant, in the alteration of the "Tempest;" but he acknowledges the invention and writing of the new characters chiefly to belong to his colleague. We cannot, however, help contemplating the perfections of Shakspeare with astonishment, when we find that two such powerful minds could produce little or no addition to the effect.

On the character of his comedies, it will not be difficult to decide. He has, himself, acknowledged his inaptitude to that species of composition; and certainly his plays in general have much less merit than his other writings. Yet, after all, he has established a reputation that will never fade, even in this branch of poetry; and his drama of the "Spanish Friar" may be selected, as an instance of happy coincidence and real ingenuity, in the combination of serious and risible materials. Indeed the unfitness of his comic performances for modern representation arises more from their extreme licentiousness and immorality than from any defect of power.

The comedies of Otway are deservedly excluded from the reading desk as well as from the stage, on account of their undignified obscenity.

Congreve, at the age of twenty-one, produced the "Old Bachelor," at the theatre in Drury Lane, to amuse himself in a slow recovery from a fit of sickness. It received some requisite touches from the maturer judgment of his friends, and Dryden declared that he had never seen such a first play. The "Double Dealer," and "Love for Love" succeeded it, at an interval of a year each. Five years afterwards his comedy, called the "Way of the World," closed his dramatic labours at a time of life, when writers in general are but beginning their career. The indifferent success of his masterpiece excited his disgust at the caprices of the public. He never resumed his pen in the service of the theatre, except to write a masque, called the "Judgment of Paris." and

and an opera, called "Semele," which was never represented; but as his fame rests on his five regular pieces, we may consider him as lost to the stage, after the unkind reception of a play, which has since vindicated its station among the most brilliant ornaments of the drama.

It is on his comedies principally, that Congreve's reputation subsists. Here, all is luminous, all genuine, pointed, and original. His men of fashion are gentlemen, and even his fops are wits. Congreve is considered as having less humour and less of real life, than his illustrious rivals of the sock. But, surely "Forefight!" abounds with the richest humour, and that of a description, which, though now antiquated, was living and current at the time. Indeed it is an undoubted testimony to the happy drawing of this character, that though it is only recognized by the modern spectator as a picture of the days that are gone by, it never fails to excite ribbidity on the stage in a very powerful degree. The leading feature of Congreve's genius is wit. Dr. Johnson says, that he formed a peculiar idea of comic excellence, which he supposed to consist in gay remarks and unexpected answers. Now, certainly, in adopting such a theory of composition, he too much narrowed his own sphere. Still, however, no more is to be required of a writer, than what he himself undertakes; and Congreve performed what he undertook with a brilliancy of success, which, with the exception of Mr. Sheridan, has neither been rivalled nor approached in the revolution of the century that has elapsed. It has been objected, that "his personages are a kind of intellectual gladiators; every sentence is to ward or strike; the contest of smartness is never intermitted." This remark is undoubtedly true; yet, when we find Congreve thus formidably censured for the exuberance of his wit, it is impossible not to feel as the king of Prussia did, when he wished a certain mad commander to bite some of his generals.

Could the licentiousness of Congreve's topics be as easily justified as the overflowings of his gaiety, his fame would continue to blaze without danger of eclipse. But in truth, the offence his muse occasions to the purer ears of a more moral age, has an unhappy tendency to shorten his theatrical existence. The observation applies equally, if not in a greater degree, to all his witty, but graceless contemporaries; and it may be remarked on such freedoms in general, that they create disgust and alienation, at least in some minds, in a place and on an occasion, where it should be as much an author's study never to offend any, as occasionally to please all; consequently though they may increase the number of temporary plaudits, they infect the vitals of a reputation, that otherwise might have been immortal, with a principle of early decay.

To particularize the merits either of Congreve's rivals, Wycherly, Farquhar, Vanburgh, &c. or the numerous class of writers in the succeeding ages, who have cultivated the *comédie larmoyante*, would exceed the limits of this article. The latter is indeed almost as obsolete as the coarse but sterling wit of king Charles's days. It has given place to the distorted portraits and philosophy-run mad of the German school; a taste from which it is most devoutly to be wished that the drama may be speedily rescued.

COMENII, in *Ancient Geography*, a people of Illyria, according to Ptolemy, adjoining to the Dauriani and Vardzani.

COMENITZA, in *Geography*, a town of European Turkey, in the province of Epire, 52 miles S.W. of Delfino.

COMENIUS, JOHN AMOS, in *Biography*, a celebrated grammarian and divine, was born in the year 1592, in Moravia. He studied at Herborn, and returned to his own

country in 1614, and was appointed rector of a college there. In 1618 he became pastor of the church at Fulnee, and was appointed master of the school which had been lately erected. Here he conceived the idea of an improved method of teaching the languages, but his writings on this subject were destroyed in 1621, when the town was taken and plundered by the Spaniards. In 1624 he retired from the persecutions inflicted upon the Protestants in Germany, to Lesna, a city of Poland, where he devoted himself to the instruction of young persons in the Latin language: here he published in 1631 his "*Janua Linguarum reферата*," a work which obtained for him great reputation, and which was speedily translated into 12 European languages, and also into the Arabic, Turkish, Persian and Mogul languages. He was now invited into Sweden to take the charge of the public schools in that kingdom, which he declined; and having published the "*Panophiz Prodomus*," or "*Forerunner of Universal Science*," he was solicited by the parliament of England to undertake the reformation of the schools there. He arrived in London Sept. 1641, but owing to the civil wars his proposals were neglected, and he went to Sweden, and from thence to Elbing in Prussia, where he employed six years in perfecting his new method of instruction, but did not meet with sufficient encouragement to induce him to publish his thoughts on the subject. In 1648 Comenius was invited to the court of Sigismund Ragotzki, prince of Transylvania, where he lived four years, and proposed regulations for the college of Patak, upon the plan of his Panophia, from whence he returned to Lesna, and continued there till 1656, when the town was burnt in the war between the Swedes and the Poles. On this occasion he lost all his manuscripts excepting what he had composed on his Panophia, and the Apocalypse. He fled into Silesia, thence to Brandenburg, afterwards to Hamburg, and lastly to Amsterdum, where he continued till his death, which happened in 1671. At Amsterdum he published his "*New Method of Teaching*," which added nothing to his reputation, and which the learned Bayle has declared of no worth whatever in the art of instruction. In this opinion he is sanctioned by the concurrent voice of the learned in every succeeding age to the present time.

Comenius was not only intent upon the reformation of scholastic learning, but he embraced the notions of a speedily approaching millennium, and pointed out as characters who were to be eminently distinguished in fulfilling the prophecies, Gultavus Adolphus, Cromwell, and others, who had little claim to the honours of a divine mission. Succeeding events contributed to dissipate, in some measure, the enthusiastic notions which he had embraced and cherished. By some of his contemporaries he was charged with having possessed more knavery than credulity, but of this there seems to be no satisfactory evidence. He published "*Commentaries on the Apocalypse*," some treatises on the Socinian controversy, and "*Historia Fratrum Bohemorum*," in 4to. Nonv. Hist. Dict. Bayle.

COMENOLITARI, in *Geography*, a country of modern Greece, which comprises the ancient kingdom of Macedonia and Thessalia.

COMENSES, in *Ancient Geography*, a people of Asia Minor, towards Galatia, according to Pliny. Hardouin calls them Chomenes, deriving their name from Choma, a town situated in the interior of Lycia.

COMERCHIN, in *Geography*, a town of European Turkey, in the province of Romania; 62 miles E. of Emboli.

COMES *Nervi Phrenici*, in *Anatomy*, is a small branch of the internal mammary artery. See ARTERIES.

COMES,

COMETS, in *Antiquity*. See *COURT*.

COMES, NAPALIS, in *Biography*, was born at Milan in the sixteenth century, and is greatly distinguished for his classical learning. He translated from Greek into Latin the "Diipnosophistæ of Athenæus," the "Rhetoric of Hermogenes," and he published poems of his own in both these languages. In 1581 he published a history of his own times from 1545 to 1573, but his principal work is a system of mythology entitled, "Mythologia, sive Explicationis Fabularum, lib. x." It was dedicated to Charles IX. of France. He died in 1589, and on account of his love of allegory and mythicism he was denominated by Joseph Scaiger "Homo futilissimus." *Moreri*.

COMES *Domeficorum Equitum et Peditum*: Colonels of the archers of the body-guard of the Roman emperors. These archers were all of them chosen men of Armenia; and their number amounted to seven thousand five hundred.

COMESSAZZA, in *Geography*, a river of Italy, which runs into the Oglio; 9 miles N.E. of Sabinetta.

COMESSAZZO, a town of Italy, in the duchy of Mantua, $3\frac{1}{2}$ miles N. of Sabinetta.

COMESUS, a lake of America, in the state of New York; 27 miles S. of the lake of Ontario.

COMET, in *Astronomy*, a heavenly body, in the planetary region, appearing suddenly, and again disappearing; and during the time of its appearance moving in a proper, though very eccentric orbit, like a planet. Comets, like the planets, move in different planes, but the motion of some of them is direct, and that of others retrograde.

Comets, popularly called *blazing stars*, have this to distinguish them from the other stars, that they are usually attended with a long train of light, always opposite to the sun, and which is of a fainter lustre, the farther it is from the body. Hence arises a popular division of comets into three kinds, viz. *bearded*, *tailed*, and *hairy comets*; though in effect this division rather relates to the several circumstances of the same comet, than to the phenomena of several.

Thus, when the comet is eastward of the sun, and moves from it, it is said to be *bearded*, because the light precedes it in manner of a beard. When the comet is westward of the sun, and sets after it, it is said to be *tailed*, because the train follows it in manner of a tail. Lastly, when the comet and the sun are diametrically opposite, (the earth being between them), the train is hid behind the body of the comet, excepting a little that appears around it in form of a border of hair, or *coma*, whence it is called *hairy*, and whence the name of comet is derived.

COMETS, *nature of*.—As to the nature of comets, the infrequency of their appearance, together with the seeming irrelevance of their phenomena, have left philosophers of ancient, and even more modern times, much in the dark. Those who lived before Aristotle, accounted for them by supposing the heavenly spaces full of an infinite number of stars; and many of them too remote, or too small, to have ever come under the notice of astronomers; these invisible stars they farther supposed to move by their own proper motion every way; finishing their courses in very unequal times. Now, a comet, according to them, was a vast heap or assemblage of these little stars, meeting together, by reason of the inequality of their motions, and uniting into a visible mass; which must again disappear, as those stars separated, and each proceeding in its course. But how these stars should thus meet, coalesce, and form a body, which in all positions of the sun should resemble a tail, and again separate, is a mystery.

This opinion, therefore, Aristotle easily overturned; substituting another in its stead. According to Aristotle, comets were only a kind of transient fires or meteors, consisting of exhalations raised to the upper region of the air, and there lit on fire; far below the moon's course. But whether is this hypothesis more just than the other; for on this principle, the light of the comet, being independent of the sun, would be dispersed every way alike, without any appearance of a train; or tail, which is contrary to the phenomena. Moreover, they are observed at the same time in places on the earth very remote from each other. Besides, the modern astronomers who have measured the distance between the comets and the earth, find that the comets have no sensible diurnal parallax; which could not be, were they not much more remote than the moon, whose parallax is sensible; and yet as they have a sensible annual parallax, they are not so remote as the fixed stars. Indeed, there were some, Pliny tells us, among the ancients, who had juster notions; who took these stars to be perpetual, and believed they moved in their proper orbs; but were never seen, unless when left by the sun." Aristotle, in his first book of Meteors, mentions this doctrine of the ancient philosophers; and observes, that some of the Italians, called Pythagoreans, said, that a comet is one of the planets, but that they do not appear unless after a long time, and are seen but for a short time, which happens also to Mercury. Apollonius Myndius declared, that he took comets for regular stars; affirming also, that the comets were reckoned by the Chaldeans among the planets, and to have their periods like them. He also ventured to foresee, that one day the periods and laws of their motion would be discovered. And more fully Seneca, *Quæst. Nat. lib. vii.* He had himself seen at least two comets, one in the reign of Claudius, the other in that of Nero; besides that which he saw in his youth, a little before the death of Augustus, which in one place he calls a comet, and in another a prodigy. He intimates that he thought them above the moon, and argues strongly against those who imagined that they were meteors elevated into the air by winds, or who held some other absurd opinions concerning them. "I am not of the common opinion," says he, "nor do I take a comet to be a sudden fire, but esteem it among the eternal works of nature." *Quid autem miramur cometas, tam rarum mundi spectaculum, nonnum tenuis legibus certis, nec initia illorum sineque innotescere, quorum ex ingentibus nec intervallis recursum est? Veniet tempus quo ista que nunc latent, in lucem dies extrahat, & longioris ævi diligentia. Veniet tempus quo pelleri nostri tam aperta nos n. sisse mirentur. Erit qui demonstret aliquando, in quibus comete partibus errent; cur tam se ducti a cæteris errent quanti qualeque sint.*

This prediction we have seen accomplished in our days by the great sir Isaac Newton; whose doctrine concerning them will appear in the sequel of this article. Seneca recommended it to astronomers to keep a catalogue of the comets, in order to be able to determine whether they returned at certain periods. The authority of Aristotle, however, long prevailed; and comets were generally considered as meteors, existing in our atmosphere, till the time of Tycho Brahe. This excellent astronomer was the first among the moderns, who, after diligently observing the comet of 1577, and finding that it had no sensible diurnal parallax, assigned it its true place in the planetary regions. (See his book *De Cometa*, anni 1577.)

Although few comets have approached so near the earth as to have a diurnal parallax, they afford sufficient indications of an annual parallax; that is, the revolution of the earth in her orbit causes their apparent motion to be very different

from

from what it would be, if they were viewed from the sun, or any fixed place. See the first of the phenomena recited in the sequel. This shews that they are not so distant as the fixed stars, which have no annual parallax; and, as Hevelius observes, affords a proof of the earth's revolution round the sun; for, without supposing that, these motions of comets are inexplicable. Tycho was preceded by Kepler, who, in his book "De Cometis," concluded from observations of the comets which appeared in 1607 and 1618, that comets move freely through the planetary orbs, with a motion not much different from a rectilinear one; but of what kind he could not precisely determine. He was followed by Hevelius, an accurate observer of the heavenly bodies, who found, by his own observations of two comets that appeared in his time, that they were not subject to diurnal parallax; that calculations of their places, made upon a supposition that they moved in straight lines, did not agree with their true places; but that their orbits were concave towards the sun; and concluded, that they moved in parabolic trajectories.

Hevelius, from a great number of observations, supposes it as his opinion, that the comets, like the solar macula or spots, are formed and condensed out of the grosser exhalations of his body: or that they are generally in the atmosphere of a planet, and discharged from it, partly by the rotation of the planet, and then revolved about the sun in a parabola by the force of projection and its tendency towards the sun, in the same manner as a projectile upon the earth's surface describes a parabola. In which notion he agrees nearly with Kepler, who maintains, that comets are generated in the ether in vast numbers, like fishes in the ocean; though they do not all become visible; either because of their smallness, or because they lie a long time under the horizon.

But sir Isaac Newton has shewn the fallacy of this hypothesis; by proving that the comet of 1682, in its passage through the neighbourhood of the sun, would have been dissipated, had it consisted of exhalations of the sun and planets: for the heat of the sun, it is allowed, is as the density of his rays, i. e. reciprocally as the squares of the distances of places from the sun. Wherefore, since the distance of that comet in its perihelion, December the 5th, was observed to be to the distance of the earth from the sun, nearly as 6 to 1000; the sun's heat in the comet at that time, was to his heat with us at midsummer, as 100000 to 36, or 28000 to 1.

And again, finding by experiment, that the heat of boiling water is little more than three times the heat of our dry earth, when exposed to the midsummer's sun; and assuming the heat of red-hot iron to be about three or four times as great as that of boiling water; he thence concludes, that the heat of the dried earth, or body of the comet in its perihelion, must be near 2000 times as great as that of red-hot iron.

Such an immense heat once acquired in its perihelion, the comet must be a long time in cooling again. The same author computes, that a globe of red-hot iron, of the dimensions of our earth, would scarce be cool in 50000 years. If then the comet be supposed to cool 100 times as fast as red-hot iron; yet since its heat was 2000 times greater, supposing it of the bigness of the earth, it would not be cool in a million of years.

James Bernoulli, in his "Systema Cometarum," supposes some primary planet revolving round the sun in the space of four years and one hundred and fifty-seven days; and at the distance, from his body, of 2583 semidiameters of the magnus orbis; this planet, he concludes, either from

its vast distance, or smallness, to be invisible to us: but, however, to have, at various distances from him, several satellites moving round him, and sometimes descending as low as the orbit of Saturn; and that these becoming visible to us, when in their perigæum, are what we call comets.

Des Cartes advances another opinion: he conjectures that comets are only stars, formerly fixed like the rest, in the heavens; but which becoming by degrees covered with maculae, or spots, and at length wholly robbed of their light, cannot keep their place, but are carried off by the vortices of the circumjacent stars; and, in proportion to their magnitude and solidity, moved in such manner as to be brought nearer the orb of Saturn; and thus coming within reach of the sun's light, rendered visible.

But the vanity of all these hypotheses abundantly appears from the phenomena of comets; the chief of which we shall enumerate; as being the tell by which all theories are to be tried.

First, then, those comets which move according to the order of the signs, do all, a little before they disappear, either advance slower than usual, or else go retrograde, if the earth be between them and the sun; and more swiftly, if the earth be situate in a contrary part. On the other hand, those which proceed contrary to the order of the signs, proceed more swiftly than usual, if the earth be between them and the sun; and more slowly, or go retrograde, when the earth is in a contrary part.

2. So long as their velocity is increased, they move, nearly, in great circles; but towards the end of their course, they deviate from those circles; and as often as the earth proceeds one way, they go the contrary way.

3. They move in ellipses, having one of their foci in the centre of the sun; and by radii drawn to the sun, describe areas proportionate to the times.

4. The light of their bodies, or nuclei, increases in their recess from the earth toward the sun; and on the contrary, decreases in their recess from the sun.

5. Their tails appear the largest and brightest, immediately after their transit through the region of the sun, or after their perihelion.

6. The tails always decline from a just opposition to the sun towards those parts which the bodies, or nuclei, pass over, in their progress through their orbits.

7. This declination, *ceteris paribus*, is the smallest, when the heads, or nuclei, approach nearest the sun: and is less, still, nearer the nucleus of the comet, than towards the extremity of the tail.

8. The tails are somewhat brighter, and more distinctly defined in their convex than in their concave part.

9. The tails always appear broader at their upper extreme than near the centre of the comet.

10. The tails are always transparent, and the smallest stars appear through them.

These are the chief phenomena of comets; which it is evident, cannot easily be reconciled with the wild notions of the ancients, and the weak conjectures of many of the moderns.

"The comets," says sir Isaac Newton, "are compact, solid, fixed, and durable bodies: in one word, a kind of planets; which move in very oblique orbits, every way with the greatest freedom; persevering in their motions, even against the course and direction of the planets; and their tail is a very thin slender vapour, emitted by the head or nucleus of the comet, ignited or heated by the sun."

This at once solves all the foregoing phenomena: for, 1. It is evident, that those which proceed according to the order of the signs, a little before they disappear, must move more slowly, or appear retrograde, if the earth be between them and the sun; and swifter if the earth be in a contrary part. On the contrary, those proceeding against the order of the signs," &c. For since this course is not among the fixed stars, but among the planets; as the motion of the earth either conspires with them, or goes against them; their appearance, with regard to the earth, must be changed; and, like the planets, they must sometimes appear swifter, sometimes slower, and sometimes retrograde.

2. "When the comets move the swiftest, they must proceed in straight lines; but in the end of their course, decline," &c. Because, in the end of their course, when they recede almost directly from the sun, that part of the apparent motion which arises from the parallax, must bear a greater proportion to the whole apparent motion.

3. "The comets must move in ellipses, having one of their foci in the centre of the sun." Because they do not wander precariously from one scintillating vortex to another; but, making a part of a solar system, return perpetually, and run a constant round.

Hence, their elliptic orbits being very long and eccentric they become invisible, when in that part most remote from the sun.

From considering the curvity of the paths of comets, Sir Isaac concludes, that when they disappear, they are much beyond the orb of Jupiter; and that in their perihelion they frequently descend below the orbit of Mars, and the inferior planets.

4. "The light of their nuclei must increase in their recess from the sun, and *vice versa*." Because as they are in the regions of the planets, their access toward the sun bears a considerable proportion to their whole distance.

From observations of the comet of 1680, Sir Isaac Newton found, that the vapour in the extremity of the tail. January 25th, began to ascend from the head before December 11th; and had therefore spent more than forty-five days in its ascent; but that all the tail which appeared December 10th, ascended in the space of those two days, then just past since its perihelion. The vapour, therefore, at the beginning, when the comet was near the sun, ascended with a prodigious swiftness; and afterwards continued to ascend with a motion retarded by the gravity of its particles; and by that ascent increased the length of the tail; but the tail, notwithstanding its length, consisted almost wholly of vapours, which had ascended from the time of its perihelion; and the vapour which ascended first, and composed the extreme of the tail, did not vanish till it was too far from the sun to be illuminated by him, and from us to be visible. Hence also, the tails of comets that are shorter, do not ascend with a quick and continual motion from the head, and then presently disappear; but are permanent columns of vapours and exhalations, gathered from the head, by a very gentle motion, and a great space of time; which yet, by participating of that motion of their heads they had at the beginning, continue easily to move along with their heads through the celestial regions: whence also the vacuity of those regions is argued. See VACUUM.

5. "Their tails must appear the largest and brightest immediately after their transit through the region of the sun." Because, then, their heads being the most heated, will emit the most vapours.

From the light of the nucleus, or apparent star, we infer

their vicinity to the earth, and that they are by no means in the region of the fixed stars, as some have imagined; since, in that case, their heads would be no more illuminated by the sun, than the planets are by the fixed stars.

6. "The tails must still decline from a distinct opposition to the sun, towards the parts which the heads pass over, in their progress through their orbits." Because all smoke, or vapour, emitted from a body in motion, tends upwards obliquely, still receding from that part, towards which the smoking body proceeds.

7. "That declination will be still the least near the nucleus of the comet; and when the comet is nearest the sun." Because the vapour ascends more swiftly near the head of the comet, than in the higher extremity of its tail; and when the comet is at a less distance from the sun than when at a greater.

8. "The tail is brighter, and better defined in its convex part than in its concave." Because the vapour in the convex part, which goes first, being somewhat nearer and denser, reflects the light more copiously.

9. "The tail must appear broader towards the higher extremity of the comet than towards the head." Because the vapour in a free space is perpetually rarified and dilated.

10. "The tails must be transparent." Because consisting of infinitely thin vapour, &c.

Thus accurately does the hypothesis tally to the phenomena.

COMETS, *phases of*.—The nuclei, which we also occasionally call the *heads* and *bodies* of comets, viewed through a telescope, shew a very different face from those of the fixed stars, or planets. They are liable to apparent changes, which Sir Isaac Newton ascribes to changes in the atmosphere of comets; and this opinion was confirmed by observations of the comet in 1744. Hist. Acad. Scienc. 1744. Sturmius tells us, that, observing the comet of 1680, with a telescope, it appeared like a coal dimly glowing, or a rude mass of matter illumined with a dusky smoky light, less sensible at the extremes than in the middle: rather than as a star, which appears with a round disk, and a vivid light.

Hevelius observed of the comet of 1661, that its body was of a yellowish colour, very bright, and conspicuous, but without any glittering light: in the middle was a dense ruddy nucleus, almost equal to Jupiter, encompassed with a much fainter, thinner matter. February 5th, its head was somewhat bigger and brighter, of a gold colour; but its light more dusky than the rest of the stars: here, the nucleus appeared divided into several parts. February 6th, the disk was lessened; the nuclei still existed, though less than before: one of them, on the lower part of the disk, on the left, much denser and brighter than the rest, its body round, and representing a very lucid little star: the nuclei still encompassed with another kind of matter. February 10th, the head somewhat more obscure, and the nuclei more confused, but brighter at top than bottom. February 13, the head diminished much, both in magnitude and brightness. March 2d, its roundness a little impaired, its edges lacerated, &c. March 28th, very pale and exceeding thin; its matter much dispersed; and no distinct nucleus at all appearing.

Weigelius, who saw the comet of 1664. the moon and a little cloud illumined by the sun at the same time, observed, that the moon, through a telescope, appeared of a continued luminous surface; but the comet very different; being perfectly like a little cloud in the horizon illumined by the sun.

fun. From these observations it was, that Hevelius concluded comets to be like maculæ, or spots formed out of the solar exhalations.

COMETS, *magnitude of.* The estimates that have been given by Tycho, Hevelius, and some others, of the magnitude of comets, are not sufficiently accurate to be depended upon; for it does not appear, that they distinguished between the nucleus and the surrounding atmosphere. Thus Tycho computes that the true diameter of the comet in 1577, was in proportion to the diameter of the earth as 3 is to 14. Hevelius made the diameter of the nucleus of the comet of 1661 and also that of 1665 at the commencement of their appearances to be less than a 10th part of the diameter of the earth, and from the parallax and apparent magnitude of the head of the comet of 1652 on the 10th of December, he computed its diameter to be that of the earth, as 52 to 100. By the same method he found the true diameter of the head of the comet of 1664 to be at one time 12 semi-diameters of the earth, at another time not much above 5 semi-diameters. The diameter of the atmosphere is often ten or fifteen times as great as that of the nucleus; the former, in the comet of 1682, was measured by Flamsteed, and found to be 2', but the diameter of the nucleus only 11 or 12". Some comets, from the apparent magnitude and distance compared, have been judged to be much larger than the moon, and even equal to some of the primary planets. The diameter of that of 1744, when at the distance of the sun from us, measured about 1', and therefore its diameter must be about three times the diameter of the earth: at another time the diameter of its nucleus was nearly equal to that of Jupiter.

Hence it has been conjectured that some of the solar eclipses, recorded in history, that cannot be verified by calculation from tables of the sun and moon, have been occasioned by the interposition of comets between the sun and the earth. The eclipses of the sun mentioned by Herodotus (l. vii. c. 37, and l. ix. c. 10.) have been thus accounted for, and also the eclipse that happened a few days before the death of Augustus, mentioned by Dion: and it is observable, that Seneca saw a comet the same year. History records four comets that have appeared as large as the sun, (vid. Seneca, N. Q. l. 7. c. 15); and, therefore, if such a comet near its perigee were to come between the sun and our earth, it would eclipse him for a time. Some have thought that the darkness which occurred at our Lord's crucifixion might have been occasioned by a comet then passing between the earth and the sun. (Hevel. Cometogr. p. 542. Freret, réflexions sur un ancien phénomène céleste au temps d'Osyges, Mem. de Littérature, vol. xix. p. 357).

Dr. Herschel observed several comets which seemed to him to have no nucleus. The six comets discovered by his filter were of this kind, and appeared to be mere collections of vapours condensed about a centre. Five more were observed by himself, which were nearly of the same nature. This circumstance, he says, "throws a mystery over their destination, which seems to place them in the allegorical view of tools, probably designed for some salutary purposes to be wrought by them; and, whether the restoration of what is lost to the sun by the emission of light may not be one of these purposes, I shall not presume to determine. The motion of the comet discovered by M. Messier, June, 1770, plainly indicated how much its orbit was liable to be changed by the perturbation of the planets, from which, and the little agreement that can be found between the elements of the orbits of all the comets that have been observed, it appears clearly that they may be directed to carry their salutary influence to any part of the heavens."

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COMETS, *Formation of the tails of.* Sir Isaac Newton shews, that the atmosphere of comets will furnish vapour sufficient to form their tails: this he argues from that wonderful rarefaction observed in our air, at a distance from the earth: a cubic inch of common air, at the distance of half the earth's diameter, or four thousand miles, would necessarily expand itself so far as to fill a space larger than the whole region of the planets. Since then the coma or atmosphere of a comet, is ten times higher than the surface of the nucleus, counting from the centre thereof; the tail, ascending much higher, must necessarily be immensely rare: so that it is no wonder the stars should be visible through it.

Now, the ascent of vapours into the tail of the comet, he supposes occasioned by the rarefaction of the matter of the atmosphere at the time of the perihelion. Smoke, it is observed, ascends the chimney by the impulse of the air wherein it floats; and air, rarified by heat, ascends by diminution of its specific gravity, taking up the smoke along with it: why then should not the tail of a comet be supposed to be raised after the same manner by the sun? for the sun beams do not act on the mediums they pass through any otherwise than by reflexion and rarefaction.

The reflecting particles, then, being warmed by the action, will again warm the æther wherewith they are compounded; and this, rarified by the heat, will have its specific gravity, whereby it before tended to descend, diminished by the rarefaction, so as to ascend, and carry along with it those reflecting particles, whereof the tail of the comet is composed.

This ascent of the vapours will be promoted by their circular motion round the sun; by means whereof, they will endeavour to recede from the sun, while the sun's atmosphere, and the other matters in the celestial spaces, are either at rest, or nearly so; having no motion but what they receive from the sun's circumrotation.

Thus are the vapours raised into the tails of comets in the neighbourhood of the sun, where the orbits are most curve; and where the comets, being within the denser atmosphere of the sun, have their tails of the greatest length.

The tails thus produced, by preserving that motion, and at the same time gravitating towards the sun, will move round his body in ellipses, in like manner as their heads; and, by this means, will ever accompany, and freely adhere to their heads. In effect, the gravitation of the vapours towards the sun will no more occasion the tails of the comets to forsake their heads, and fall down towards the sun, than the gravitation of their heads will occasion them to fall off from their tails: but by their common gravitation, they will either fall down together to the sun, or be together suspended, or retarded. This gravitation, therefore, does not at all hinder, but that the heads and tails of comets may receive and retain any position towards each other, which either the above mentioned causes, or any other, may occasion. The tails, therefore, thus produced in the perihelion of comets, will go off along with their heads into remote regions; and either return thence, together with the comets, after a long series of years; or rather, be there lost, and vanish by little and little, and the comets be left bare; till at their return, descending towards the sun, some little short tails are gradually and slowly produced from the heads; which afterwards, in the perihelion, descending down into the sun's atmosphere, will be immensely increased.

The vapours, when they are thus dilated, rarified and
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diffused

diffused through all the celestial regions, the same author observes, may probably, by little and little, by means of their own gravity, be attracted down to the planets, and become intermingled with their atmospheres.

He adds, that for the conservation of the water, and moisture of the planets, comets seem absolutely requisite; from whose condensed vapours and exhalations, all that moisture which is spent in vegetations and putrefactions, and turned into dry earth, &c. may be replenished and recruited. For all vegetables grow and increase wholly from fluids; and, again, as to their greatest part, turn, by putrefaction, into earth again; and earthly slime being perpetually precipitated to the bottom of putrifying liquors. Hence, the quantity of dry earth must continually increase, and the moisture of the globe decrease, and at last be quite evaporated, if it has not a continual supply from some part or other of the universe. And I suspect, adds our great author, that the spirit, which makes the finest, subtlest, and the best part of our air, and which is absolutely requisite for the life and being of all things, comes principally from the comets. So far are they from portending any hurt or mischief to us which the natural fears of men are apt to suggest from the appearance of any thing that is uncommon and astonishing.

On this principle, there seems to be some foundation for the popular opinion of presages from comets; since the tail of a comet thus intermingled with our atmosphere, may produce changes very sensible in animal and vegetable bodies.

But the transmutation of water into earth is now justly exploded: Woodward, Boerhaave, and others, having observed that water is only an agent in conveying the nutritious matter to vegetable bodies, and not that matter itself.

Another use which Sir Isaac Newton conjectures comets may be designed to serve, is that of reuniting the sun with fresh fuel, and repairing the consumption of his light by the flames continually sent forth in every direction from that luminary. In support of this conjecture he observes, that comets in their perihelion may suffer a diminution of their projectile force, by the resistance of the solar atmosphere; so that by degrees their gravitation towards the sun may be so far increased, as to precipitate their fall into his body. Thus also, fixed stars which have been gradually waded, may be supplied with fresh fuel, acquire new splendour, and be taken for new stars: of this kind are those fixed stars, which appear on a sudden, or shine with a surprising brightness at first, and afterwards vanish by degrees.

There have been various conjectures also, touching the generation of the tails of comets. Apian, Cardan, Tycho Brahe, and some others, apprehended that they were produced by the sun's rays transmitted through the nucleus of the comet, which they supposed to be transparent, and there refracted as in a lens of glass, so as to form a beam of light behind the comet. But this cannot be the case, because the figure of a comet's tail does not correspond to such a refraction, and also because such refracted light would not be seen by an eye placed sideways to it, unless it fell upon some reflecting substance denser than the circumambient air. Kepler supposed, that the rays of the sun carry away some of the gross parts of the comet which reflect the sun's rays, and give the appearance of a tail. Hevlhus thought, that the thinnest parts of the atmosphere of a comet are raised by the force of the heat, and driven from the fore-part and each side of the comet towards the parts turned from the sun. Des Cartes accounted for the phenomenon of the tail by the refraction of light from the head of the comet to the eye of the spectator. If this were the case, the planets and principal

fixed stars must have tails also; for their rays pass through the same medium before they reach our eyes, as light from the comets does. Mairan supposes that the tails are formed out of the luminous matter that composes the sun's atmosphere, which is supposed to extend as far as the orbit of the earth, and to furnish matter for those northern lights called the *Aurora borealis*, which see. M. De la Lande combines this hypothesis with that of Newton above recited. He thinks that part of the vapour which forms them arises out of the atmosphere rarified by heat, and is pushed forward by the force of the light streaming from the sun; and also that a comet passing through the sun's atmosphere is drenched therein, and carries away some of it. Mr. Rowning, who is not satisfied with Sir Isaac's opinion, accounts for the tails of comets in the following manner. It is well known, says he, that when the light of the sun passes through the atmosphere of any body, as the earth, that which passes on one side, is by the refraction thereof made to converge toward that which passes on the opposite one; and the convergency is not wholly effected either at the entrance of the light into the atmosphere, or at its going out; but beginning at its entrance, it increases in every point of its progress. It is also agreed that the atmospheres of the comets are very large and dense. He therefore supposes that by such time as the light of the sun has passed through a considerable part of the atmosphere of a comet, the rays thereof are so far refracted toward each other, that they then begin sensibly to illuminate it, or rather the vapours floating therein; and so tender that part they have yet to pass through visible to us: and that this portion of the atmosphere of a comet, thus illuminated, appears to us in form of a beam of the sun's light, and passes under the denomination of a comet's tail. Rowning's *Natural Philosophy*, part iv. chap. 11.

We have an inquiry into the cause of the tails of comets, by Mr. Euler, in the *Mem. de l'Acad. de Berlin*, tom. ii. p. 117, seq. He thinks there is a great affinity between these tails, the zodiacal light, and the *Aurora borealis*; and that the common cause of them all, is the action of the sun's light on the atmosphere of the comets, of the sun, and of the earth. He supposes that the impulse of the rays of light on the atmosphere of comets, may drive some of the finer particles of that atmosphere far beyond its limits; and that this force of impulse combined with that of gravity towards the comet, would produce a tail, which would always be in opposition to the sun, if the comet did not move. But the motion of the comet in its orbit, and about an axis, must vary the position and figure of the tail, giving it a curvature, and deviation from a line drawn from the centre of the sun to that of the comet; and that this deviation will be greater, as the orbit of the comet has the greater curvature, and that the motion of the comet is more rapid. It may even happen, that the velocity of the comet, in its perihelion, may be so great, that the force of the sun's rays may produce a new tail, before the old one can follow; in which case the comet might have two or more tails. The possibility of this is confirmed by the comet of 1744, which was observed to have several tails while it was in its perihelion. See *AURORA borealis*, and *ZODIACAL light*.

Dr. Hamilton urges several objections against the Newtonian hypothesis; observing, that we have no proof of the existence of a solar atmosphere: and if we had, that when the comet is moving in its perihelion, in a direction at right angles to the direction of its tail, the vapours which then arise partaking of the great velocity of the comet, and being also specifically lighter than the medium in which they move,

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must suffer a much greater resistance than the dense body of the comet does, and therefore ought to be left behind, and would not appear opposite to the sun; and afterwards they ought to appear towards the sun. Besides, if the splendour of the tails be owing to the reflexion and refraction of the sun's rays, it ought to diminish the lustre of the stars seen through it; which would have their light reflected and refracted in like manner; and consequently their brightness would be diminished. He concludes that the tail of a comet is formed of matter which has not the power of refracting or reflecting the rays of light; but that it is a lucid or self-luminous substance; and from its similarity to the *Aurora borealis*, produced by the same cause, and a proper electrical phenomenon. Dr. Hamilton supports his opinion by the following arguments. A spectator, at a distance from the earth, would see the *Aurora borealis* in the form of a tail opposite to the sun, as the tail of a comet lies. The *Aurora borealis* has no effect upon the stars seen through it, nor has the tail of a comet. The atmosphere is known to abound with electric matter, and the appearance of the electric matter in vacuo resembles exactly that of the *Aurora borealis*, which, from its great altitude, may be considered to be in as perfect a vacuum as we can make. The electric matter in vacuo suffers the rays of light to pass through, without being affected by them. The tail of a comet does not expand itself sideways, nor does the electric matter. Hence, he supposes the tails of comets, the *Aurora borealis*, and the electric fluid to be the same kind of matter. As a further confirmation of this opinion it may be added, that the comet in 1607 appeared to shoot out the end of its tail. Le P. Cyat remarked the undulations of the tail of the comet in 1618. Hevelius observed the same in the tails of the comets in 1652 and 1661. M. Pingré noticed the same appearance in the comet of 1769; and these are circumstances similar to the *Aurora borealis*. Dr. Hamilton conjectures, that the use of the comets may be to bring the electric matter, which continually escapes from the planets, back into the planetary regions. These arguments very much corroborate this hypothesis; and if it be true, we may further add, that the tails are hollow; for if the electric fluid only proceed in its first direction and do not diverge sideways, the parts directly behind the comet will not be filled with it; and this thinness of the tails will account for the appearance of the stars through them. Dr. Halley seemed inclined to this hypothesis, when he said, that the streams of light in an *Aurora borealis* so much resembled the long tails of comets, that at first sight they might well be taken for such: and that this light seems to have a great affinity to that which the effluvia of electric bodies emit in the dark. Phil. Transf. N^o 347. Hamilton's Philosophical Essays, p. 91, &c.

Hevelius particularly informs us, that he observed the comet of 1665 to cast a shadow upon the tail, for in the middle of its length there appeared a dark line. Cassini also observed in the tail of the comet of 1680 a darkness in the middle of the tail; and the same appearance was taken notice of by a curious observer in the tail of the comet of 1744. The lengths of the tails of comets are various, and depend on a variety of circumstances. Longomontanus mentions a comet that in 1618, December the 10th, had a tail which appeared under an angle of 104° : that of 1680 appeared under an angle of 70° , according to sir I. Newton, and very brilliant: the comet of 1744 had a tail, which at one time appeared to extend 16° from its body; and which, allowing the sun's parallax to be $10''$, must have been above 23 millions of miles in length. The diameter of its nucleus was nearly equal to that of Jupiter. The tail of the comet of 1759 appeared, according to M. Pingré, under an angle of 90° ; but the

light was very faint. The length of a comet's tail may be thus found. Let S (Plate IV. *Astronomy*, fig. 23.) be the sun, E the earth, C the comet, CL the tail when directed from the sun; then, knowing the place of the comet, we know the angle FCL. EC, and the angle CEL, the angle under which the tail appears; hence we find CL the length of the tail. If the tail deviate by any angle LCM, found from observation, we shall then know the angle ECM, with CE, and the angle CEM, to find CM.

M. Fatou has suggested that some of the comets have their nodes so very near the annual orbit of the earth; that if the earth should happen to be found in that part next the node, at the time of a comet's passing by; as the apparent motion of the comet will be incredibly swift, so its parallax will become very sensible; and the proportion thereof to that of the sun will be given: whence such transits of comets will afford the best means of determining the distance of the earth and sun.

The comet of 1472, *v. gr.* had a parallax above twenty times greater than the sun's: and if that of 1618 had come down in the beginning of March to its descending node, it would have been much nearer the earth, and its parallax much more notable. But, hitherto, none has threatened the earth with a nearer approach than that of 1680: for, by calculation, Dr. Halley finds that November 11th, 1 h. 6 min. P. M. that comet was not above one semidiameter of the earth, to the northward of the way of the earth; at which time had the earth been in that part of its orbit, the comet would have had a parallax equal to that of the moon: what might have been the consequence of so near an approach, a contact, or, lastly, a shock of the celestial bodies?

If the earth had been at this time in that part of her orbit nearest to that node of the comet, through which it passed, their mutual gravitation must have caused a change in the plane of the orbit of the earth, and in the length of our year. Dr. Halley adds, that if so large a body, with so rapid a motion as that of this comet near its perihelion, were to strike against our earth, a thing by no means impossible, the shock might reduce this beautiful frame to its original chaos. Whiston, who, from Flamsteed's measure of the apparent diameter of this comet, concluded its nucleus to be about ten times as big as the moon, or equal to a fourth part of our earth, attributes the universal deluge, in the time of Noah, to its near approach. His opinion was, that the earth passing through the atmosphere of the comet, attracted from it a considerable part of the waters of the flood; that the proximity of the comet raised a great tide in the subterranean waters, so that the outward crust of the earth was changed from spherical to oval; that this could not be done without making fissures and cracks in it; that through these fissures the subterranean waters were forced, in consequence of the change of the hollow of the earth into a less capacious form;—that, along with the water thus squeezed up upon the surface of the earth, much slime or mud would rise; which, together with the grosser parts of the comet's atmosphere, would, after the subsiding of the water partly into the fissures and partly into the lower parts of the earth to form the sea, cover all over to a considerable depth the antediluvian earth:—and thus he accounts for trees and bones of animals being found at very great depths in the earth. He also supposed, that before the fall the earth revolved round the sun in the plane of the ecliptic, keeping always the same points of its surface towards the same fixed stars; by this means, as every meridian would come to the sun but once in a whole revolution, a day and a year were then the same: but that a comet striking obliquely upon the

earth gave it the diurnal rotation. Moreover, he apprehended, that the antediluvian year consisted of 360 days; but that the additional matter deposited upon the earth from the atmosphere of the comet at the time of the deluge, so retarded its revolution round the sun, that it is not now performed in less than 365 days and about a quarter.

The same comet, he imagined, would probably, by coming near the earth after being heated to an immense degree in its perihelion, be the instrumental cause of that great catastrophe, the general conflagration, foretold in the Sacred Writings, and from ancient tradition, mentioned by heathen writers. See CONFLAGRATION, DELUGE, and *Theory of the Earth*.

COMETS, distance of. The analogy between the periodical time of the planets, and their distances from the sun, discovered by Kepler, takes place also in the comets. Hence, the mean distance of a comet from the sun may be found by comparing its period with the time of the earth's revolution round the sun: thus, the period of the comet that appeared in 1531, 1607, 1682, and 1759, being about 76 years, its mean distance is found by this proportion; as 1 the square of one year, the earth's periodical time, is to 5776 the square of 76, the comet's periodical time, so is 1000000 the cube of 100, the earth's mean distance from the sun, to 5776000000 the cube of the comet's mean distance; the cube root of which is 1794, the mean distance itself, in such parts as the mean distance of the earth contains 100. If the perihelion distance of this comet 58 be taken from 3588 double the mean distance, we shall have the aphelion distance 3530 of such parts as the distance of the earth contains 100; and this is a little more than 35 times the distance of the earth from the sun. By a like method the aphelion distance of the comet of 1680 comes out 138 times the mean distance of the earth from the sun, supposing its period to be 575 years; so that this comet in its aphelion goes to more than 14 times the distance from the sun that Saturn does.

The limit of a comet's distance may be very easily ascertained from its tail, it being supposed to be directed from the sun. Let S (*fig. 24.*) be the sun, E the earth, ET the line in which the head of the comet appears, EW the line in which the extremity of the tail is observed, and draw ST parallel to EW; then the comet is within the distance ET; for if the comet were at T, the tail would be directed in a line parallel to EW, and therefore it could never appear in that line. TEW is known by observation, and consequently its equal ETS, together with TES, the angular distance of the comet from the sun, and ES, to find ST the limit. E. G. On December 21, 1680, the distance of the comet from the sun was $32^{\circ} 24'$, and length of the tail 70° ; hence ST : SE :: $\text{fin. } 32^{\circ} 24' : \text{fin. } 70^{\circ} :: 4 : 7$ nearly; consequently the comet's distance from the sun was less than $\frac{4}{7}$ of the earth's distance from the sun. Hence Sir Isaac Newton deduced this conclusion, that all comets, whilst they are visible, are not further distant from the sun than three times the earth's distance from the sun. This must, however, depend upon the goodness of the telescope, and magnitude of the comet. *Vince's Altr.* vol. i. p. 446.

COMETS, motion of. If the paths of comets be supposed directly parabolic, as some have imagined, it would follow, that being impelled toward the sun by a centripetal force, they descend as from spaces infinitely distant; and by their falls acquire such a velocity, as that they may again run off into the remotest regions; and moving upwards, with such a perpetual tendency as never to return. But the

frequency of their appearance, and their degree of velocity, which does not exceed what they might acquire by their gravity towards the sun, seem to put it past doubt that they move, planet-like, in elliptic orbits, though exceedingly eccentric; and so return again, though after very long periods.

The apparent velocity of the comet of 1472, as observed by Regiomontanus, was such as to carry it through 40° of a great circle in 24 hours; and that of 1770 was observed to move through more than 45° in the last 25 hours.

G. S. Doërfell, minister at Plaven in Upper Saxony, made observations upon the comet of 1680, and found that its motion might very well be represented by a parabola, having the sun in its focus; but not understanding the laws by which the motion of a body in a parabola is regulated, he erred considerably in his parabola, making the perihelion distance about 12 times greater than it was. This was published five years before the "Principia" of Newton, in which this illustrious author proved that Kepler's law, by which the planetary motions are regulated, was a necessary result of his theory of gravity; whence it immediately followed, that comets were governed by the same law; and the observations upon them agreed so accurately with his theory, as to leave no doubt of its truth.

Newton, Flamsteed, Halley, and the English astronomers, &c. seem satisfied of the return of the comets. Cassini, and others of the French, thought it highly probable; but De la Hire, and others, opposed it.

Those on the affirmative side suppose the comets to describe orbits prodigiously eccentric, inasmuch that we can only see them in a very small part of their revolution: out of this, they are lost in the immense spaces; hid not only from our eyes, but from our telescopes. That little part of their orbit near us, M. Cassini, &c. has found to pass between the orbits of Venus and Mars.

For the reasons of the return of comets, M. Cassini gives these which follow. 1. In considering the course of the comets, with regard to the fixed stars, they are found to keep a considerable time in the arc of a great circle, *i. e.* a circle whose plane passes through the centre of the earth: indeed, they deviate a little from it, chiefly towards the end of their appearance; but this deviation is common to them with the planets.

2. Comets, as well as planets, appear to move so much the faster as they are nearer the earth; and when they are at equal distances from their perigee, their velocities are nearly the same.

By subtracting from their motion the apparent inequality of velocity occasioned by their different distances from the earth, their equal motion might be found: but we should not be certain this motion were their true one; because they might have considerable inequalities, not distinguishable in that small part of their orbit visible to us. It is, indeed, probable, their real motion, as well as that of the planets, is unequal in itself: and hence we have a reason why the observations made, during the appearance of a comet, cannot give the just period of their revolution.

3. There are not two different planets whose orbits cut the ecliptic in the same angle, whose nodes are in the same points of the ecliptic, and whose apparent velocity in their perigee is the same; consequently, two comets seen at different times, yet agreeing with all those three circumstances, can only be one and the same comet. And this were the comets of 1577 and 1680 observed to do; and those of 1652 and 1698; not that this exact agree-

agreement, in these circumstances, is absolutely necessary to determine them the same comet. M. Cassini finds the moon herself irregular in them all; accordingly, he is of opinion, there are several which disagree herein, and yet may be accounted the same.

The great objection against the return of comets, is, the rarity of their appearance, with regard to the number of revolutions assigned to them.

In 1702, there was a comet, or rather the tail of one, seen at Rome, which M. Cassini takes to be the same with that observed by Aristotle, and that since seen in 1668, which would imply its period to be thirty-four years. Now, it may seem strange, that a star which has so short a revolution, and of consequence such frequent returns, should be so seldom seen.—Again, in April, of the same year, 1702, a comet was observed by Mess. Bianchini, and Maraldi, supposed by the latter to be the same with that of 1664, both by reason of its motion, velocity, and direction. M. de la Hire took it to have some relation to another he had observed in 1698, which M. Cassini refers to that of 1652. On this supposition, its period appears to be forty-three months; and the number of revolutions between 1652 and 1698, fourteen; but it is hard to suppose, that in this age, wherein the heavens are so narrowly watched, a star should make fourteen appearances unperceived; especially such a star as this which might appear above a month together: and of consequence be frequently disengaged from the repensula.

For this reason M. Cassini was very reserved in maintaining the hypothesis of the return of comets, and only proposed those for planets, where the motions are easy and simple, and are resolved without straining, or allowing many irregularities.

M. de la Hire proposes one general difficulty against the whole system of the return of comets, which would seem to hinder any comet from being a planet: and it is this; that by the disposition necessarily given to their courses, they ought to appear as large at first as at last; and always increase, till they arrive at their greatest proximity to the earth: or, if they should chance not to be observed, as soon as they become visible, for want of attention thereto; at least it is impossible but they must frequently shew themselves before they have arrived at their full magnitude and brightness. But he adds, that none were ever yet observed till they had arrived at it.

But the appearance of a comet in the month of October 1723, while at a great distance, so as to be too small and dim to be viewed without a telescope, may serve to remove this obstacle, and set the comets, still, on the same footing with the planets.

Sir Isaac Newton supposes, that as those planets which are nearest the sun, and revolve in the least orbits, are the smallest; so among the comets, such as in their perihelion come nearest the sun, are the smallest, and revolve in lesser orbits.

In order to prove that comets describe ellipses, and not parabolas or hyperbolas, Dr. Halley, in his "Synopsis of the Astronomy of Comets," advances the following reasons. "Hitherto I have considered the orbits of comets as exactly parabolic; upon which supposition it would follow, that comets being impelled towards the sun, by a centripetal force, would descend as from spaces infinitely distant; and, by their so falling acquire such a velocity, as that they may again fly off into the remotest parts of the universe, moving upwards with a perpetual tendency, so as never to return again to the sun. But since they appear frequently enough, and since none of them can be

found to move with an hyperbolic motion, or a motion swifter than what a comet might acquire by its gravity to the sun, it is highly probable they rather move in very eccentric elliptic orbits, and make their returns after long periods of time; for so their number will be determinate, and perhaps not so very great. Besides, the space between the sun and the fixed stars is so immense, that there is room enough for a comet to revolve, though the period of its revolution be vastly long. Now the *latus rectum* of an ellipse is to the *latus rectum* of a parabola, which has the same distance in its perihelion, as the distance in the aphelion, in the ellipse, is to the whole axis of the ellipse. And the velocities are in a subduplicate ratio of the same; wherefore, in very eccentric orbits, the ratio comes very near to a ratio of equality; and the very small difference which happens, on account of the greater velocity in the parabola, is easily compensated in determining the situation of the orbit. The principal use therefore of the table of the elements of their motions, and that indeed which induced me to construct it, is, that whenever a new comet shall appear, we may be able to know, by comparing together the elements, whether it be any of those which has appeared before, and consequently to determine its period, and the axis of its orbit, and to foretell its return. And, indeed, there are many things which make me believe, that the comet which Apian observed in the year 1531, was the same with that which Kepler and Longomontanus more accurately described in the year 1607; and which I myself have seen return, and observed in the year 1682. All the elements agree, and nothing seems to contradict this my opinion, besides the inequality of the periodic revolutions; which inequality is not so great neither, as that it may not be owing to physical causes. For the motion of Saturn is so disturbed by the rest of the planets, especially Jupiter, that the periodic time of the planet is uncertain, for some whole days together. How much more therefore will a comet be subject to such like errors, which rises almost four times higher than Saturn, and whose velocity, though increased but a very little, would be sufficient to change its orbit, from an elliptical to a parabolical one. And I am the more confirmed in my opinion of its being the same; for, in the year 1456, in the summer-time, a comet was seen passing retrograde between the earth and the sun, much after the same manner; which, although nobody made observations upon it, yet, from its period, and the manner of its transit, I cannot think different from those I have just now mentioned. And since looking over the histories of comets, I find, at an equal interval of time, a comet to have been seen about Easter, in the year 1305, which is another double period of 151 years before the former. Hence, I think, I may venture to foretell that it will return again in the year 1758." Dr. Halley computed, *lavi calamo*, as he himself informs us, the effect of Jupiter upon this comet in 1682, and found that it would increase its periodic time above a year, in consequence of which he predicted its return at the end of the year 1758, or the beginning of 1759. M. Clairaut computed the effects both of Saturn and Jupiter, and found that the former would retard its return in the last period 100 days, and the latter 511 days; and he determined the time when the comet would come to its perihelion to be in April 15, 1759, observing that he might err a month, from neglecting small quantities in the computation. It passed the perihelion on March 13, within 53 days of the time computed. Now if we suppose the time stated by Dr. Halley, to mean the time of its passing the perihelion, then if we add to that 100 days, arising from the action of Saturn

which

which he did not confid^r, it will bring it very near to the time in which it did pass the perihelion, and prove his computation of the effect of Jupiter to have been very accurate. If he mean the time when it would first appear, his prediction was very accurate, for it was first seen on December the 14th, 1758. and his computation of the effects of Jupiter will then be more accurate than could have been expected, considering that he made his calculations only by an indirect method, and in a manner professedly not very accurate. Dr Halley, therefore, had the glory, first to foretel the return of a comet, and the event answerd remarkably to his prediction. He further observed, that the action of Jupiter, in the descent of the comet towards its perihelion in 1682. would tend to increase the inclination of its orbit; and accordingly the inclination in 1682 was found to be 22' greater than in 1657. From the observations of M. Messier upon a comet in 1770, M. Edric Propperin, member of the Royal Academies of Stockholm and Upsal, shewed, that a parabolic orbit would not answer to its motions, and he recommended it to astronomers to seek for the elliptic orbit. This laborious task was undertaken by M. Lexell, who has shewn that an ellipse, in which the periodic time is about 5 years and 7 months, agrees very well with the observations. (See Phil. Transf. for 1779.) As the ellipses which the comets describe are all very eccentric, astronomers, for the ease of calculation, suppose them to move in parabolic orbits for that part which lies within the reach of observation, by which they can very accurately find the place of the perihelion of a comet, its distance from the sun, the inclination of the plane of its orbit to the elliptic, and the place of the node. But before we can determine the orbit of a comet, from observation, it will be necessary to premise such particulars respecting the motion of a body in a parabola, as may be requisite for such an investigation.

Accordingly let $\triangle P M$ (fig. 25.) be a parabola, S it's focus, A the vertex, P the place of the body, draw P Q perpendicular to A S, and P D perpendicular to the tangent P T, also S M perpendicular to A D. Now, by the property of the parabola, Q D is equal to half the latus rectum; hence if A S = 1, then Q D = 2; also the angle P S A = 2 P D A; therefore if Q D be radius, P Q will be the tangent of P D A, or $\frac{1}{2}$ P S A; hence to the radius A S, P Q will be twice the tangent of $\frac{1}{2}$ P S A; therefore if 2t = P Q, t will be the tangent of ($\frac{z$) half the true anomaly P S A, to the radius A S = 1. Also, by the property of the parabola, A Q \times 4 A S = P Q², hence A Q = t²; also the area A Q P = $\frac{2}{3}$ t³; and as Q S = 1 - t, the area Q P S = 1 - t²; hence the area A S P = $\frac{1}{3}$ t³ + t; also the area A S M = $\frac{2}{3}$. Now let a and b be the times in which the comet moves from A to M, and from A to P; then, as the areas described about S are proportional to the times, a : b :: $\frac{2}{3}$: $\frac{1}{3}$ t³ + t, therefore a t³ + 3 a t = 4 b.

Hence if a, and the true anomaly be given, we have the time b = $\frac{1}{3}$ a t³ + $\frac{2}{3}$ a t. Also, because a : b :: $\frac{2}{3}$: $\frac{1}{3}$ t³ + t, therefore if the true anomaly, and consequently t, be given in different parabolas, the times of describing those true anomalies from the perihelions will be in proportion to the times of describing 90° from the perihelions.

If the times a and b be given, the true anomaly may be found from resolving the cubic equation t³ + 3t = $\frac{b}{a}$, which may be done thus. In the right-angled triangle C A B, (fig. 26.) let A B = 1, A C = $\frac{b}{a}$, and compute B C; then find two mean proportionals between B C + A C and B C - A C, and their difference is the value of t.

Take the fluxion of t³ + 3t = $\frac{4b}{a}$, and we have $\dot{t} = \frac{4}{3a} \times \frac{b}{1+t^2}$; but $\dot{t} = \frac{1}{1+t^2} \times \dot{z}$; hence we get 2 z $\dot{z} = \frac{8}{3a} \times \frac{b}{1+t^2}$; $\frac{\dot{z}}{1+t^2} = \frac{8}{3a} \times \frac{b}{1+t^2}$ \times col. $\frac{z}{1+t^2}$ \times \dot{b} the variation of the true anomaly corresponding to any small variation \dot{b} of time expressed in decimals of a day, a being expressed in days.

Let S A (fig. 25.) be the mean distance of the earth from the sun; then the area of the circle, described with that radius, will be 3.14159; also the area A M S = $\frac{1}{2}$. Now the velocity in the parabola : velocity in the circle :: $\sqrt{2} : 1$; for let P p (fig. 27.) be an indefinitely small arc described by the body, S the place of the sun, S N a line drawn from the focus S, perpendicular to a tangent to the parabola A P D at the point P; then, 1st, The velocity u in any point P of the parabola, is as the square root of the parameter to the axis, divided by S N: for, the velocity is as the arc P p or u = p P: now, p M being perpendicular to P S, in the similar right-angled triangles p P M, P S N: S P :: p M : p P = $\frac{p M \times S P}{S N}$. But the parameter is as

the square of the described sector; therefore R (the parameter) = p M² \times S P², and $\sqrt{R} = p M \times S P$; and by substitution, p P or u = $\frac{\sqrt{R}}{S N}$ or u = $\frac{\sqrt{4 A S}}{S N}$, from the

nature of the parabola. 2dly, The velocity u in any point P of the parabola, is to the velocity V of a body running through the circumference of a circle with a central force tending to its centre, the radius being equal to S P, as $\sqrt{2} : 1$. For, since u = $\frac{\sqrt{4 A S}}{S N}$, u² = $\frac{4 A S}{S N^2}$; or, because S N² = S P \times

S A (by the property of the Parabola), u² = $\frac{4 A S}{S P \times A S}$ = $\frac{4}{S P}$. But the circle whose radius is S P, being taken as an ellipsis, its parameter is = 2 S P; and the velocity V being uniform, it is every-where as $\frac{\sqrt{2} S P}{S P}$; therefore V V = $\frac{2 S P}{S P^2} = \frac{2}{S P}$; consequently u² : V² :: $\frac{4}{S P} : \frac{2}{S P}$:: 2 : 1; and therefore u : V :: $\sqrt{2} : \sqrt{1}$:: $\sqrt{2} : 1$.

The areas described in the same time will be in the same ratio as the velocities, because at A the motion in each orbit being perpendicular to S A, the areas described will be as the velocities, and it being so in one case, it must be always so, because in each orbit respectively equal areas are described in equal times. But the times of describing any two areas are as the areas directly, and the areas described in the same time inversely; therefore

$\frac{3.14159}{2} : \frac{4}{3\sqrt{2}} \left(\frac{\sqrt{S}}{3} \right)$:: the time of the revolution in the circle = 365d. 6h. 9' : the time of describing A M = 109d. 14h. 46'. 20". Now as the time of describing A M is in a given ratio to the time in the circle, which

varies as A S, therefore if r = the perihelion distance in any other parabola, we have 1³ : r³ :: 109d. 14h. 46'. 20" : the time of describing 90° in that parabola from the perihelion. Hence, knowing the time corresponding to any true anomaly in that parabola whose perihelion distance = 1, we know the time corresponding to the same true anomaly in any other parabola, because the times

times of describing 90° are as the times corresponding to the same true anomaly; therefore if n be the number of days corresponding to any given anomaly in that parabola

whose perihelion distance is unity, then $n r^{\frac{2}{3}}$ will be the time t corresponding to the same anomaly in that whose perihelion distance is r ; this may be readily found thus. Multiply the log. r by 3 and divide by 2, and to the quotient add the log. n , and the sum will be the log. of the time required.

Hence also $n = \frac{t}{r^{\frac{2}{3}}}$; therefore if from the log. t we subtract $\frac{2}{3} \log. r$, it gives the log. n of the number of days corresponding to the same anomaly in the parabola, whose perihelion distance = 1; hence the anomaly will be found from a table which exhibits the times corresponding to the true anomaly for 200000 days from the perihelion, in that parabola whose perihelion distance is unity. This table may be constructed by the preceding problem, by taking $a = 109, 6154$, and assuming $b = 1, 2, 3, 4, \&c.$ and finding the corresponding values of t . Dr. Halley first constructed a table of this kind. M. de la Caille changed it into a more convenient form, by putting the areas for the times; Mr. Vince has given that which was computed by M. de Lambré. (See Vince's Astron. vol. i. p. 454, &c.)

Draw SY perpendicular to the tangent; then SP : SY :: SY : SA, therefore $\sqrt{SP} : \sqrt{SA} :: SP : SY :: \text{rad.} : \text{cof. PSY}$, or $\frac{1}{2}$ PSA the true anomaly; or SP : SA :: $\text{rad.}^2 : \text{cof.}^2 \text{ true anom.}^2$. Hence, if SA = 1, and $a + x = \frac{1}{2}$ PSA, $a - x = \frac{1}{2}$ PSA, then $1 : \sqrt{SP} :: \text{cof. } a + x : \text{rad.}$ and $\sqrt{SP} : 1 :: \text{rad.} : \text{cof. } a - x$; hence $\sqrt{SP} : \sqrt{SP} :: \text{cof. } a + x : \text{cof. } a - x$.

Hence $SP = \frac{SA}{\text{cof. } \frac{1}{2} \text{ true anom.}}$, radius being unity; therefore from log. SA subtract twice the log. cof. $\frac{1}{2}$ true anomaly, and the remainder is the log. of the distance of the comet from the sun.

Erect BD (fig. 2S.) perpendicular to AB, take BC = AB, produce AC to E, and draw EDF perpendicular to AE, meeting AF parallel to BD in F, join AD, and draw DG, CH parallel to AB. Then, as EAF = 45° , EA = EF; also FG = GD = AB; hence AF = BD + BA, and GH = BD - BA; a fo, by similar triangles, AF or BD + BA : CD = GH or BD - BA : EF or EA : ED :: $\text{rad.} : \tan. DAE$; but AB : BD :: $\text{rad.} : \tan. BAD$. from which (subtract 45° and we have $BD + BA : BD - BA :: \text{rad.} : \tan.$ of that difference. If $BD = \sqrt{SP}$, and $BA = \sqrt{SP}$, then

$$\sqrt{SP} : \sqrt{SP} :: \text{rad.} : \tan. BAD = \sqrt{\frac{SP}{SP}}; \text{ hence,}$$

to get that angle, take half the difference of the logarithms of SP and SP , and add 10 to the index (because in the log. tangents, the index of log. tan. of 45° , or log. of rad. = 1, is 10, instead of 0), and it gives the log. tangent of the angle; from which take 45° , and we have $\sqrt{SP} + \sqrt{SP} : \sqrt{SP} - \sqrt{SP} :: \text{rad.} : \text{tang. of that difference.}$

Hence if we know two radii SP, Sp (fig. 25.) and the angle PSp between, we can find the two anomalies. For let a be $\frac{1}{2}$ of ASP + ASp, and x be $\frac{1}{2}$ of ASP - ASp, then $\frac{1}{2}$ ASP = $a + x$, and $\frac{1}{2}$ ASp = $a - x$; hence $\sqrt{SP} : \sqrt{SP} :: \text{cof. } a + x : \text{cof. } a - x ::$ (by plane Trig.) $\text{cof. } a \times \text{cof. } x - \text{fin. } a \times \text{fin. } x : \text{cof. } a \times \text{cof. } x + \text{fin. } a \times \text{fin. } x$, therefore $\sqrt{SP} + \sqrt{SP} : \sqrt{SP} - \sqrt{SP} :: \text{cof. } a \times \text{cof. } x - \text{fin. } a \times \text{fin. } x : \text{cof. } a \times \text{cof. } x + \text{fin. } a \times \text{fin. } x$. Now the ratio of the two first terms is found from the last article, and as the angle PSp is given, the value of x will be given, hence we find a , and consequently we know the sum and difference of ASP, ASp, therefore we know the angles themselves. If β lie on the other side of A, then we know a , to find x .

$-\sqrt{SP} :: \text{cof. } a \times \text{cof. } x : \text{fin. } a \times \text{fin. } x :: \frac{\text{cof. } a}{\text{fin. } a}$
 $\frac{\text{fin. } x}{\text{cof. } x} :: \text{cot. } a : \tan. x$. Now the ratio of the two first terms is found from the last article, and as the angle PSp is given, the value of x will be given, hence we find a , and consequently we know the sum and difference of ASP, ASp, therefore we know the angles themselves. If β lie on the other side of A, then we know a , to find x .

Given two distances SP, Sp from the f cus to the curve of a parabola, and the angle between them, to find the parabola (fig. 29.) With the centres P and p, and radii PS, pS, describe two circular arcs $rw t, m \sigma n$, to which draw the tangent $a \sigma \sigma b$; draw ST perpendicular to ab , and bisect it in A, and it will be the vertex of the parabola; hence we may describe the parabola.

Having the Elements of the Orbit of a Comet, to compute its place at any time.

The elements of the orbit of a comet are, 1. The time when the comet passes the perihelion.—2. The place of the perihelion.—3. The distance of the perihelion from the sun.—4. The place of the ascending node.—5. The inclination of the orbit to the ecliptic. From these elements, the place at any time may be computed; and, for example, we shall take that given by M. de la Caille in his Astronomy. The comet in 1759, which was retrograde, passed its perihelion on June 17, at 10h. 6' 52" mean time; the place of the perihelion was in $3^\circ 12' 38'' 40''$; the perihelion distance was 0.67358, the mean distance of the earth from the sun being unity; the ascending node was in $0^\circ 27' 25'' 14''$, and the inclination of the orbit $55^\circ 42' 44''$; to compute the place seen from the earth on August 17, at $14^\circ 20'$ mean time.

Let WAW (fig. 3.) be the parabolic orbit of the comet, N the ascending node, P the place of the comet, T the corresponding place of the earth, and draw Pw perpendicular to the ecliptic; produce SN, Sw, SP, ST to n, u, p and t the sphere of the fixed stars, and describe the great circles $nps, nu \sigma t$ and pu .

I. The interval of time from the perihelion to the given time is 61d. 4h. 10' 30" = 61.174, whose log. is 1.786567; also the log. of .67358 is 9.828388, $\frac{1}{2}$ of which log. (from the nature of logarithms) is 9.424282, which subtracted from 1.786567 leaves 2.042985, the log. of 110.6547 days, which, by the table, answers to $3^\circ 0' 21' 38''$ the true anomaly PSA at the given time.

II. Subtract $3^\circ 0' 21' 38''$ from $3^\circ 12' 38'' 40''$ the place of the perihelion, because the comet was retrograde, and had passed the perihelion, and it leaves $12^\circ 17' 1''$ for the heliocentric place β of the comet in its orbit.

III. The longitude of n is $27^\circ 27' 14''$, also $\beta n = 27^\circ 14'' - 12^\circ 17' 1'' = 15^\circ 8' 13''$; hence $\text{rad.} : \text{cof. } \beta n u = 55^\circ 42' 44'' :: \tan. \beta n = 15^\circ 8' 13'' : \tan. nu = 8^\circ 30' 53''$ the distance of the comet from the ascending node, measured upon the ecliptic.

IV. Subtract this value of nu from the place of the node, and there remains $18^\circ 45' 21'' = \sigma n$ the true heliocentric place of the comet reduced to the ecliptic.

V. As $\text{rad.} : \text{fin. } \beta n = 15^\circ 8' 13'' :: \text{fin. } \beta n u = 55^\circ 42' 44'' : \text{fin. } \rho = 12^\circ 27' 34''$ the latitude seen from the sun, which is fourth.

VI. The true place T of the earth at the same time is $10^\circ 24' 34' 36''$; hence TS $\sigma = 35^\circ 25' 24''$; therefore TS $\sigma + \sigma n = TS u = 1^\circ 24' 10' 45''$. Also TS = 1.0115.

VII. In the preceding article, $\cot. 45^\circ 10' 49'' : \text{rad.}^2 :: 67.358 : S P = 1.3557$.

VIII. As $\text{rad.} : \cot. P S \nu = 12^\circ 27' 34'' :: S P = 1.3557 : S \nu = 1.3277$.

IX. In the triangle $T S \nu$, we know $T S$, $S \nu$ and the included angle $T S \nu$; hence, by plain trigonometry, we find the angle $S T \nu = 77^\circ 33' 38'' \frac{1}{2}$, which subtracted from $4^\circ 24' 34'' 36'$, the place of the sun, leaves $2^\circ 7' 0' 57'' \frac{1}{2}$ for the comet's true geocentric longitude.

X. Moreover, as $\sin. 54^\circ 10' 4'' : \sin. 77^\circ 33' 38'' \frac{1}{2} :: \tan. P S \nu = 12^\circ 27' 34'' : \tan. P T \nu = 14^\circ 54' 4''$ the comet's true geocentric latitude.

To determine the Orbit of a Comet from Observation.

Sir I. Newton first resolved this problem, which he called *Problema longe difficillimum*. The orbit of a comet may be computed from three observations; but although these data be sufficient, the direct solution of the problem is impracticable. Astronomers therefore have solved this problem by indirect methods, first finding an orbit very near to the truth by mechanical and graphical operations, and then, by computation, correcting it, until such a parabola was found as would satisfy the observations. Mr. Vince therefore begins, by shewing the methods by which the orbit may be nearly determined; and then explains the manner in which it may be corrected by calculation.

M. de la Lande proposes the following mechanical method of finding the orbit nearly. Divide the distance of the earth from the sun into ten equal parts, and describe ten parabolas whose perihelion distances are, 1, 2, 3, &c. of these parts, and divide these parabolas into days from the perihelion, answering to the motion of a body in each. Let S (*fig. 31.*) be the sun, a, b, c , the places of the earth at the times of three observations of the comet. Then take three geocentric latitudes and longitudes of the comet, and set off the elongations $S a \alpha$, $S b \beta$, $S c \gamma$, in longitude. From a, b, c , extend three fine threads am, bn, ep , vertical to aa, bb, cc , making angles with them equal to the geocentric latitudes respectively. Then take any one of the parabolas, and placing its focus in S apply the edge to the threads, and observe whether you can make it touch them all, and whether the intervals of time cut off by the threads upon the parabola be equal to the respective intervals of the observations, or very nearly so; and if these circumstances take place, you have then gotten the true parabola, or very nearly the true one. But if the parabola do not agree, try others, till you find one which does agree, or very nearly so, and you will then have got very nearly the true parabola, whose inclination, place of the node, and perihelion, are to be determined as accurately as possible from mensuration; also the projection upon the ecliptic. If none of these parabolas should nearly answer, it shows, that the perihelion distance must be greater than the distance of the earth from the sun, in which case, other parabolas must be constructed; but this does not very often happen. This method will determine the elements very nearly; but it would be extremely troublesome to construct and divide so many parabolas, if we only wanted to compute the elements of one comet; for those who purpose to make many computations of this kind, it might be worth while to have a set of parabolas thus divided. To avoid this trouble therefore, Mr. Vince proposes to do it in the following manner, by means of one parabola, without dividing it.

Take a firm board perfectly plane, and fix on paper for the projection; let a groove be cut near the edge, and five perpendiculars be moveable in it, so that they may be fixed at any distances. Let S (*fig. 32.*) represent the sun, and

describe any number of circles about it. Compute five geocentric latitudes and longitudes of the comet, from which you will have the five elongations of the comet at the times of the respective observations. Draw $S A, S B, S C, S D, S E$, making the angles $A S B, B S C, C S D, D S E$, equal to the sun's motion in the intervals of the observations; and on any one of the circles, make the angles $S a \alpha, S b \beta, S c \gamma, S d \delta, S e \epsilon$, equal to the respective elongations in longitude, and fix the five perpendiculars, so that the edge of each may coincide with $a, b, \gamma, \delta, \epsilon$. From the points a, b, c, d, e , extend threads to the respective perpendiculars, making angles with the plane equal to the geocentric latitudes of the comet; then fix the focus of the parabola in S , and apply its edge to the threads, and if it can be made to touch them all, it will be the parabola required, corresponding to the mean distance $S a$ of the earth, which we here suppose to revolve in a circle, as it will be sufficiently accurate for our purpose. If the parabola cannot be made to touch all the threads, change the points a, b, c, d, e , to such of the other circles as you may judge, from your present trial, will be most likely to succeed, and try again; and by a few repetitions you will get such a distance for the earth, that the parabola shall touch all the threads, in which position, find the inclination, observe the place of the node, and measure the perihelion distance, compared with the earth's distance, and you will get very nearly the elements of the orbit.

The next method of approximating to the orbit of a comet, which we shall explain, is that given by Bolcovich. Let S (*fig. 33.*) be the sun, $X Z$ the orbit of the earth, supposed to be a circle; T the place of the earth at the first observation, and t at the third; draw $T C, t c$ to represent the observed longitudes of the comet; and let L, l, λ be the longitudes at the first, second, and third observations; m and n the geocentric latitudes of the comet at the first and third observations; and t, T , the intervals of time between the first and second, second and third observations. Assume C for the place of the comet, at the first observation, reduced to the ecliptic; then to determine the point at the third observation, say $T \times \sin. \lambda - T : t \times \sin. T - T :: T C : t c$, and c will be nearly the place required; (See B *scov.* "Opuscula," vol. iii. or Sir H. Englefield's valuable work upon comets, p. 27.) join $C c$, and it will represent the path of the comet on the ecliptic, upon this assumption. Perpendicular to the ecliptic draw $C K, c k$, taking $C K : T C :: \tan. m$; radius, and $c k : t c :: \tan. n$; radius; join $K k$, and it will represent the orbit of the comet, if the first assumption be true. Bisect $C c$ in x , and draw $x y$ parallel to $C K$, and y will bisect $K k$; join $y S$. Let $S X = r$; then if v be the mean velocity of the earth in its orbit, the velocity of the comet

at $y = \frac{\sqrt{2} \times v}{\sqrt{S y}}$; taking therefore $v = T t$, compute

$\frac{\sqrt{2} \times v}{\sqrt{S y}}$, and if this be equal to $K k$, measured by the

scale, the assumed point C was the true point. But if these quantities be not equal, assume a new point for C , in doing which, the error of the first assumption will direct you which way, from the first assumed point, it must be taken, and about how far from it; if, for instance, the computed value of $K k$ be greater than the true value, and the lines $C K, c k$, are diverging from each other, and receding from the sun, the point C must be taken further from T , and how much further we must conjecture from the value of the error, and also from hence, that the velocity of the comet diminishes as it recedes from the sun. These considerations

derations will lead us to make a second assumption near to the truth. Having thus determined the true points C, c, very nearly, produce cC, cK to meet at N, join NS, and it will be the line of the nodes. Draw Cr, cz perpendicular to SN, and the angles KCr, Kzc will measure the inclination of the orbit. From the two distances SC, Sz, and the angle between, the parabola may be constructed, and applied as in the last method, from which the time of passing the perihelion may be found.

Another method by which we may readily get the orbit very nearly, is this. Let S (fig. 34.) be the sun, T, t, τ three places of the earth at the times of the three observations; extend three threads Tβ, tβ, τβ, in the directions of the comet, as before directed. Assume a point y for the place of the comet at the second observation, and measure Sy; then if ST = 1, and the velocity of the earth

be v, the velocity of the comet at y will be $\frac{\sqrt{2} \times v}{\sqrt{S y}}$; let

v be represented by Tt, tτ; and upon any straight edge PQ, set off ce = $\frac{\sqrt{2} \times T t}{\sqrt{S y}}$, and ed = $\frac{\sqrt{2} \times t \tau}{\sqrt{S y}}$; then

apply the point e to y, and, by turning about the edge, try whether you can make the point c fall in Tβ, and the point d in τβ; if you find this can not be done, the error will direct you to assume another distance; and by a very few trials you will find the point y where the points c and d will fall in Tβ, τβ. This method is very easy in practice, and sufficiently accurate to obtain a distance Sy, from which you may begin to compute, in order to find the orbit more correctly, when the comet is not too near to the sun, as, says Mr. Vince, I have found by experience.

Having determined the parabola nearly, we first assume some one quantity as known at the first and second observations, and thence compute the place of the comet at those times, and also the time between; and if that time agree with the observed interval, you have got a parabola which agrees with the two first observations; if the times do not agree, alter one of the assumed quantities, and see how it then agrees; and then, by the rule of false, you may correct the supposition which was altered, and get a parabola which will agree with the two first observations. In like manner, by altering the other assumed quantity, you get another parabola agreeing with the two first observations. Then see how they agree with the third observation, and if they do not, a correction must be made by proportion, and the three observations will be answered.

For further particulars we must refer to Vince's Astronomy, vol. i. p. 428, &c. See also "An account of the discoveries concerning comets, with the way to find their orbits, and some improvements in constructing and calculating their places, to which are added new tables, fitted for these purposes," by Thomas Barker, Gent. Lond. 1757.

As the comets do not move in parabolas, but in very eccentric ellipses, it is impossible to find a parabola agreeing accurately to all the data; it will be sufficient, therefore, when it agrees very nearly. When great accuracy is required, we must take into consideration the effect of aberration and parallax; the former may be computed in the manner stated under the article ABERRATION, and the latter by taking the horizontal parallax to that of the sun = 8".75 as the distance of the sun is to the distance of the comet; and then finding the parallax in latitude and longitude.

To ascertain the periodical time of a Comet, and the axes of its Orbit.

If comets, after having receded from the lower regions

of the solar system to vast distances beyond the orbits of the most distant planets return again to the neighbourhood of the sun, the paths they describe must be nearly elliptical; and then, if observations have been made sufficiently exact to be a basis of the operations, the requisites of the problem may be determined in the following manner: Let A K B I (fig. 35.) be the trajectory of a comet, A B its major axis, I K the minor, S, F, the two foci, the former of which being the place of the sun, C the place of the comet, C S its distance from the sun, C c the space it passes over in a very small portion of time, D C E a tangent to the curve in the point C, S D, F E, perpendiculars demitted thereon from the foci: draw S G parallel to the tangent, and join F C. Also, let A L B be a circle, described on the major axis A B; A P T B a rectangle about the ellipse A I B, and A Q R B a square about the circle A L B. Lastly, let A N O be the elliptic orbit of any planet, S, f, its foci; put S C = a, S D = b, C c = z, the time in which it is described by the major axis of the cometary orbit A B = x, of the planetary orbit A O = q, the circumference of the circle A V O described on the same axis = p, the periodical time of the comet = t, and that of the planet = v.

The space C c described, the distance S C, and the angle S C D, being all determinable by observation, are given quantities. The mean distance of the comet is A H = S K = $\frac{1}{2} x$, and of the planet is A g = S N = $\frac{1}{2} q$; and, because the squares of the periodical times are as the cubes of the mean distances, we have $\frac{1}{2} q^3 = \frac{1}{2} x^3 :: n^2 = t^2$; therefore $t^2 = \frac{1}{2} \frac{x^3 n^2}{q^3}$, and $t = \frac{n x}{q} \sqrt{\frac{x}{q}}$.

But it is necessary to find another expression for the periodical time t, which may be done thus: because C c is a very minute portion of the orbit, it may be esteemed a right line, and the sector C S c as a rectilineal triangle, whose area $\frac{1}{2} S D \times C c = \frac{1}{2} b c$ is given: then, as the area $\frac{1}{2} b c$, is to the whole area of the ellipse A K B I = A; so $\frac{1}{2} b c$ is to the whole periodical time t; wherefore $t = \frac{f}{\frac{1}{2} b c} \times A$.

Now, in order to determine the area A, we must find the semiconjugate H K; and here, because A B = S C + F C, we have F C = x - a; and by the similar triangles S D C, F E C, we have S C : S D :: F C : F E, that is, a : b :: x - a : $\frac{b x - a b}{a}$ = F E; consequently F G = F E -

G E = $\frac{b x - 2 a b}{a}$. Again, S C : C D :: F C : C E;

or a : $\sqrt{a^2 - b^2} :: x - a : \frac{x - a}{a} \sqrt{a^2 - b^2}$: hence D E or

S G = C E + C D = $\frac{x - a}{a} \sqrt{a^2 - b^2} + \sqrt{a^2 - b^2} = \frac{x}{a} \sqrt{a^2 - b^2}$. But F G = $\frac{b x - 2 a b}{a}$; therefore F S =

$\sqrt{F G^2 + S G^2} = \sqrt{\frac{b^2 x^2 - 4 a b^2 x + 4 a^2 b^2 + a^2 x^2 - 4 a^2 x \sqrt{a^2 - b^2} + 4 a^2 (a^2 - b^2)}{a^2}}$; and, of course, S H =

$\frac{1}{2} F S = \sqrt{\frac{a^2 x^2 - 4 a b^2 x + 4 a^2 b^2}{4 a^2}}$.

Moreover, since S K = A H = $\frac{1}{2} x$, H K = $\frac{1}{2} \sqrt{4 x^2 - a^2 x^2 - 4 a b^2 x + 4 a^2 b^2}$

$\sqrt{S K^2 - S H^2} = \sqrt{\frac{4 x^2 - a^2 x^2 - 4 a b^2 x + 4 a^2 b^2}{4 a^2}}$
 = $\frac{b}{a} \sqrt{a x - a^2}$; therefore I K = 2 H K = $\frac{2 b}{a}$

$\sqrt{ax - a^2}$, and $\frac{x}{a} \sqrt{ax - a^2}$ = area of the rectangle
 APTB. Let P be the periphery of the circle AIB, whose diameter is x , then its area will be $\frac{1}{2} L.H \times P = \frac{1}{2} x P$, and we shall have $x^2 : \frac{1}{2} x P : \frac{1}{2} x P : \frac{1}{2} x P :: AQRB : AIB :: APTB : AIB :: \frac{1}{2} q p : \frac{1}{2} q p$; that is $q p : \frac{1}{2} q p :: \frac{x}{a} \sqrt{ax - a^2} : \frac{b p}{4 a q} \sqrt{ax - a^2} = AIB$. But

$2 AIB = AIKB = A = \frac{b p x}{2 a q} \sqrt{ax - a^2}$; therefore, substituting this value of A , in the preceding expression, we have $t = \frac{f p x}{a e q} \sqrt{ax - a^2}$. Equate this value

of t , with that already given, then $\frac{n x}{q} \sqrt{\frac{x}{q}}$
 $= \frac{f p x}{a e q} \sqrt{ax - a^2}$; which equation reduced, gives $x = \frac{a^2 e^2 p^3 q}{f^2 p^2 q - a^2 n^2} = A B$, the major axis of the comet's elliptical trajectory.

If we substitute this value of x , in the above equation, for t , we shall have $t = \frac{p^3 f^2 n^2 a^{\frac{3}{2}}}{q^{\frac{3}{2}} p^2 - a^2 e^2 n^2} \cdot \frac{1}{2}$ = the periodical time. Also, because the conjugate $IK = \frac{2 b}{a} \sqrt{ax - a^2} = c$, we have $x = \frac{c^2 a^2 + 4 b^2 a^2}{4 b^2 a} = \frac{a f^2 p^2 q}{f^2 p^2 q - a^2 e^2 n^2}$, whence

by reduction, we find $c = 2 b e n \sqrt{\frac{a}{f^2 p^2 q - a^2 e^2 n^2}}$, the minor axis of the orbit.

From these equations, it obviously appears, that when the velocity of the comet is such that $f^2 p^2 q = a^2 e^2 n^2$, the axis x will be infinite, and consequently the trajectory will be a parabola; if $a^2 e^2 n^2$ be greater than $f^2 p^2 q$, the direction of the axis will be on the other side of the curve, which will be an hyperbola; in either of which cases, the comet can never return: but in every instance where $f^2 p^2 q$ is greater than $a^2 e^2 n^2$, the comet will describe an ellipsis; among these we may comprise the circle, where $x = 2 a = \frac{a f^2 p^2 q}{f^2 p^2 q - a^2 e^2 n^2}$ and $f^2 p^2 q = 2 a^2 e^2 n^2$, whence $e = C c = \frac{f p}{a} \sqrt{\frac{q}{2 a}}$, the

arc of the circle described in one day, or one hour, according as the value of n is given in days, or hours.

Let the earth be the planet which we supposed to describe the ellipsis ANO; then its mean distance $\frac{1}{2} q = 100000$, or $q = 200000$, and $p = 628318$; also the periodical time $n =$ one year: then if Cc be the portion of the comet's orbit described in one day, we have $f = \frac{t}{365.2505} = 0.0027378$. The other expressions will become as follow: for the principal axis, $x = \frac{5918 \cdot 6599235 \times a}{5918 \cdot 6599235 - a^2 e^2}$, and for the periodical time $t = \frac{4750560000 \times a^{\frac{3}{2}}}{591820599235 - a^2 e^2 \cdot \frac{3}{2}}$.

It is extremely difficult to determine, from computation, the elliptic orbit of a comet, to any degree of accuracy; for when the orbit is very eccentric, a very small error in the observation will change the computed orbit into a parabola, or hyperbola. Now, from the thinness and in-quality of the atmosphere with which the comet is surrounded, it is impossible to determine, with any great precision, when either

the limb or centre of the comet pass the wire at the time of observation. And this uncertainty in the observations will subject the computed orbit to a great error. Hence it happened, that M. Bouguer determined the orbit of the comet in 1729 to be an hyperbola. M. Euler first determined the time for the comet in 1744; but having received more accurate observations, he found it to be an ellipse. The period of the comet in 1680 appears, from observation, to be 57.5 years, which M. Euler, by his computation, determined to be 166 $\frac{1}{2}$ years. The only fair way to get the period of comets, is to compare the elements of all those which have been computed, and where you find they agree very well, you may conclude that they are elements of the same comet, it being so extremely improbable that the orbits of two different comets should have the same inclination, the same perihelion distance, and the places of the perihelion and node the same. Thus, knowing the periodic time, we get the major axis of the ellipse; and the perihelion distance being known, the minor axis will be known. When the elements of the orbits agree, the comets may be the same, although the periodic times should vary a little; as that may arise from the attraction of the bodies in our system, and which may also alter all the other elements a little. We have already observed, that the comet which appeared in 1759, had its periodic time increased considerably by the attraction of Jupiter and Saturn. This comet was seen in 1682, 1607, and 1531, all the elements agreeing, except a little variation of the periodic time. Dr. Halley suspected the comet in 1680, to have been the same which appeared in 1106, 531, and 44 years before Christ, when Julius Cæsar was murdered; and that its period was five hundred and seventy-five years. Mr. Dunthorne, however, in the Phil. Trans. vol. xliii., has endeavoured to shew from a MS. in Pembroke-hall library, that the comet in 1106 could not be the same with that of 1680. But M. de la Lande adopts the opinion of Dr. Halley. He also conjectured, in the first edition of his Synopsis, without repeating it in the second edition, that the comet observed by Apian in 1532, was the same as that observed by Hevelius in 1661; if so, it ought to have returned in 1789, or 1790, but it has never been observed. The interval between the passages of the comet by the perihelion in 1532 and 1661 is 128 years, 80 days, 1 hour, 29 minutes, (32 of the years being bissextile) which, added to the time of the perihelion in 1661, together with 11 days to reduce it from the Julian to the Gregorian stile, which we now use, brings out the time of the next perihelion, to be April 27th, 1st 20', in the year 1789. But M. Mechain having collected all the observations in 1532, and calculated the orbit again, found it to be sensibly different from that determined by Dr. Halley, which renders it very doubtful whether this was the comet which appeared in 1661; and this doubt is increased, by its not appearing in 1790. The comet in 1770, whose periodic time M. Lexell computed to be five years and seven months, has not been observed since. There can be no doubt but that the path of this comet, for the time it was observed, belonged to an orbit whose periodic time was that found by M. Lexell, as the computations for such an orbit agreed so very well with the observations. But the revolution was probably longer before 1770: for as the comet passed very near to Jupiter in 1767, its periodic time might be sensibly increased by the action of that planet; and as it has not been observed since, we may conjecture, with M. Lexell, that having passed in 1772 again into the sphere of sensible attraction of Jupiter, a new disturbing force might probably take place: as to destroy the effect of the other. According to the above elements, the comet would be in conjunction with Jupiter on

August 23, 1779, and its distance from Jupiter would be only $\frac{1}{337}$ of its distance from the sun, consequently the sun's action would be only $\frac{1}{337}$ times that of Jupiter. What a change must this make in the orbit! If the comet returned to its perihelion in March 1776, it would then not be visible. See M. Lexell's account in the Phil. Transf. 1779. The elements of the orbits of the comets in 1264 and 1556 were so nearly the same, that it is very probable it was the same comet; if so, it ought to appear again about the year 1848.

Mr. Cole, in his "Theory of Comets," advances an hypothesis, which, in some cases, may perhaps, be accurate. He supposes that the orbit of a comet is not an ellipse; but that, when it passes its perihelion, it has acquired so great a velocity, that its centripetal force is overcome by its centrifugal, and that consequently the comet continues to fly off in a parabola or hyperbola, till it come within the attraction of some fixed star; that this attraction may give it a new direction, and increase its velocity till it come to an apsis below that star, when it may again fly off either in a parabola or hyperbola, and proceed till it fall within the attraction of another star; and thus visit many different systems.

Dr. Halley has given us a table of the astronomical elements of twenty-four comets, on the supposition that they moved in parabolas; though he thought it extremely probable that they really moved in very eccentric ellipses, and consequently returned after long periods of time. This table commences with the year 1337, and closes with 1698. By means of this table, and others similar to it, it may be determined whenever a new comet shall appear, by comparing it therewith, whether it be one of those which have already appeared, and consequently its period and the axis of its orbit be ascertained, and its return foretold. See his Synopsis of the Astronomy of Comets, annexed to Gregory's Astronomy. This was first published in the Philosophical Transactions in 1705, and republished with his Astronomical Tables in 1749. M. de la Caille changed this table into another of a more convenient form, by putting the areas for the times.

Another table has since been computed, from the observations contained in the Philosophical Transactions, De la Caille's Astronomy, and De la Lande's Histoire de la Comete de 1759, and Connoissance des Mouvemens Celestes 1763 & 1764. In this table are seen the elements of twenty-five other comets, from the year 1264 to 1762. The most extensive table for calculating the motions of comets, was computed by M. de Lambert; it is inserted, as we have already mentioned, in Mr. Vince's Astronomy, vol. i. Another table on an extensive scale, computed by Mr. Lee, an ingenious friend of the editor, an excellent astronomer, and an attentive observer of the heavens, is annexed to this article.

The number of comets that are stated in the most accurate accounts to have appeared, since the commencement of our æra, is about 500; and before that æra, about 100

others are recorded to have been seen, though it is probable that not more than half of them were comets.

The elements of the comet of 1770, and the trajectory of its path, may be found in the Transactions of the American Philosophical Society, vol. i.

In Whiston's Solar System, the orbits of several comets are delineated, and the periods of as many of them as were then known, expressed.

COMET, *To determine the place and course of a.* For this purpose, it will be advisable to take the apparent diameter very frequently; as a judgment may thus be formed of its relative distance at different times; its degree of motion, its brightness, &c. must also be regarded; for when it moves with the greatest velocity, or appears most bright, we may infer that it is near its perihelion. If the place of the comet can be observed when it has no latitude, the place and time of its being in one of its nodes will then be exactly known; but as this can seldom be actually observed, these elements are generally obtained by approximation from other observations. In order to obtain the proper course of a comet, observe its distance from two fixed stars, whose longitudes and latitudes are known; or, find its altitude when in the same azimuth with any two known fixed stars; from the distance or altitude thus found, calculate the place of the comet by trigonometry, after the manner delivered under PLANET, or in the preceding article. By repeating the observations and operations for several days successively, the course of the comet will be had.

COMET, *to determine the course of a, mechanically, and without any apparatus of instruments.* The following ingenious method, by a thread, we owe to Longomontanus: Observe four stars round the comet, such, as that the comet may be in the intersection of the right lines that join the two opposite stars; which is easily found by means of a thread placed before the eye, and extended over-against the stars and comet.

Suppose, v.g. the comet's place in the heavens A (*Pl. IV. Astronomy, fig. 36.*) between the four stars, B, C, D, E; where the line joining the stars B and D, passes through the body of the comet; and the like does the line passing through C and E.

On a globe, whereon these four stars are found, extend a thread through B and D, and another through C and E; the point of intersection will give the place of the comet. This practice being repeated for several days, the comet's course will be had on the globe; which course will be found to be a great circle: if this great circle, drawn through three distant places, and shewing its path among the stars, be continued till it intersect the ecliptic, it will shew nearly the place of the node, and the inclination of the orbit to the ecliptic. The plane of the node and inclination of the orbit being thus found from several triplets of places independent of each other, a medium of the results may be considered as tolerably accurate.

COMET, *to determine the parallax of a.* See PARALLAX.

COMET, *trajectory of a.* See TRAJECTORY.

The Elements of Ninety-seven Comets.

No.	Passage through the Perihelion in Mean Time at Greenwich.	Longitude of the Perihelion on the Orbit of the Comet.	Perihelion Distance, that of the Earth being 1.	Longitude of the ascending node.	Inclination of the Orbit.	Mean Motion.	Authors who have calculated the Orbit, and Remarks.
1	Anno A. C. 539 October 20	10° 13' 30"	0.3412	1° 28' or 7° 28'	10° + or -	D	Burckhardt
2	Anno Domini, Old Style. 837 March	9 19 3	0.5800	6° 27' 33" 0"	10° or 12°	R	Puigré
3	1097 September 21,	11 2 30	0.7385	78° 30' 0"	6° 5 0	D	Burckhardt
4	1231 January 30,	4 14 48	0.9478	5 13 30	6 5 0	D	Puigré
5	1264 July 6, July 17,	9 21 0 9 5 45	0.445 0.41081	5 10 0 5 28 45	36 30 0 30 25 0	D	Dunthorn, } supposed by some to be the fame as No. 12 Puigré, }
6	1299 March 31	0 3 20	0.3179	3 17 8	68 57 0	R	Puigré
7	1301 October + or -	9' or 10'	0.457	0 15' or 0"	70° + or -	R	Puigré
8	1337 June 2	1° 7' 59"	0.40666	2° 24' 21" 0"	32° 11' 0"	R	Halley, nearly
9	1351 November 26	0 20 0	0.6445	2 0 22	32 11 0	R	Puigré
10	1456 June 8	2 9 0	1.0000	1 18 30	17 56 0	D	Burckhardt
11	1472 February 28	1 15 33	0.54273	9 11 46	5 20 0	R	Puigré, period 75½ years
12	1531 August 24	10 1 39	0.59700	0 15' or 0"	5 20 0	R	Halley, nearly
13	1532 October 19	3 21 7	0.50910	2 20 27	17 56 0	D	Halley, nearly
14	1533 June 16	4 27 16	0.20286	4 5 44	32 36 0	D	Halley, nearly, who supposed it might be the fame as No. 25
15	1556 April 21	0 20 3	0.46390	5 25 42	35 49 0	R	Downes, nearly
16	1577 October 26	4 9 22	0.18342	0 25 52	32 6 30	D	Halley nearly, supposed by some to be the fame as No. 5
17	1580 November 28	3 19 11	0.59553	0 19 7	71 32 45	R	Halley, nearly
18	1582 May 7	3 19 5	0.59028	0 18 57	64 51 50	D	Puigré
19	1590 January 29	8° 5' or 9' 11"	0.23 or 0.04	7 5' or 21°	64 40 0	R	Halley
20	1593 July 8	7 6 54	0.57661	1° 5' or 21°	59° or 61°	R	Puigré nearly
21	1596 July 31	5 26 19	0.08911	7 5' or 21°	6° 4' 0"	D	Halley
22	1607 October 16	7 18 36	0.51293	5 15 30	29 40 40	D	De la Caille, nearly
23	1618 August 7	3 2 40	0.51298	5 14 15	87 58 0	D	De la Caille, nearly
24	1618 October 29	0 2 14	0.37975	10 12 12	55 12 0	R	Halley
25	1652 November 2	0 28 18	0.84750	10 15 36	50 9 45	R	Puigré
26	1661 January 16	3 25 58	0.44851	11 20 21	32 9 45	R	Puigré
27	1664 November 24,	4 10 41	1.025755	9 23 25	21 28 0	D	Halley, vide Principia Newtoni, p. 524
28	1665 April 14	2 11 54	0.16649	2 16 10	21 28 0	D	Puigré, nearly
29		5 15 30		2 16 1	37 34 0	D	Halley
30				2 28 10	79 28 0	D	Halley
31				2 22 30	32 35 50	D	Halley, who supposed it might be the fame as No. 12
32				2 21 13	21 18 40	R	Halley, vide Principia Newtoni, p. 520
33				7 18 2	76 5 0	R	Halley

28	1672	February 20	8 37 0	1 16 59 30	0.69739	9 27 30 30	83 22 10	D	Halley	
29	1677	April 26	0 37 30	4 17 37 5	0.28059	7 26 40 10	79 3 15	R	Halley	
30	1678	August 16	14 3 0	10 27 46	1.23801	5 11 40 0	3 4 20	D	Douwes, nearly	
31	1680	December 8	0 1 2	8 22 40 10	0.006030	9 1 57 13	61 22 55	D	Pingré	
		7	0 4 0	8 22 33 0		9 1 53 0	61 20 20	R	Halley, vide Principia Newtoni, p. 500	
		7	23 9 0	8 22 44 25	0.006170	9 2 2 0	61 6 48	R	{ Halley, an elliptical orbit, major axis 138.29557, period 575 years, vide Principia Newtoni, p. 501	
		7	20 38 39	8 23 26 48	0.006505	9 2 59 9	58 39 50	R	{ Euler, an elliptical orbit, vide Theoria motuum Planetarum & Cometarum.	
		8	0 4 0	8 27 43 0	0.0065920	9 1 53 0	61 20 20	R	Newton, graphically determined, vide Principia, p. 500	
*10	1682	September 4	7 39 0	10 2 52 50	0.58328	1 21 10 30	17 56 0	R	Halley, vide Principia Newtoni, p. 52	
			21 31 0	10 1 36 0	0.58250	1 20 48 0	17 42 0	R	{ Halley, an elliptical orbit, major axis 177.8, period 75½ years, vide Principia Newtoni, p. 524	
32	1683	July 2	3 52 0	2 25 29 30	0.56620	5 23 23 0	83 11 0	R	Halley, vide Principia Newtoni, p. 522	
33	1684	May 29	10 16 0	7 28 52 0	0.06015	8 28 15 0	63 48 40	D	Halley	
34	1686	September 6	14 33 0	2 17 0 30	0.32500	11 20 34 40	31 21 40	D	Halley	
35	1689	November 21	14 55 0	8 23 44 45	0.010889	10 23 45 20	69 17 0	R	Pingré, nearly	
36	1698	October 8	16 57 0	9 0 51 15	0.69129	8 27 44 15	11 46 0	R	Halley	
37	1699	January 3	8 22 19	7 2 31 6	0.74400	10 21 45 35	69 20 0	D	De la Caille, nearly	
38	1702	March 2	14 12 10	4 18 41 3	0.64500	6 9 25 15	4 30 0	D	De la Caille	
39	1706	January 19	4 22 39	2 12 29 10	0.42580	0 13 11 40	55 14 10	D	De la Caille	
			4 56 4	2 12 36 25	0.42685	0 13 11 23	55 14 5	D	Struyck	
40	1707	November 30	23 29 39	2 19 54 56	0.8597	1 22 46 35	88 56 0	D	De la Caille	
			23 43 6	2 19 58 9	0.85904	1 22 50 29	88 37 40	D	Struyck	
41	1718	January 3	23 38 39	4 1 30 0	1.02650	4 8 43 0	30 20 0	R	De la Caille	
		4	1 14 55	4 1 26 36	1.02505	4 7 55 20	31 12 53	R	Douwes	
42	1723	September 16	16 10 0	1 12 15 20	0.998651	0 14 16 0	49 59 0	R	Bradley, very accurate, vide Principia Newtoni, p. 523	
43	1729	June 14	11 6 40	10 22 40	4.26140	10 10 32 37	76 58 4	D	De la Caille, vide Mem. de l'Acad. Roy. des Sciences 1763	
		12	6 36 2	10 22 16 53	4.0668	10 10 35 75	77 1 58	D	Douwes	
44	1737	January 19	8 20 0	10 25 55 0	0.22282	7 16 23 0	18 20 45	D	Bradley, very accurate	
45	1739	June 6	9 59 40	3 12 38 40	0.67358	0 27 15 14	55 42 44	R	De la Caille	
46	1742	January 28	4 38 40	7 7 35 13	0.76568	6 5 38 29	66 59 14	R	De la Caille	
		27	4 20 50	7 7 33 44	0.765555	6 5 34 45	67 4 11	R	Struyck	
47	1742	December 30	20 25 40	7 10 49 23	0.7521	6 9 32 7	61 43 44	R	Euler, vide Theoria motuum Planetarum & Cometarum, p. 188	
			21 15 16	3 2 41 45	0.83501	2 8 21 15	2 19 33	D	De la Caille, nearly	
48	1743	September 9	21 10 18	6 33 52	0.838115	2 8 10 43	2 15 50	R	Struyck	
49	1744	February 19	8 27 0	6 17 12 55	0.32157	0 5 10 25	45 48 21	D	Klinkenberg	
50	1747	February 20	11 44 38	9 7 2 0	2.19851	1 15 45 20	47 8 36	D	Bradley, very accurate, vide Philof. Transf. vol. 43	
		17	11 44 38	9 10 5 41	2.29188	4 26 18 50	79 6 20	R	De la Caille, vide Mem. de l'Acad. 1757	
51	1748	April 17	19 35 0	7 5 0 50	0.84067	7 22 32 16	85 26 57	R	Maraldi	
52	1748	June 7	1 24 15	9 6 9 24	0.65525	1 4 39 43	56 59 3	D	Struyck, nearly	

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	New Style.	4	2	49	0	0.33800	7	4	0	12	48	0	D			
53	1757 October 21	9 46 40	4	2	49	0	0.33800	7	4	0	12	48	0	D	Pingré, vide Mem. de l'Acad. 1757	
54	1758 June 11	3 17 40	8	27	38	0	0.21535	4	20	50	0	68	19	0	R	Pingré, vide Mem. de l'Acad. 1759
*10	1759 March 12	13 31 0	10	3	16	0	0.58349	1	23	49	0	17	39	0	R	De la Caillé
		13 19 4	10	3	16	10	0.58400	1	23	45	35	17	40	14	D	De la Laude
		13 48 16	10	3	16	20	0.58360	1	23	49	41	17	35	20	D	Maraldi, vide Mem. de l'Acad. 1759
55	1759 November 27	0 2 37	1	23	34	19	0.501300	4	19	39	21	79	0	38	D	Pingré
56	1759 December 16	21 3 40	4	18	24	35	0.96599	2	19	50	45	4	51	32	R	De la Caillé
57	1762 May 28	15 17 40	3	15	15	0	1.0134	11	19	20	0	84	45	0	D	De la Laude, vide Mem. de l'Acad. 1762 and 1763
		6 11 20	3	14	20	46	1.000856	11	19	20	2	85	35	2	D	Struyck
	29	0 18 28	3	15	22	23	1.01415	11	18	55	31	85	22	21	D	Maraldi
58	1763 November 1	19 43 18	2	24	51	54	0.49876	11	26	23	26	72	40	40	D	Pingré, vide Mem. de l'Acad. 1774
		20 58 14	2	25	1	6	0.49820	11	26	27	0	72	28	0	D	Burckhardt
59	1764 February 12	13 42 16	0	15	14	52	0.55532	4	0	4	33	52	53	31	R	Pingré, vide Mem. de l'Acad. 1771
60	1766 February 17	8 40 40	4	23	15	25	0.59533	8	4	10	59	40	50	20	R	Pingré, nearly, vide Mem. de l'Acad. 1766
61	1766 April 22	20 46 20	8	2	17	53	0.33274	2	14	22	59	11	8	4	D	Pingré, vide Mem. de l'Acad. 1773
62	1769 October 7	12 20 40	4	24	5	54	0.12376	5	25	0	43	40	37	33	D	De la Lande, vide Mem. de l'Acad. 1769 and 1775
		13 35 53	4	24	11	7	0.12272	5	25	6	33	40	48	49	D	Properri
		14 59 39	4	24	16	0	0.12265	5	25	3	0	40	50	0	D	Euler, an elliptical orbit
		15 38 16	4	24	10	51	0.1227	5	25	4	41	40	49	33	D	{ Lexell, an elliptical orbit, vide Mem. de l'Acad. 1775 p. 430.
		12 34 9	4	24	11	8	0.1232852	5	25	2	44	40	48	29	D	Sir Henry Englefield
		15 43 2	4	24	15	53	0.12275	5	25	6	4	40	46	42	D	Pingré, an elliptical orbit, vide Mem. de l'Acad. 1771
		12 44 38	4	24	11	32	0.12327	5	25	3	40	40	47	56	D	Legendre, vide Non. Mct. pour la Del. des Orb. des Cometes
63	1770 August 14	0 4 4	11	26	26	13	0.67683	4	12	17	3	1	34	30	D	{ Pingré, an elliptical orbit, major, femi axis, 3.68891, pe- riod 5.42886 years
	13	12 55 40	11	26	16	26	0.6743815	4	12	0	0	1	33	40	D	{ Lexell, an elliptical orbit, major, femi-axis 3.14786, period 5.585 years, vide Phil. Trans. vol. 69
	13	12 37 35	11	26	15	0	0.67435	4	11	54	59	1	34	31	D	{ Burckhardt elliptical orbit, major, femi-axis 3.1455, pe- riod 2935 days
64	1770 November 22	5 39 40	6	28	22	44	0.52824	3	18	42	10	31	25	55	R	Pingré
65	1771 April 18	22 5 7	3	13	28	13	0.96576	0	27	51	0	11	15	20	D	Pingré
	19	5 1 21	3	14	2	54	0.96340	0	27	50	27	11	10	0	D	Burckhardt, an hyperbolic orbit
66	1772 February 18	25 44 15	3	18	6	22	1.01815	8	12	43	5	18	59	40	D	De la Lande
67	1773 September 5	11 9 25	2	15	35	43	1.13390	4	1	5	21	61	25	21	D	Pingré, an elliptical orbit, vide Mem. l'Acad. 1774 and 1777
		14 33 48	2	15	10	58	0.10120	4	1	5	30	61	14	7	D	Burckhardt
68	1774 August 15	10 06 15	10	17	22	4	1.4286	6	0	49	38	83	0	25	D	Mechain
69	1779 January 4	2 2 40	2	27	13	11	0.71312	0	25	5	51	32	24	0	D	Mechain
		2 15 10	2	27	13	40	0.7132	0	25	3	37	33	25	30	R	Chev. d'Angos
70	1786 September 30	18 3 30	8	6	21	18	0.69925	4	4	9	19	53	48	5	R	Mechain
71	1781 July 7	- 4 32 0	7	29	11	25	0.75861	2	23	0	38	81	43	26	D	Mechain
72	1781 November 29	12 32 26	0	16	3	28	0.6101	2	17	22	32	27	13	8	R	Mechain
		12 33 25	0	16	3	7	0.96095	2	17	22	55	27	12	4	D	{ Legendre, vide Nouvelle Methodes pour la determ. des Orbites des Cometes

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73	1783	November 15	5 44 3	1 15	24 46	1.5553	1 24 13 50	53 9 9	D	Mechain, nearly
74	1784	January 21	4 47 40	2 20	44 24	0.70786	1 20 49 21	51 9 12	R	Mechain
75	1784	April 9	21 7 26	10 28	54 57	0.650331	2 26 52 9	47 55 8	R	Chev. d'Angres
76	1785	January 27	7 48 44	3 19	51 56	1.14.308	8 24 12 15	70 14 12	D	Mechain
77	1785	April 8	8 58 52	0 27	29 33	0.447300	2 4 33 36	87 31 54	R	Mechain
78	1786	July 7	21 50 52	5 9	25 30	0.41610	6 14 22 40	50 34 28	D	Mechain, vide Mem. de l'Acad. 1786
79	1787	May 10	19 43 40	0 7	44 9	0.34891	3 16 51 36	48 15 51	R	P. de Saron, vide Mem. de l'Acad. 1787
80	1788	November 10	7 25 40	3 9	27	1.02601	5 7 10 38	2 28 20	R	Mechain, vide Mem. de l'Acad. 1788
81	1788	November 20	9 4 25	0 23	12 32	0.766911	11 21 42 15	64 52 32	D	Mechain
82	1790	January 15	5 5 39	2 0	14 32	0.7581	5 26 11 46	51 54 15	R	De Saron, vide Connoissance des Temps
83	1790	January 23	7 30 13	3 21	44 37	1.003286	8 27 8 37	56 58 13	D	Mechain
84	1790	May 21	5 46 54	9 3	43 27	0.79790	1 3 11 2	63 52 27	R	La Lande
85	1792	January 13	13 35 9	1 6	29 43	1.003	6 10 46 15	39 46 55	D	
86	1795	December 14	23 17 53	5 13	37 0	0.227	11 29 11 0	24 17 0	D	Zach
		15	15 6 18	5 7	37 0	0.258	11 13 23 0	20 3 0	R	Bouvard
		14	18 43 0	5 15	34 0	0.215	0 1 7 0	24 42 0	R	Properin
87	1795	April 2	19 47 51	6 12	44 0	1.578	0 17 2 0	64 55 0	R	Olbers
88	1797	July 9	2 44 31	1 19	34 48	0.52545	10 29 16 35	50 35 50	R	Bouvard
89	1797	April 4	11 32 21	3 14	59 0	0.48476	4 2 9 0	43 52 16	D	Burekhardt
90	1798	December 31	12 58 57	1 4	29 48	0.77968	8 9 30 44	42 23 25	D	Burekhardt
91	1799	September 7	5 49 48	0 3	39 12	0.859865	3 9 31 59	50 55 37	R	Mechain.
			5 34 4	0 3	39 10	0.840178	3 9 27 19	50 57 30	R	Von Zach
			4 24 39	0 3	36 0		3 9 34 0	50 52 30	R	Burekhardt
92	1799	December 25	21 30 40	6 10	20 12	0.625810	10 26 49 11	77 1 38	R	Mechain. De la Lande thinks it may be the same as N ^o . 37
93	1801	August 8	13 22 39	6 3	49 0	0.2617	1 14 28 0	21 20 0	D	Burekhardt
94	1803	September 9	20 33 54	11 2	8 0	1.0942	10 10 17 0	57 0 0	R	Mechain, vide Conn. des Temps, an. 14
95	1804	February 13	13 31 7	4 28	44 51	1.07117	5 56 47 58	56 28 40	D	Gauss, vide Connoissance des Temps, an. 15
		13	15 30 39	4 28	53 32	1.072777	5 26 49 47	56 44 20	D	vide Connoissance des Temps, an. 1808
96	1805	November 18	0 15 30	4 29	0 28	0.37567	11 15 6 51	15 58 12	D	Legendre, } vide Nou. Meth. pour la Del ^{te} . des Orbits
97	1855	December 31	6 1 36	3 19	23 40	0.69139	8 10 35 24	16 25 25	D	Legendre, } des Cometes.

COMETARIUM.

On the subject of *Comets*, see Newton's *Principia*, lib. iii. Halley's *Synopsis of Comets*; Sejmou Elfaï for les Cometes, 1775; M. Pingre's *Cometographie*, 2 vols. 4to. 1781, Sir H. Englefield's work "On the determination of the Orbits of Comets," M. Bode's *General Considerations on the situations of the Orbits of all the Planets and Comets* which have hitherto been calculated, inserted in the *Memoirs of the Academy of Sciences of Berlin*; Dr. Gregory's *Astronomy*; O. Gregory's *Treatise on Astronomy*, 1803; De la Lande, *Théorie des Cometes*, 1759; and *Astronomie*, vol. iii.; An Account of the Discoveries concerning Comets, with the way to find their Orbits, &c. by Thomas Barker, 1757; Vince's *Astronomy*, &c. &c.

COMETARIUM, or COMETARIAN, in *Mechanics*, is the name of a machine, contrived by Dr. Desaguliers, for the purpose of exhibiting and explaining the eccentric motion of a comet, agreeably to that law, of planetary motion, by which equal areas are described by the radius vector in equal times. Ben. Martin has given an account of this machine, in his "Young Gentleman and Lady's Philology," and Mr. Ferguson has described it still more particularly in his "Astronomy," but as those authors have not given a perspective view of the parts of action, we have thought it necessary to give a new drawing, such as we conceive will render the mechanism clearly intelligible to every reader. In *Plate I. of Planetary Machines*, *fig. 1.* represents the cover of the cometarium, taken from the box which contains the wheel-work, and *fig. 2.* shews the box and its contents, with the exception of the cover, and one side, the latter of which is supposed to be removed, in order to disclose more fully the disposition of all the contained parts. A B in *fig. 2.* is the bottom of the box, which supports the lower pivots of the three vertical arbors; C D is a longitudinal bar inserted into the ends of the box, and bearing the upper pivots of the said arbors, as may be clearly seen in the figure; E is the handle put on the end of the horizontal arbor E F, which arbor is pivoted into the front and back sides of the box; on this horizontal arbor, under the letter C, is an endless screw actuating the wheel G, with teeth not rounded but cut a little obliquely; the number of which teeth may be assumed at option, to correspond to an aliquot part of a circle, suppose $\frac{7}{2}$, in which case one tooth, or revolution of the handle, will correspond to 5° ; at the inferior end of the arbor of wheel G, is fixed another wheel H, of the same number of teeth, that actuates a similar wheel I, on the second vertical arbor; so that these two wheels, H and I, also revolve each in $\frac{1}{2}$ d part of a circle, or 5° , at each revolution of the handle. Mr. Ferguson has placed the endless screw as in *fig. 2.* of *Plate II.*, between the wheels H and I in such a way, as to impel them both in contrary directions at the same time, which construction is still more simple, as it dispenses altogether with the wheel G, and requires no rounding of the teeth; to the arbor of wheel I a solid plate K, in the form of an ellipse, is fixed fast at a point out of the centre, and has a groove round its edge to admit a cord to pass round it; and a second elliptic plate L, every way similar to plate K, is attached, at a point equally distant from the centre, to the third vertical arbor, but in such a way, that, when an endless cord is made to embrace the grooves of both, after crossing between them, the long radius of one is always directed towards the short radius of the other reciprocally, so that as the radius of plate K continues to lengthen in revolving half round, the radius of L continues to shorten, and *vice versa* during the other half of the revolution; this alteration of gradual lengthening and shortening of the radii, of the equally moving elliptic plate K, produces an

alternate acceleration and retardation of motion in the plate L, such as corresponds with the equated motion of a heavenly body, describing equal areas in equal times; and the quantity of eccentricity given to the elliptic plates determines the quantum of the greatest equation in the orbit to be represented. Above the cross-bar CD is fixed an elliptic plate M, by two ferrets, seen in both the figures, round which the comet O is confined to move in its motion round N, the sun, which is a ball attached to the superior end of the arbor of the plate L of unequal motion; to the ball N, the arm or radius vector N O is attached, which therefore also moves with alternate accelerations and retardations of motion along with plate L; and as the comet O has liberty to slide along the radius vector, while a fluid under it penetrates the black elliptic groove, made in the cover round the plate M, the variation of distances is thereby effected as the comet is carried round: the point of the greatest distance, where the motion is slowest, is called the *aphelion*, from *απο*, *from*, and *ήλιος*, the *sun*, and the point of nearest distance, where the motion is quickest, is called the *perihelion*, from *περι*, *round*, and *ήλιος*, the *sun*. The two circles of signs, and also the graduated ellipse, are marked on the cover of the machine, and the arm G, in *fig. 1.* is placed on the equally moving arbor of wheel G, in *fig. 2.* so that when the arm G moves through the signs in the small circle, by equal arcs in equal times, the arm N O moveable round the point N, passes through corresponding unequal arcs in the larger circle of signs, while the difference between the places of the two said arms shews the quantity of prosthaphæresis, or equation in any situation in the large graduated circle, which is assumed to be parallel to the comet's orbit. In order that the nature of the comet's motion may be the more apparent to the eye of a spectator, when referred to its own orbit, the small ellipse, beyond the darkened aperture that regulates the distances, is also divided into signs, but in such a way, that the angles subtended by each sign, when referred to the point N, or centre of motion, are unequal among themselves throughout each six successive signs, and if lines were drawn from each point where the comet is found at the end of each day or week, to the point N, they would include equal areas, or plane surfaces taken geometrically; in some of the machines indeed, those lines are actually drawn, and the separate triangular areas corresponding to each equidistant period are painted alternately black and white, to render the doctrine of the celebrated Kepler still more evident to the senses. The principal objections to the construction of the machine before us is, that the comet O is apt to move by jerks in certain parts of the orbit, particularly when the eccentricity is great; and also the cord is liable to slide in some situations, without producing the corresponding motion in the elliptic plates K and L; the latter of which objections has been attempted to be obviated, by attaching forked pieces of metal to the plane of one of the elliptic plates near its end, and pins to the other, as in *fig. 2. Plate II.* to form a kind of teeth; but a better plan, and which has been adopted sometimes in practice, where the eccentricity is not very great, is to cut the elliptic plates themselves into toothed wheels, and to substitute them for the wheels H and I, in which case the cord may be dispensed with altogether, and the arm N O, we presume, will thus be less liable to jerks.—After all, however, this machine does not profess to represent the period of a revolution of any of the comets or planetary bodies, but is intended merely to explain the law of their motion, which it will do in a very satisfactory manner, when well made; and it is easy to see, that, as the plate M may be fixed more or less out of the centre, such a change of distances

distances may be produced, as shall correspond to the changes of angular velocity; which is the chief difficulty to be overcome in the mechanical representation of the orbit.

New Cometarium by Mr. Jones.

Subsequently to our writing the preceding account of the cometarium, Mr. W. Jones, optician in Holborn, has favoured us with a drawing and description of a new construction of the cometarium, which he says is free from the jerks that we have stated as an objection to the plan of Dr. Desaguliers, and which, therefore, we lay before the public as nearly in the author's own words as our arrangement and observations on it will admit.

Fig. 1. of *Plate II.* of *Planetary Machines* is a representation of the external part of the machine, which is not confined to any particular dimensions, but has generally been made as follows; *viz.* A B C D is a mahogany box, about 12 inches long, 9 wide, and $4\frac{1}{2}$ deep, containing the wheelwork that gives motion to the comet *x*; the dark elliptical space is a groove representing the orbit of the comet, which is carried round in the direction of the alphabetical order of the letters. The point *a* is the perihelion, and the point *g* the aphelion; and the triangular spaces or areas, *a S b*, *b S c*, &c. are all respectively equal to each other: in one turn of the handle N, the comet *x* is moved over one of these areas; consequently, in the same time that it moves from *f* to *g*, or from *g* to *b*, it moves from *m* to *a*, or from *a* to *b*, and in like manner through each succeeding area, the quicker motion being at *a*, and the slowest at *g*; thus showing that the velocity of a comet in its orbit continually and gradually decreases from the perihelion *a* to the aphelion *g*, and increases in the same proportion from the aphelion to the perihelion. The elliptical orbit is divided into twelve signs with their respective degrees, and in a similar manner is the circle *n o p s t*, which represents a great circle in the heavens, and to which the motion of the comet is referred by the extremity of the wire W, moveable at S, and actuated by the stem of the comet, which slides against it, in and out alternately, in its progress in the orbit. During the comet's motion in its orbit from *f* to *g*, its apparent motion is only about five degrees in this circle, as pointed out by the end of the wire; but in the same time as the comet moves from *m* to *a*, or from *a* to *b*, it appears to describe the large angular space *1 m*, or *n o* in the heavens, each of which arcs contains about 120° , or four signs; and if the eccentricity of the orbit were still greater, the greater would be the difference between the two extreme velocities. The figures 1, 2, 3, 4, &c. to 12, represent a small comparative circular orbit, for shewing the equable motion of a body, supposed to move concentrically round the sun S, and to describe equal arcs, as well as equal areas, 1 S 2, 2 S 3, &c. in equal times with those of the comet *x* in its elliptical orbit before mentioned. Suppose now the bodies *x* and *o* to commence their motions at the same instant from the points *a* and *1*, and to arrive at the same respective points again, after a revolution of each, at the same instant, it will be observed, during their progress, that the body *x* will be more forward than the body *o* in the first six signs from *a* to *g*, but more backward in the next signs from *g* to *a*, and the difference between the places of the two bodies, in any part of the small or equable orbit, will be the *equation of the centre* in that particular part. At the points *a*, 1, and *g*, 7, the bodies are together, and consequently the equation vanishes, and from thence begins to take an opposite character, changing from plus to minus, and *vice versa* at the respective points; also, the distance from the aphelion point, in the small orbit, is called the *mean anomaly*, reckoned in

signs and degrees; and the distance from *a*, in the large circle, reckoned in a similar manner, is called the *true or equated anomaly*. Thus the reason appears evident, why, in astronomical calculations taken from the tables of Dr. Halley, or la Lande, the grand equation of a body moving in an elliptic orbit is *additive* in the first six signs, and *subtractive* in the second six, with respect to the place ascertained by an assumption of mean motion; and the same application of the grand equation, after some modification of its varying quantity, is used from the apogee to the perigee, and back again from the perigee to the apogee of the lunar orbit.

The mechanism, by means of which these motions are produced in the original cometarium, has been already explained above, from which that of Mr. Jones is very different, and is thus explained by him.

From the circumstance of its being considered as impracticable to obtain an easy and uniformly steady motion of a comet, by Dr. Desaguliers's mechanism, Mr. Jones has adopted the plan of using only one great wheel revolving on an arbor placed out of the centre, agreeably to the drawing exhibited in *fig. 3.* of *Plate II.* near the point H, and under the cock attached to the plane of the wheel, by three visible screws. The different parts and action of the mechanism are these; A B represents the inside bottom of the box, seen in *fig. 1.* of the same plate; C D is an oblong piece of mahogany, fitted so as to slide easily but steadily in the grooves of two parallel side-pieces of the same wood, made fast to the bottom, and denoted by the letters E and F; G is the large brass wheel, about five inches diameter, which we have said revolves on an eccentric arbor, near the point H; over this point is placed the cock, or bent arm, H I, with an oblong slit through it, to receive the sliding piece *a*, which piece supports the low end of the stem that carries the comet X in *fig. 1.* K and L are two wheels pivoted above into a bridge P, shaped like a cross, and have equal numbers of teeth, the latter of which wheels is actuated by the contrary wheel M, inserted on the axis B, of the handle N; on the same arbor with K, and close under the bridge P, is a small wheel (seen in the figure) that impels the large wheel G, round its eccentric arbor; it will not perhaps appear evident to an ordinary mechanic, how the action of the small and large eccentric wheel is rendered continual, and the pitching of the teeth made good all round the great wheel, notwithstanding the constant variation of the distances from the eccentric point, which is the centre of its motion, and the successive points of its circumference; to effect this apparently difficult purpose, considerable ingenuity was necessary; by examining the crosses and rim of the large wheel, it will be seen, that the thickness of the crosses, and of the teeth, is less than of the rim, so that the rim may be said to have a circular edge-bar on its plane projecting upwards; this edge-bar is embraced by two rollers, the larger one moving round on the arbor of wheel K, above the small wheel, and the smaller one carried by a cock O, fast to the crossed bridge P; so that, as the great wheel is urged round by the small one, these two rollers give motion to the sliding piece of wood C D, alternately in and out, and consequently bring the teeth of the wheel borne by this sliding piece, into a proper depth to act with its small impelling wheel, in every part of the revolution of the former, which therefore acts as well, when the teeth are directed towards the centre of motion, as if the arbor had been in the centre of the wheel, and placed on a stationary bar. The wheel, however, has many more teeth coming successively into action during one half of its revolution, round the eccentric point of its motion, than it has during the other; and on this circumstance depends the variable velocity of the comet attached

to its arm I, as it regards the said centre of motion. We shall have occasion to shew, in another place, that the equation, produced by this cause only, would be just one half of the proper equation of the centre, or very nearly so, provided the sun were placed exactly over the centre of motion, or eccentric point of the wheel: it is also not difficult to shew, that if the wheel had no eccentric motion, but had the sun placed at a similar distance out of its centre of motion, one half of the due equation would also, in that case, be effected, supposing the circle of figures, pointed to by the wire, to be eccentric with regard to the wheel, and supposing the sun to be in its centre; now, in the instrument before us, these two causes operate together to produce the total equation due to the orbit, where the eccentricity of the wheel is to its radius, and also the eccentricity of the sun's position, at the opposite side of the wheel's centre, to the same, as the eccentricity of the comet is to the radius of its orbit. It must, however, be acknowledged, that the joint agency of the two said causes of the equation, supposes the sliding bar CD to be stationary, in which case the action of the wheels would soon be impeded; consequently, that part of the equation which depends on the sun's eccentric position, as it regards the wheel's arbor, is variable, and in some measure must derange the scale of equations, as it would have been, if the wheel's arbor had been stationary; the remedy for this small deviation from perfect accuracy in the scale of equations thus produced by the joint agency of three causes, is best effected by making the straight lines, that form the triangular areas, to correspond, not to a geometrical measurement, but to the actual turns of the handle, one of which will correspond to each triangular area, when the contrate wheel M, and also the small wheel over K, have each one twelfth part of the number of teeth that the great wheel has, which wheel, in that case, may have any optional number that is divisible by twelve. When the centre of the large wheel lies exactly in a line joining the centre of motion H, and the arbor of K, the sliding board CD is the most pushed out, and the comet is at the aphelion *g*, *fig. 1.* moving slowly; but when the centre of the wheel's motion lies between the central point of it and of wheel K, then the comet is at the perihelion *a*, moving quickly. The cock *y*, in *fig. 1.*, holds the elliptic plate, with the triangular areas marked on it, and bearing on it the sun, in such a situation, that the groove round its edge, in which the stem of the comet moves, limits the distance at all times of this body, as it respects the sun, which is done by making the sliding piece in *fig. 3.* move in or out in the slit of the arm I, already described. Thus the jerks of the old cometarium are avoided, and all its apparent properties are preserved, except that a portion of the large graduated celestial circle is unavoidably concealed by the superior elliptic plate of triangular areas.

COMETES, in *Botany*, (*comætes*, *crinitus*, so called on account of the remarkably hispid involucre,) Linn. Mant. 39. Schreb. 211. Willd. 211. Lam. II. 203. Juff. 437. Class and order, *tetrandria monogynia*. Nat. Ord. *Tricoccoe*.

Gen. Ch. *Calyx* common. Involucre four-leaved, inclosing three fessile flowers, oblong, equal, ciliate-hispid. *Calyx* proper. Perianth four-leaved; leaflets oblong, equal the length of the involucre. *Cor.* none. *Stam.* Filaments four, capillary, the length of the involucre; anthers roundish. *Pist.* Germ superior, roundish; style filiform; stigma triû. *Peric.* Capsule tricoccos. *Seeds* solitary.

Eff. Ch. Involucre four-leaved, three-flowered. *Calyx* proper, four-leaved. *Corolla* none. *Capsule* tricoccos.

Sp. C. *alternifolia*. Linn. Syst. Nat. Mart. Willd. Burm. Ind. 39. tab. 15. fig. 5. (*Clinopodium parvum finicum*; Puk. Alm. 61. tab. 380. fig. 4.) *Root* annual. *Stem* a foot high, herbaceous. *Leaves* opposite, narrowing into a petiole; inversely egg-shaped, acuminate, quite entire. *Peduncles* in pairs, terminal and axillary. A native of Surat.

COMETITES, in *Natural History*, a name given by some writers to a kind of afroites, which has flars much larger than those of the common kind, and therefore called *comets*.

COMEUS, in *Mythology*, a surname of Apollo, under which title he was worshipped at Seleucia, whence his statue was carried to Rome, and placed in the temple of Apollo Palatine.

COMFETS, **STONY**, in *Natural History*, drop-stones or confets. These are stalactites, broken into short pieces, somewhat resembling comets, and certain kinds of sugar-plums, and which in Italy and other places are sometimes put up in boxes and labelled, so as to deceive strangers at first sight, in supposing them to be real comets.

COMFLOENTA, in *Ancient Geography*, a town of Spain, in the Tarragonensian territory, placed by Ptolemy in the country of the *Arevaci*.

COMFORT POINT, in *Geography*, is the fourth easternmost part of Elizabeth-city county, in Virginia, formed by James river, at its mouth in Chesapeake bay; 19 miles W. by N. of Cape Henry.

COMFREY, or **COMPHRY**, in *Botany*. See *SYM- PHYTUM*.

COMHOLA, in *Geography*, a river of Ireland, which runs into Bantry bay; 3 miles N. of Bantry.

COMI, in *Ancient Geography*, a people of Asia, in Bactriana, said by Ptolemy to have dwelled in the vicinity of the *Chomari*.

COMILDAVA, a town of Dacia, according to Ptolemy.

COMILLAH, in *Geography*, a town of Hindoostan, in the province of Bengal; 160 miles E. N. E. of Calcutta, and 176 E. S. E. of Moorshedabad. N. lat. 23° 25'. E. long. 91° 15'.

COMIN and **COMINOT**, two small islands in the Mediterranean, lying between Malta and Gofa or Gozo; the former supposed to be the Hephestia, or isle of Vulcan of the ancients. They were formerly uninhabited; but by the care of Vingnacourt, a fort having been built upon each of them for their safety, they have been since partly inhabited, and that of Comin, which is about 4 or 5 miles in circuit, breeds a large quantity of cattle. See *MALTA*.

COMINES, a town of Flanders, situated on the *Lis*, which divides it into two parts; formerly a considerable place, but reduced by war and various accidents; 25 miles S. of Bruzes, and 7 N. of Lille.

COMINGE, in *Military Language*, a shell of uncommon magnitude, which takes its name from the person who invented it.

COMING-TO, in *Sea Language*, denotes the approach of a ship's head to the direction of the wind.

COMINIUM, in *Ancient Geography*, a town of Italy in Samnium, which did not subsist in the time of Pliny.

COMIOLA, in *Botany*, a name given by some of the old Roman authors, to the plant commonly called *LUTEOLA*, or dyers' weed.

COMITATU commissio, in *Law*, a writ or commission, by which a sheriff is authorized to take upon him the charge of the county.

COMITATU et castra commissio, a writ by which the charge of a county, together with the keeping of a castle, is committed to the sheriff.

COMITATUS, in *Law*, a county. Ingulphus tells us, that England was first divided into counties by king Alfred; and the counties into hundreds, and these again into tythings; and Fortescue writes, that *regnum Anglie per comitatus, ut regnum Francie per balivatus, distinguitur*. Sometimes it is taken for a territory or jurisdiction of a particular place; as in Mat. Paris, anno 1234. See COUNTY.

COMITATUS *posse*. See POSSE.

COMITIA, an assembly of the Roman people, either in the Comitium, or Campus Martius, i. e. *Field of Mars*; meeting for the election of magistrates, or for consulting on the important affairs of the republic.

The word comes from the verb *coco*, or *comco*, to go together.

There were certain days fixed for these assemblies, called *dies comitiales*; marked with a C in the calendar of Julius Cæsar. Comitial assemblies, held for the election of consuls, were called *consular comitia*: in like manner, the other comitia took names from the officer to be created; whether a tribune, a pontiff, ædile, or the like.

There were three kinds of these comitia, viz. *curiata, centuriata, and tributa*; so distinguished from the manner wherein the people voted, and gave their suffrages, viz. by curiæ or parishes, tribes, or centuries.

The power of calling these assemblies pertained to all of the chief magistrates, and sometimes to the sovereign pontiff.

Authors make the difference between *comitia* and *concilia*, to consist in this; that in the former the whole people were called together, in the latter only a part.

COMITIA *curiata*. Romulus instituted the *comitia curiata*, or the public assemblies of the people, called to vote in their several curiæ: and it is agreed by all that the matters subjected to their decision, were the choice of all the magistrates, and the right of making laws, war, and peace: an ample jurisdiction, comprehending the most important articles of government, yet not wholly absolute, according to Dionysius, unless the senate concurred with them. This method of transacting all the greater affairs by the people, assembled in their curiæ, after it had subsisted through five successive reigns, was found to be inconvenient.

Servius Tullius, the sixth king of Rome, in order to correct the inconvenience of the *comitia curiata*, instituted a new division of the people into six classes, according to a census, or valuation of their estates; whence proceed the *comitia centuriata*: then he subdivided these classes into one hundred and ninety-three centuries, and contrived to throw a majority of these centuries, that is, ninety-eight of them, into the first class of the richest citizens. By which regulation, though every man voted now in his century, as before, in his curiæ; yet, as all matters were decided by a majority of the centuries, the balance of power was wholly transferred into the hands of the rich; and the poorer sort deprived of their former weight and influence in the affairs of state: which wise institution was ever after observed, through all succeeding ages, in the elections of the principal magistrates, and the determination of all the principal transactions of the republic.

COMITIAL *days*. Paulus Manutius is of opinion, that there were certain days on which the Roman senate might regularly be assembled; and others on which it could not: and that these last were called comitial days, and marked under that name in the calendars, as days wholly defined, and set apart by law, for the assemblies of the people. But Sigonius contends, that the senate might meet on any of those days, unless when the people were actually assembled, and transacting business on them; and consequently that

the title of comitial denoted such days only, on which the people might be legally assembled, not such on which they were of course to be assembled. Middlet. of Rom. Senat. p. 138, 139.

The truth of the matter seems to be this, that though the days called comitial were regularly destined to the assemblies of the people, yet the senate also might not only be convened on the same, after the popular assemblies were dissolved; but had the power likewise, whenever they found it expedient, to supersede and postpone the assemblies of the people to another day; and, by a particular decree, to authorize their own meetings upon them, for the dispatch of some important affair therein specified.

COMITIALIS *morbus*, in *Medicine*, an ancient term for the *epilepsy*, or falling sickness; so called, because if any person was seized with it in the Roman comitia, the assembly was immediately dissolved; this being esteemed an unlucky omen; or, rather, because those liable to it were chiefly seized in the comitia, or great assemblies. See EPILEPSY.

COMITIUM, the place where the comitia were ordinarily held, which was a large hall in the Roman Forum: it was a long time open at top; on which account the assemblies were often interrupted by bad weather: it was first covered over in the time of the second Punic war. See FORUM.

Rosinus observes, that the consuls and tribunes were not created in the *comitium*, but in the Campus Martius.

It was in this place that the rostra were placed. See COMITIA.

COMITLAN, in *Geography*, a town of North America, in Mexico, and province of Chiapa.

COMITOLO, PAUL, in *Biography*, one of the ablest of the society of Jesuits, acquired great reputation by his instructions in morality and theology at the commencement of the seventeenth century. He died in 1626, at the age of eighty years. His publications are "Catena illustrium authorum in Librum Job," translated from the Greek into the Latin language;—"Concilia seu responsa moralia;"—"Doctrina de contractu universo." Nouv. Dict. Hist.

COMMA, in *Grammar*, a point, or character, formed thus [,]; serving to mark a short stop, or pause; and to divide the members of a period.

The word is formed of *comisus*, *scio*, I cut.

It is very difficult to fix the precise use of the comma; different authors define and use it differently: the ordinary doctrine is, that the comma serves to distinguish nouns, verbs, adverbs, and the several parts of a period that are not necessarily joined together. But this conveys no clear, precise idea; for what is it to distinguish the parts of a period not necessarily joined together? F. Buffler has carried the doctrine of the comma farther: according to him, the comma serves to distinguish those members of a period, in each whereof is a verb, and the nominative case of the verb. Thus, "That so many people are pleased with trifles is owing to a weakness of mind, which makes them love things easy to be comprehended."

Besides this, the comma is used to distinguish, in the same member of a period, several nouns substantives, or nouns adjectives, or verbs, not united by a conjunction. Thus, "Virtue, wit, knowledge, are the chief advantages of a man:" or, "A man never becomes learned without studying constantly, methodically, with a just application, &c."

If those words be united in the same phrase by a conjunction, the comma is omitted: thus, "The imagination and the judgment do not always agree." The comma may also be omitted between the phrases that are very short, especially

if they depend upon the same regimen, and are united by a conjunction: thus, "Alexander conquered Asia and established the monarchy of the Greeks."

The ingenious author of the tract "De Ratione Interpungendi," printed with Vossius's Element. Rector. Lond. 1724, lays down the use of a comma to be, to distinguish the simple members of a period, or sentence; i. e. such as only consist of one subject, and one definite verb. Thus Cicero, "Veni in hac ad voluptates agrorum, quibus ego incredibiliter delector. quæ nec ulla impediuntur lenitate, & mihi ad lapentis vitam proxime accedere videntur." See SENTENCE.

But this rule does not go throughout; the same author inducing many particular cases, not included herein, where yet the comma is advisable.

Sometimes, *e. gr.* a proposition includes another, which may be called *paritibus*, as being only a part of the entire phrase; in which case, the two are to be divided from each other by commas. Thus, "He always says, as he tells us, the finest things in the world."

The points, or pauses in discourse, if is observed, are in a kind of musical proportion: the comma stops the reader's voice while he may privately tell one; the semi-colon, two; the colon, three; and the period, or full-stop, four. Others make the stop at the colon four; and the period six. Professor Ward observes, that the suspension of the voice should be twice as long for a comma, as between words separated by no mark of distinction; thrice for the semi-colon; and so in the same proportion. Bishop Lowth assigns to the period a pause in duration double to the colon; to the colon, double of the semi-colon; and to the semi-colon, double of the comma: so that they are in the same proportion to one another as the semibreve, the minim, the crotchet, and the quaver in music. But whatever be the duration of the several pauses, the proportion between them would be ever invariable, if the doctrine of punctuation were exact. Introd. to English Grammar, ed. 1772. p. 167.

The ancients only made use of two kinds of points, or pauses, in a period; the larger they call *members*, the Greeks *cola*, marked thus [:]; the smaller *incisæ*, the Greeks *commata*, thus [,].

The moderns, refining on their predecessors, have subdivided the first into a colon, and semi-colon; some say, without any good foundation in nature; though others maintain the usefulness of the division.

As the member, or colon, divides the period into two parts, each containing a sense, though that imperfect; thus, "Antequam de republica, patres conscripti, dicam ea quæ dicenda lege tempore arbitror;" where the sense does not rest, nor is the period or sentence perfect, without the addition of "exponam vobis brevier & protectionis & reversionis meæ;" the comma subdivides each member into intermediate divisions, which, of themselves, have no precise meaning at all: *e. gr.* "Nihil est, mihi crede, virtute formosius, nihil pulchrius, nihil amabilius."

Frequent commas, as on other occasions they promote perspicuity and distinctness, and ease the reader, both in the rehearsal and comprehension of his author; so, in oratory, are of especial use and effect; particularly where an adversary is to be closely and pointedly attacked, upbraided, reprehended, wounded, &c. Witnesses that of Cicero against Verres: "Non enim nos color iste fervilis, non pilosa genæ, non dentis putridi deceperunt: oculi, supercilium, frons, vultus denique totus, qui sermo quidam tacitus mentis est, hic in fraudem, homines impulit: hic, eos, quibus erat ignotus, decepit, sefellit, in fraudem induxit: pauci tua ista

Intulenta vitæ novimus; pauci tarditatem ingenii, suporem, debilitatamque linguam;" &c. On the use of commas, see Murray's English Grammar, ed. 8. p. 224, &c.

COMMA, in Music. By this term, theoretic writers on music have denominated several different small intervals in the musical scale, which makes it necessary that we should here enter rather minutely into the subject. We shall begin with that very essential interval in almost all musical calculations which is for the most part implied by the word comma without further addition, otherwise the

COMMA Major, Greater Syntonic or Elementary of various writers, being also the *Schisma* or *Schisma* of Des Cartes, Holder, and others. This interval seems first to have been noticed by the Greek writers, as the quantity by which the major tone T ($\frac{9}{8}$) exceeds the minor tone t ($\frac{8}{9}$); its ratio is $\frac{81}{80}$ and its value in the common or Briggs's logarithms is .0946049,6811, or when reckoned downwards .0053950,3189; and in the logarithms of Euler .017970; this last being, in fact, its decimal value, compared with the octave = 1. This comma is usually marked C, and is equal to 11.0078631 times the *Schisma* (Σ) = to 73.55198 times the lesser fraction (*f*) = to 1400.0913 times the minute (*m*), and = to $\frac{1}{375}$ of the octave nearly.

It is equal to the sum of 11 *Schismas* and a minute, ($11\Sigma + m$), or of a minor comma and a *Schisma*; it also results as the difference or remainder, after subtracting the following intervals from each other, *viz.* a *Schisma* from a *Diasthisma*, a minor comma from an *Euharmonic Disis*, a *Semitone minor* from a *Semitone medius*, a *Semitone medius* from an *Apotome*, (here observing that $\frac{21}{16}$ is the *Apotome* and not $\frac{21}{32}$, erroneously printed in our article), an *Euharmonic Disis* from a *Semitone minimum*, a *Limma* from a *Semitone major*, a *Semitone major* from a *Semitone maximum*, a *Semitone subminimum* from a *Semitone minor*, &c. The comma major is equal to the following additions of intervals, in triples, *viz.* two *Schismas*, a *Medius Residual* and a *Major Residual*; three *Schismas*, a *Minor Residual* and a *Major Residual*; five *Schismas*, a *Lesser Fraction* and a *Major Residual*; ten *Schismas*, a *Lesser Fraction* and a *Greater Fraction*; ten *Schismas*, three *Lesser Fractions* and a *Medius Fraction*, &c. See these several articles.

The curious, and those concerned in these kinds of calculations, will find a great variety of other relations, in which the comma major stands, to the musical intervals, both great and small, in the elaborate manuscript treatise on music by the late Marmaduke Overend, organist of Isleworth, and by the late Dr. Boyce, which Dr. Callcott lately presented to the library of the Royal Institution in Albemarle-street, after kindly permitting the writer of this article to peruse and extract from them for the use of this work. The ratio of the major comma may be resolved into the component primes $\frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2}$, and then, according to the method of Mr. Farey in the Philoſophical Magazine, vol. xxvii. p. 103, (see our articles MUSICAL PRIMES, and TUNEABLE INTERVALS) can be resolved into factors $\frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2}$ or two fifths (V) reversed, a fourth (IV) and a major sixth (VI); whence it appears, that the interval of a major comma can be tuned on an instrument, having a sufficient number of strings or pipes, by tuning two fifths downwards in succession, and thence upwards a major sixth, and a minor fourth in succession, or VI + 4 - 2 V; where it is observable, that two Vths might have been tuned upwards, and a V and 4th downwards, which would also produce the interval of a major comma. but *above* the first or *key* note, instead of *below* it, as in the first case, where VI + 4 - 2 V is a negative quantity, as well as all the following. The fraction $\frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2}$, does not at first appear capable of division into any other tuneable ratios, than

than the above; but, if we multiply the same by $\frac{3}{2}$, it will then be resolvable into the factors $\frac{3}{2}, \frac{3}{2}, \frac{3}{2}, \frac{3}{2}$, and may be tuned thus, $2 VI - III - 2 V$; or multiplying by $\frac{3}{2}$, we can obtain $2 fourths - V - 3$; or if by $\frac{3}{2}$, we can get $2 fourths + III - 2 V$; and if by $\frac{3}{2} \times \frac{3}{2} \times \frac{3}{2}$, we may get $3 fourths - 6 - V$; and if by $\frac{3}{2} \times \frac{3}{2} \times \frac{3}{2} \times \frac{3}{2}$, we shall have $2 fourths - III - 2 thirds$: and thus, we have six methods of exactly tuning a major comma, either above or below any given note, by help of perfect intervals only.

The method above explained, of analysing musical ratios or intervals, and expressing them in different ways, by the use of tuneable intervals only, is calculated to instruct the musical student, in the curious and important relations which the several concordant intervals bear to each other: hence we see, for instance, that if in any chant, or passage in a melody, to be performed by voices, by violins, or other perfect instruments, any one of the above six successions of notes were to occur, and the intervals were all to be performed perfect, or without temperament in the melody, the conclusion would not be in the key-note, or that set out from, but a comma different in pitch, which property of the musical scale is called *divergency of tune*; see that article.

It is observable, that all of the above six expressions or passages in melody, which diverge a comma, contain two *fifths* or two *fourths*, each moving the same way, and to which the divergency seems attributable, when the same is not counteracted by a proper succession of other intervals. Mr. Maxwell in his "Reformed or Complete Diatonic Scales for the Organ and Violin," &c. in his "Essay on Tune," (and so does Overend in his manuscripts) proposes to mark the rise of a comma by the acute accent ($'$), and the fall of the same by the grave accent ($`$), and that when either of these are required to be taken off, this mark ($^{\circ}$) is to be used, in the writing of music, in the same way as the musical mark \natural is used, to take off or destroy the effect of a \sharp or \flat , which has gone before, either accidentally, or in the signature of the staff. Mr. Maxwell shews, how a violin performer may practically tune a *comma* upon his instrument, in a variety of ways.

Modern writers on the temperament of the musical scale, usually refer their temperaments, or small corrections, to be applied to the concords, to this major *comma* as a unit or standard, on which account we shall present our readers with some further particulars relating to this small interval of the scale. Dr. Robert Smith, in his "Harmonics," Lemma to the 9th proposition, cor. 4, has demonstrated, that if any part or parts of a comma c , denoted by $\frac{q}{p}c$, be the interval of imperfect unisons (or temperament), the ratios of the times of their single vibrations will be $161 \frac{p}{p} - q$ to $161 \frac{p}{p} + q$, extremely near: for example, if we want a finite or approximate ratio for a $\frac{1}{3}$ of a comma, we have $q = 1$, $p = 4$, and $\frac{161 \times 4 - 1}{161 \times 4 + 1} =$

$\frac{643}{645}$ is the ratio, the complement arithmetical of its logarithm being 13487, which is true to the last of 7 places of figures: in like manner, $\frac{161 \times 3 - 1}{161 \times 3 + 1} = \frac{483}{484}$ or $\frac{241}{242}$ is the ratio answering to $\frac{2}{3}c$, or $\sqrt[3]{\frac{80}{81}}$, which is also true to the last of 7 places in the logarithm, and is sufficiently

accurate for all purposes: but it must be noticed that these are not composed of musical primes.

It may be of use here to enquire, what proportion the major *comma*, or ratio of $\frac{80}{81}$, bears, to the hemitone or ratio of $\frac{15}{16}$; for which purpose we have the logarithm of the latter divided by the logarithm of the former, or $\frac{280287}{539501}$

$= 5.195282$, the number of major commas in one hemitone (or H) very nearly: and as it may be useful on many occasions for the student to know, how many major commas make up any interval, we have subjoined a short table, shewing very exactly how many major commas make up the different concords within the octave, and also some of the smaller discords.

Intervals.	Ratios.	N ^o . of Commas.
VIII	$\frac{1}{2}$	55.797636
VI	$\frac{2}{3}$	41.120938
6th.	$\frac{3}{4}$	37.834808
V	$\frac{4}{5}$	32.639526
4th.	$\frac{5}{6}$	23.158110
III	$\frac{6}{7}$	17.962828
3rd.	$\frac{7}{8}$	14.676696
II	$\frac{8}{9}$	9.481414
I ^o	$\frac{9}{10}$	8.481414
2nd.	$\frac{10}{11}$	5.195282
comma	$\frac{80}{81}$	1.000000
Key.	$\frac{1}{1}$	0.000000

From the above table it appears, that the octave, whose ratio is $\frac{1}{2}$, contains something more than $55\frac{3}{4}$ major commas, the VI, a little more than 41 commas, &c. We shall next consider the

COMMA *Minor*, or *Lesser*, of Rameau, Overend, &c., being also the *apotome* minor of Salomon de Caus, Boetius, &c. the *diatichisma* of Euler, and the major *diefs* of Maxwell. This interval seems first to have been noticed by the Greek writers, as the quantity by which two *semitones* major $2S$ ($\frac{15}{16} \times \frac{15}{16}$) exceeded the *tone* major T ($\frac{8}{9}$). Its

ratio is $\frac{2025}{2048}$, and its value in Briggs's logarithms .99509597525, which reckoned downwards, by its arithmetical complement, is .00490492475; and its value in Euler's logarithms is .016295, being that decimal part of an octave. The minor comma is marked by Overend, Dr. Boyce, Dr. Callcott, and others, with a dashed c , (c'), similar to the mark for scruple in apothecaries weight, but reversed. (See Philosophical Magazine, vol. xxviii.) It is equal to 10.007863 times the *schisma* (Σ) = to .909170 times, or nearly $\frac{15}{16}$ ths of the major comma. It is equal to the sum of ten *schismas* and one minute ($10 \Sigma + m$). And it results as the difference when a *schisma* is taken from a major comma, a *diatichisma* from two major commas, two major commas from a *semitone* minimum, a major comma from an *enharmonic diefs*, a *semitone* minor from a *limma*, an *apotome* from a *semitone* maximum, a *semitone* minimum from two *enharmonic diefs*, a *semitone* medius from a *semitone* major, a *lesser fraction* from a *prima*, two *schismas*

fichimas from a diachisma, a hyperoche from a semitone sub-minimum, two semitones medii from a tone major, &c. The comma minor is equal to the following additions of intervals in triples, v. z. a schisma, a major residual and a medius residual; two schimas, a major residual and a minor residual; four schimas, a major residual and a lesser fraction; six schimas, a greater fraction and a medius residual; nine schimas, a greater fraction and a lesser fraction; nine schimas, a medius fraction and two lesser fractions, &c. (See Overend's MS. before quoted.)

The ratio of this interval is composed of these primes, $\frac{3^2 5^2}{2^7}$, which resolved as shewn above, give 3^4 ths - V - 2^4 ths, and 3^4 ths - 2^4 ths - 3, as different methods of practically tuning the minor comma upon an organ, piano-forte, &c.

COMMA *Maximum*, of Pythagoras, Boetius, &c. or ancient comma; this interval, whose ratio is $\frac{524,288}{531,441} = 12 \Sigma + m$, is now called the DIASCHISMA; see that article.

COMMA, *Greater*, has erroneously been applied by some to the ratio $\frac{125}{138} = 21 \Sigma + 2 m$, which is the *Enharmonic DIESIS*; see that article.

COMMA *Minimum*, according to some former writers, expresses the ratio $\frac{32768}{32805} = \Sigma$, which is now called the SCHISMA; see that article.

COMMA, *Ancient*, according to Galileo, had a ratio of $\frac{625}{648} = 32 \Sigma + 3 m$, which is now called the SEMITONE *Minimum*, which see.

COMMA of *Philolaus*, is the ratio of $\frac{229}{230}$, intended as an approximation for $\frac{1}{2}$ th part of a tone major, but which it exceeds considerably; besides, the fraction $\frac{229}{230}$ is not composed of the small or musical primes 2, 3, and 5, and cannot therefore be admitted into musical computations.

COMMA of *Boetius*, according to Giareanus, also of D. Nicola was $\frac{1}{3}$ th part of the tone major, or $11 \frac{5}{9} \Sigma + \frac{2}{9} f + m$, whereof 5 made their semitone major or apotome, and 4 made their semitone minus or limma; this interval was anciently supposed by some to be the same with the modern diachisma ($12 \Sigma + m$), but from which it differs, $\frac{4}{9} \Sigma - \frac{2}{9} f = .477702 \times \Sigma$, or nearly half a schisma.

The ancients mention another comma, $\frac{1}{4}$ of the tone minor, or $11 \frac{5}{8} \Sigma + \frac{1}{4} f + m$. (See Dr. Callcott's "Musical Grammar," pages 119 and 49.)

COMMA, *Artificial*, of Nicholas Mercator, is the $\frac{3}{5}$ part of the octave, or $11 \frac{29}{53} \Sigma + \frac{12}{53} f + m$. (See Mercator's "Temperament of the Musical Scale".)

COMMA of *Mersennus*. According to Holder's "Treatise on Harmony," page 104, Mersennus divided the octave into about 58 $\frac{1}{2}$ parts, and called one of these a comma.

COMMA of *Galileo*. The interval $\frac{524441}{524288}$, called a

comma in the writings of this author, was intended to have been the diachisma or $\frac{524288}{531441}$, as Mr. Overend has shewn, vol. i. p. 140, of his MS. before referred to; the error originated in an erroneous multiplication, in the second figure of Galileo's numerator, by which it was rendered unfit for the musical scale. (See Sir John Hawkins Hist. Mus. vol. i. p. 321.)

COMMA and half of *Galileo*, has a ratio of $\frac{625}{648} = 32 \Sigma + 3 m$, which is the SEMITONE *minimum*; see that article.

COMMA and half of *Rameau*. This interval results from the addition of a major comma and a major residual, and is also the difference between a semitone subminimum and a hyperoche; its ratio is $\frac{1953125}{1990625}$, its common logarithm is $-.9917338,2179$ and Euler's log. $0.027456 = 17 \Sigma - f + 2 m$. The component primes of this ratio are $\frac{5^9}{2^{12} 3^3}$, whence it appears, from the procefs before explained, that $3^3 - 4$ ths, or five minor thirds upwards, and four major thirds downwards, furnish a practical method of tuning this interval above any note, and the reverse of this procefs or 4 ths - 3^3 would tune the same below any given note.

COMMA, *Semi*. See SEMI-COMMA.

COMMA *Redundant*, or *superfluous*, or *deficient*, or *diminished*; these terms are applied to such intervals, whether concords or discords, as exceed or fall short of the true ratio of that interval by a major comma, as a comma redundant fifth, a comma deficient third, &c. Sometimes the term comma is omitted in naming these intervals, as a redundant fifth, a deficient third, &c. See FIFTH, THIRD, &c.

COMMAGENE, or COMAGENE, *Kamagb*, in *Ancient Geography*, a country of Syria, bounded on the west by mount Amanus, on the north by part of mount Taurus, on the east washed by the Euphrates; and with regard to its southern boundaries, it is uncertain whether it is contiguous to Seleucia, Cyrrhestica, or both. It is near the north corner of Syria. This country is mentioned by Strabo, Ptolemy, Pliny, and Ammianus Marcellinus, but they assign to it different extents. Its chief cities were Samofata upon the Euphrates, its capital, Antiochia ad Taurum, Germanicia, Singa, Chaonia, and several other cities, once of great note, but long since utterly destroyed. In the time of Antiochus the Great, Commagene was subject to the Syrians, and left to him by the treaty of peace which he concluded with Rome, after the famous battle of Magnesia; and hence it is probable, that it was seized by some of the princes of the Seleucian family, during their intestine wars, as no mention of the kings of Commagene occurs till the time of Pompey, and the names of those, who afterwards reigned there, are altogether Syrian. The first that is mentioned is Antiochus, who joined with Darius king of Media, in opposing the entrance of Pompey into Syria, after the defeat of Tigraues; but, being overcome in battle, he submitted to the conqueror, and was not only confirmed in his kingdom, but rewarded with part of Melopotamia. In the civil war between Cæsar and Pompey, he sent large supplies to the latter. Antiochus having been put to death by order of Augustus, for the assassination of the Roman ambassador, was succeeded by Mithridates, on whom Augustus bestowed the kingdom of Commagene, in recompence of his services during the war with Antony and Cleopatra. Upon the death of Mithridates, Antiochus II., the son of Antiochus I., was permitted by Augustus to take posses-

tion

gor of the kingdom. This prince died in the reign of Tiberius; and Commagene became a Roman province, and at the request of the nobles, it was governed by a prætor. But Caligula restored the kingdom to Antiochus III., the son of Antiochus II., adding to it the maritime parts of Cilicia. He was succeeded by his son Antiochus IV., surnamed Epiphanes, who distinguished himself under Vespasian in his war with the Jews, and particularly at the siege of Jerusalem. Vespasian, however, having reduced Commagene to the form of a Roman province, would not allow any of the sons of Antiochus to succeed him. This country was afterwards made part of the province called Augustopatensis, or as Ammianus has it, Euphratensis, and was commonly known by the name of Euphratensis.

COMMAND, in French *Commandement*, in *Military Language*; the act or action of him who commands; a thing commanded; the right of commanding and making one's self obeyed. The movements of a battalion at exercise, are performed by the words which the major or commanding officer pronounces. Hence, the *word of command* is a phrase in common use among military people.

COMMAND denotes also authority. Every command falls to the eldest officer in the same circumstances, whether he belong to the horse dragoons, artillery, engineers, foot, or marines. In our service when the commissions of two officers are of the same date, a retrospection of former commissions takes place, or length of service is examined into, and the dispute, if any arises, is determined according to precedents, and the rules of war.

COMMAND, in the *Royal Navy*, implies the rank or power of an officer, who has the management of a ship of war of any kind under twenty guns. He ranks with a major in the army.

COMMANDANT, or **COMMANDER**, the person who commands an army, a brigade, a garrison, a fort, castle, regiment, company, &c.

COMMANDE, a rope made use of for boats and pontoons.

COMMANDER, is a name given to a large wooden mallet used in a ship.

COMMANDERY. See **COMMANDRY**.

COMMAND in *front*, in *Fortification*, a height, or an eminence, which is directly opposite to, or faces the work, that it commands.

COMMAND in *rear*, an eminence or a height, which is directly behind the work that it commands.

COMMAND in *flank*, or *by enfilade*, a height or an eminence on the flank, or prolongation of any part of a work, which it sees and looks along.

COMMANDEMENT, *Fr.* A commanding ground, an eminence or elevation, which overlooks a post or strong place. There are three sorts of *commandemens*; namely the *commandement in front*, which faces a work, and batters or fires on it in front; the *commandement en revers*, or *in reverse*, which is behind a work or place, and fires on its rear either directly or obliquely; and the *commandement de courtoine* or *en enfilade*, which is on the flank of a work, and fires along the whole extent of a rectilinear part of it. Nine feet in perpendicular height, constitute a simple command or *commandement*; 18 feet a double one; 27 feet a triple one; and so on.

COMMANDEMENT, *Order of*, among the officers of *infantry and cavalry*. In France it was customary in a place of war, and every inclosed city, for the officers of infantry to have the command over those of the cavalry, and on the other hand to be commanded by them in the open field.

COMMANDEUR, *Fr.* The commander of an order

of knights. In some orders of chivalry it is the title, which a professed knight takes the moment he pronounces the vows, that subjected him to celibacy without his ceasing on that account to be military. There are, however, in Spain orders of chivalry, that do not require celibacy on the part of the commanders.

COMMANDEUR, in *Ornithology*, the French name of *Oriolus Phœnicæus*, which see.

COMMANDINUS, **FREDERICK**, in *Biography*, was born at Urbino, in Italy, 1509. He was descended from a noble family, and celebrated for his great classical learning, and for his extensive acquaintance with the mathematical sciences. He was patronized by Francis Maria, duke of Urbino, and by his liberality enabled to publish translations of various parts of the works of Archimedes: the Conics of Apollonius; the Elements of Euclid, and many other works of high reputation. He was also author of a book entitled, "De Centro Gravitatis Solidorum." Bologn. 1565; and of another entitled, "Horologiorum Descriptio." Romæ, 1562. He died in 1575; a funeral oration was delivered in his praise, by Antonio Toronco. Gen. Biog.

COMMANDMENT, in a *Legal Sense*, has various uses: as, *Commandment of the king*, when on his own mere motion, and from his own mouth, he calls a man into prison.

Commandment of the justices, is either *absolute* or *ordinary*; *absolute*, as when, on their own authority, and their own discretion, they commit a man for contempt, &c. to prison, as a punishment. *Ordinary*, as when they commit him rather for safe custody, than punishment.—A man committed by an ordinary commandment is releivable. Persons committed to prison by the special command of the king were not formerly bailable by the court of king's bench; but at this day, the law is otherwise. 2. Hawk. P. C. c. 15. § 36.

COMMANDMENT, is also used for the offence of him who directs or wills another to transgress the law; as by murder, theft, and the like. See **ACCESSORY**.

He that commandeth any one to do an unlawful act, is accessory to it and all the consequences, if it be executed in the same manner as commanded: but if the commander revoke the command; or if the execution varies from it, or in the nature of the offence; in such case he will not be accessory. 3 Inst. 51, 57. 2 Inst. 182.

In another sense of this word, magistrates may command others to assist them in the execution of their offices, for the doing of justice; and so may a justice of peace, to suppress riots, apprehend felons; or any officer to keep the king's peace, &c. Bro. 3.

A master may command his servant to drive another man's cattle out of his ground, to enter into lands, to seize goods, to distrain for rent, or to do other things; if the thing be not a trespass to others. The commandment of a thing is good; where he that commands hath power to do it; and a verbal command is in most cases sufficient; unless it be, where it is given by a corporation, or when a sheriff's warrant is to a bailiff to arrest, &c. Bro. 288. Dyer, 202.

In trespass, &c. the master shall be accountable for the act of the servant done by his command; but servants shall not be excused for committing any crime, when they act by command of their master, who have no authority to give such commands. The commands of infants and feme covert are void; but in forcible entries, &c. an infant or feme covert may be guilty in respect of actual violence done by them in person.

COMMANDMENTS, *Ten*. See **DECALOGUE**.

COMMANDRY, or **COMMANDERY**, a kind of benefice.

or fixed revenue belonging to a military order, and conferred on ancient knights, who had done considerable service to the order.

There are *strict*, or regular commandries, obtained in order, and by merit: there are others of *grace* or *favour*, conferred at the pleasure of the grand master.

There are also commandries for the religious in the orders of St. Bernard and St. Antony.—The kings of France have converted several of the hospitals for lepers into commandries of the order of St. Lazarus.

The commandries of Malta are of different kinds; for as the order consists of knights, chaplains, and brother servants, there are peculiar commandries, or revenues, attached to each.

The knight to whom one of these benefices or commandries is given, is called commander: which agrees pretty nearly with the *propofitus* fed over the monks in places at a distance from the monastery, whose administration was called *obediencia*: because depending entirely on the abbot who gave him his commission. Thus it is with the simple commanders of Malta, who are rather farmers of the order than beneficiaries: paying a certain tribute, or rent, called *responfo*, to the common treasure of the order.

The commandries belonging to the priory of St. John of Jerusalem in England, consisting of manors, lands, &c. such was that of New Eagle in Lincolnshire, Selbach in Pembrokehire, and Shengay in Cambridgehire, were given to Henry VIII. by statute 32 Hen. VIII. c. 20.; so that the name of commandries only remains, the power being long since extinct.

COMMANI, in *Geography*. See COMMENDO.

COMMANIPULARIS, in *Ancient Military Language*, a Roman soldier, who could not sleep but with his own company, nor fight but under its standard.

COMMANOËS, in *Geography*, one of the small Virgin isles in the West Indies, situated to the N.N.E. of Tortola. N. lat. 13° 25'. W. long. 63°.

COMMANTAWANA, a bay on the north coast of the island of St. Vincent, about one mile east of Tarray Point.

COMMARCHIO, in *Antiquity*, the confines of the land; whence probably is derived the word *marches*. "Imprimis de nostris landemais, commarckionibus" Du-Cange.

COMMARODES, in *Ancient Geography*, a piece of Thrace, in the vicinity of Constantinople.

COMMEATUS, in *Military Language*, a passport or permission granted to a Roman soldier to absent himself from the army for a fixed or limited time. The same name was also given to soldiers' provisions and their escorts.

COMMELIN, JOHN, a distinguished botanist, was born at Amsterdam, July 23, 1629. He succeeded his father as one of the magistrates of the city, and while holding this office, was very active in forming a new botanical garden; the ground occupied by the old gardenhaving been taken into the city. The second and third volumes of the "Hortus Indicus Malabaricus," owe much of their value to his judicious notes and observations. He published "Catalogus Plantarum indigenarum Hollandiæ," 1683, 12mo. It contains a list of 776 plants; and, in 1789, "Catalogus Plantarum Horti Medici Amstelodami, pars prior." These have been frequently reprinted. While preparing to complete this work, he died at Amsterdam in 1692.

COMMELIN, GASPARD, nephew to John Commelin. After taking his degree of doctor in medicine, he was appointed professor in botany, and director of the garden at Amsterdam, offices which he filled with distinguished ability and

attention. He completed the work begun by his uncle, which he published in 1701. His next production was "Flora Malabarica, seu Horti Malabarici Catalogus," serving as an index to the Hortus Malabaricus. This was followed by "Præluia Anatomica," 4to. 1703; and the same year, "Præluia Botanica," with figures for the benefit of students in those arts. In 1715, he published, "Icones Plantarum, præsertim ex Indis Collectarum," 4to.; and, in 1718, "Botanographia Malabarica, a Nominum Barbarissimis restituta," Lugduni Bat. folio. All useful to students in botany, but serving rather to shew the great industry, than the genius of the writer. Haller. Bib. Botan. Eloy. Dict. Hist.

COMMELINA, in *Botany*, (so named by Plumier from the two brothers, John and Gaspar Commelin, celebrated Dutch botanists.) Plum. 38. Linn. Gen. 62. Schreb. 86. Willd. 104. Lam. Ill. 83. Gart. 56. Juss. 15. Vent. 2. 152. Class and order, *triandria monogynia*. Nat. Ord. *Enfatæ*. Linn. *Junci*, Juss. *Juncaceæ*, Vent.

Gen. Ch. *Cal. common*. Spathe heart-shaped, converging, compressed, very large, permanent. *Cal. proper*. Perianth, three leaved; leaves egg-shaped, concave. *Cor.* Petals three, unguiculated, larger than the calyx, alternating with its leaves; one sometimes smaller. *Stam.* Filaments two, three, or six, awl-shaped, reclined; anthers oblong, versatile. *Nect.* three, often cruciform, fixed to the top of their proper filaments, rising above the stamens. *Pysl.* Germ superior, roundish; style awl-shaped, revolute, stigma simple. *Peric.* Capsule, somewhat globular, two or three-celled; two or three-valved. *Seeds* few.

Ess. Ch. Calyx proper, three-leaved. Petals three, unguiculated. Nectaries three, on their proper filaments.

Observ. Linnæus considers the spathe as the only calyx, and attributes fix petals to the flower; three exterior, small, resembling a perianth, and three interior, very large, coloured.

* Two petals larger; one small.

Sp. 1. *C. communis*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Encyc. 598. Ill. Willd. 1. Dill. Elth. tab. 78. fig. 89. Gart. tab. 15. fig. 1. Lam. Ill. tab. 35. fig. 1. Koefkii. Kempf. fig. 888. tab. 889. *β. C. polygama*; Roth. Catal. Bot. 1. p. 1. "Leaves ovate-lanceolate, acute, stem creeping, smooth." *Root* annual. *Stems* several, two feet long, jointed, branched, leafy. *Leaves* alternate, nerved, supported by a membranous sheath with short hairs at its edge. *Flowers* axillary, two or three together, on short peduncles; two of the petals blue, the third whitish green. *Capsule* egg-shaped, slightly compressed on each side, somewhat two-celled, two-valved; valves thin, membranous, with the longitudinal partition on their inner side. *Seeds* two in each cell, affixed to the valves near the insertion of the partition, two adhering to each valve, gibbous and pitted on one side, flat and furrowed, with a longitudinal line on the other, truncate at the end where they are opposite to each other, umbilicated. A native of North America, Africa, and Japan. *β.* differs only in having polygamous diandrous flowers. In all other respects it exactly corresponds with *C. communis*, of which it appears to be only a variety. Willd. 2. *C. africana*. Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Ill. 599. Willd. 2. Gart. tab. 15. fig. 3. Lam. Ill. tab. 35. fig. 3. "Leaves lanceolate, smooth; stem decumbent." *Root* per annual. *Stems* about a foot long, branched, smooth. *Leaves* narrower, with ciliated or bearded sheaths, and a smaller one within the other. *Flowers* with two petals; yellow, unguiculated and roundish, or kidney shaped; the third small, oval, sessile, and

and of a pale colour. *Capsule* egg-shaped, two-valved, three-celled. *Seeds* in the upper cells, two, three, or four, roundish, smooth, umbilicated; but always barren and destitute of albumen; in the lower cell solitary, fertile, adnate to the valve on its whole length. A native of Africa. 3. *C. mollis*. Willd. 7. Lam. III. 600. Jacq. Collect. 3. 253. ic. rar. 293. "Leaves egg-shaped, petioled, villous; stem creeping." A native of South America. 4. *C. bengalensis*. Linn. Sp. Pl. 3. Mart. 3. Lam. 3. Ill. 601. Willd. 3. (Ephemeron bengalense repens; Pluk. Alm. 135. tab. 27. fig. 3.) "Leaves egg-shaped, obtuse; stem creeping." *Root* annual. *Stems* numerous, slightly villous, slender, branched. *Leaves* from an inch to an inch and half long, edged with very short hairs, petioled above the sheath; sheath ciliated, marked with lines, spotted with purple. *Spathes* terminal, cowed, somewhat triangular, marked with lines. *Peduncles* within the spathe, two; one slender, longer, with a single flower; the other thicker, channelled, bearing from two to four flowers, on jointed inflexed pedicels. *Petals* blue; smaller one paler. *Nectaries* yellow. A native of Bengal and Cochin-china. 5. *C. erecta*. Linn. Sp. Pl. 4. Mart. 4. Lam. 4. Ill. 602. Willd. 4. Dill. Elth. 91. tab. 77. fig. 88. "Leaves ovate-lanceolate; stem erect, scabrous, quite simple." *Root* perennial, fibrous. *Stems* a foot and half high, leafy. *Leaves* a little lufure, but not hairy, except at the sheath. *Flowers* pale blue; smaller petal very narrow, whitish and pellicid. *Capsules* roundish, obtusely triangular, with three feeds. A native of Virginia.

* * *Petals* nearly equal.

6. *C. virginica*. Linn. Sp. Pl. 5. Mart. 5. Lam. 5. Ill. 603. Willd. 5. (Ephemeron phalangoides; Pluk. Alm. 135. tab. 174 fig. 4.) "Leaves lanceolate, in short petioles; bearded at the edge; stems erect." Nearly allied to the preceding, and perhaps, only a variety. *Root* perennial. *Stems* two feet high, simple, slightly villous. *Leaves* scabrous on the upper surface when rubbed from the base, pubescent underneath, narrowed near the sheath. *Sheaths* nerved, somewhat pubescent, ciliated at the edge with reddish hairs. *Flowers* blue; the lower one on a short pedicel; petals heart-shaped, quite entire. A native of Virginia. 7. *C. longicaulis*. Willd. 6. Jacq. ic. rar. 2. tab. 294. Collect. 3. p. 234. "Leaves linear-lanceolate, sessile; sheaths ciliated; stem decumbent." *Root* perennial. *Leaves* smoothish. *Pedicels* in pairs, filiform, jointed. A native of Caracae. 8. *C. hexandra*. Lam. 6. Ill. 604. Aubl. Guian. tab. 12. "Flowers hexandrous, in racemes." *Root* perennial. *Stems* three feet high or more, farmentous, climbing, bent at the joints. *Leaves* egg-shaped, acute, narrowed and petioled near the sheath; sheaths half an inch long, ciliated. *Flowers* blue; filaments short and not villous, as in Tradescantia. 9. *C. tuberosa*. Linn. Sp. 6. Mart. 6. Lam. 7. Ill. 605. Willd. 8. Dill. Elth. 94. tab. 79. fig. 90. Gært. tab. 15. fig. 2. Lam. tab. 35. fig. 2. "Leaves sessile, ovate lanceolate, somewhat ciliated." *Root* perennial, consisting of several tubers somewhat like those of ranunculus, or of common orpine (sedum telephium), joining together at the top and forming a head, diminishing gradually downwards. *Stems* a foot high, weak, ascending, branched at their base. *Leaves* villous underneath, smooth above; sheath smooth, striated, reddish, simply ciliated at the edge. *Flowers* blue, growing several together on slender peduncles. *Capsule* ovate-acuminate, somewhat depressed, two-valved, three-celled; upper valve, divided longitudinally into two cells; lower valve one-celled, a little concave above, convex below, closely adnate to the feed. *Seeds* in each of the upper cells two, tubercle wrinkled,

ferruginous; in the lower cell, one, elliptical, smooth, lenticularly compressed, of a bay colour. Gært. A native of Mexico. 10. *C. barbata*. Lam. III. 606. "Leaves egg-shaped, sessile; sheaths bearded; stem creeping." A native of the island of Mauritius. 11. *C. longifolia*. Lam. III. 607. "Leaves lanceolate-linear; peduncles very long." A native of the island of Java. 12. *C. zanonica*. Linn. Sp. Pl. 7. Mart. 7. Lam. 8. Gært. tab. 15. fig. 4. Lam. Ill. tab. 35. fig. 4. (Zanonica; Plum. Gen. 38. Tradescantia zanonica; Willd. Swartz.) "Peduncles thickened; leaves lanceolate; sheaths hairy at the edge; bractes in pairs." *Root* perennial. *Stem* about two feet high, cylindrical, jointed, smooth, branched towards the top. *Leaves* four or five inches long, about two broad, green and smooth above, slightly pubescent underneath when young, with purple-brown, or violet edges; sheaths whitish-green, large. *Flowers* white; Lam. Sky-blue; Miller. *Fruit* berryed, in an egg-shaped terminal raceme; berries false, dark-purple, formed of the corolla changed into a fleshy succulent three-lobed substance which completely encloses the capsule; capsule cylindrical-egg-shaped, crustaceous, dotted in rows, testaceous, three-celled, opening at the tip into three parts. *Seeds* two, or one in each cell; in the cells which have two, angular, a little wrinkled, cinereous, with a small pap on the side covering the embryo; in the cell which has only one, elliptical plano-convex, a little wrinkled about the edge, bearing the embryo on the middle of the back. Gært. A native of Cayenne, in South America. 13. *C. vaginata*. Linn. Mant. 177. Mart. 8. Lam. 9. Ill. 609. Willd. 9. "Leaves linear; flowers d'androus, sheathed with an involucre." *Root* annual. *Stems* ascending, numerous, somewhat scabrous. *Leaves* sessile, acute. *Peduncles* terminal and axillary, elongated, ending in a striated, lanceolate involucre, which is so convolute as to be almost cylindrical; calyx-leaves lanceolate, acute, coloured at the tip; petals oval, the length of the calyx; filaments of the nectary four, half the length of the filaments; nectaries linear; filaments of the stamens two, bearded, somewhat recurved, the length of the corolla; anthers yellow, marked with a black spot; style awl-shaped, somewhat recurved. Found by Koenig in the East Indies. 14. *C. nudiflora*. Linn. Mant. 177. Mart. 9. Lam. 10. Ill. 609. Willd. 10. "Peduncles capillary; leaves linear, without an involucre; flowers diandrous." *Root* annual. *Stem* about seven inches high, slender, nearly erect, decumbent at the base, somewhat scabrous. *Leaves* sessile, acute; sheath short, edged with a few lax hairs. *Peduncles* for the most part terminal, from two to four together, accompanied by a very short bractee. *Flowers* from four to six on each peduncle, naked, pedicelled; calyx-leaves ovate-lanceolate, acute, less than the corolla; petals three, egg-shaped, unequally distributed; the two lower ones most distant; filaments of the nectary three, half the length of the stamens, naked; nectaries deltoid; filaments of the stamens two, bearded, declining at the opening of the corolla; style declining. Found by Koenig in dry pastures of the East Indies. 15. *C. cucullata*. Linn. Mant. 176. Mart. 7. Lam. 11. Ill. 611. Willd. 11. (C. nervosa; Burm. ind. 18. tab. 7. fig. 3.) "Leaves egg-shaped; involucre cowed, turbinate." *Root* annual. *Stems* seven inches high, creeping at the base, and sending out sixform roots. *Leaves* nerved, petioled; sheaths wider than the stem; ciliated at the edge with distant, spreading, bristle-shaped hairs; involucre terminal, truncated, many-flowered, entirely coalescent by the side. *Flowers* peduncled, minute. A native of the East Indies. 16. *C. japonica*. Thunb. in Linn. Transf. 2. 332. Mart. 12. Willd. 12. "Leaves ovate-lanceolate, undulated; stem erect, angular,

hairy; flowers panicled." *Stem* a foot high, furrowed, panicled at the top. *Leaves* alternate, sheathing, acute, firmish; lower ones three inches long; upper ones about 2½ inch. A native of Japan. 17. (*C. spirata*. Linn. Mant. II. 176 Hort. Kew. 77. (*C. bracteolata*; Lam.?) "Leaves lanceolate; flowers panicled." Linn. "Leaves lanceolate-linear, undulated, somewhat curled; peduncles panicled, furnished with small bractes, half-embracing the stem." Lam. *Root* annual. *Stem* creeping, ascending, somewhat scabrous; Linn. *Stem* six or seven inches long, very slender, bent at the joints, almost smooth, leafy, branched; Lam. *Leaves* lanceolate, sheathing, very minutely serrated; upper leaf cordate-lanceolate; sheaths ciliated at the edge. Linn. *Leaves* narrow; sheaths short, ciliated; Lam. *Flowers* small, blueish; Lam. *Panicle* terminal, divaricated, with small sheathing bractes; Linn. Lam. *Peduncles* capillary, compound; Lam. *Calyx* three-leaved; leaves ovate-lanceolate, concave; Lam. *Petals* three, equal, orbicular-egg-shaped; Linn. *Petals* three, egg shaped, a little longer than the calyx. Lam. *Filaments* of the *stamens* three, bearded, naked above the middle. Linn. Almost entirely naked. Lam. *Filaments* of the *nectary* three, somewhat ciliated at the sides. Corpuscles cruciform, globular at the tips, whitish; Linn. corpuscles yellow; Lam. *Style* and *stigma* spirally convolved, and evolved variously; Linn. *Style* permanent, a little spirally twisted when the flower is past; Lam. Found by Koenig in moist ground, by the side of rivulets in the East Indies; communicated to La Marek from the East Indies by Sonnerat. La Marek seems to have no good reason to doubt the identity of his plant with that of Linnæus.

Obs. It is evident from the above descriptions, that this genus, as it now stands, is a very anomalous one. *C. hexandra*, if it had bearded filaments, would unquestionably be a *tradesantia*. *C. virginata*, *undiflora*, and *spirata*, approach that genus, by their partially bearded filaments, but differ in the number of stamens; the first two have the additional anomaly of being diandrous, without a corresponding diminution in the number of the other parts. Linnæus, when he took up these three species, in his second Mantissa, seems to have forgotten, or to have discarded, his original idea with respect to the flower; for he there attributes to it, not a six petalled corolla, but a three-petalled one, with a proper three-leaved calyx. Gærtner is of opinion that *commelina* and *tradesantia* are one truly natural genus.

COMMELINA axillaris et cristata. Linn. See TRADESANTIA.

Propagation and Culture. All the species are propagated by seed. If the seeds of *C. communis*, which is an annual, be sown upon a warm border of light earth in the autumn, they will come up early in the spring and ripen their fruit. The roots of *C. africana* send out offsets, by which the plant is easily propagated; but they will seldom live through the winter in the open air. The other species are tender, and must be sown in a moderate hot bed in the spring; transplanted to a fresh hot-bed, when they are two inches high; and in June, again transplanted into a warm border of light earth. *C. tuberosa* may be preserved, if planted in pots, and placed in the bark-stove in autumn; or its roots may be taken out of the ground in the autumn, kept in a warm place during the winter, and planted again in the spring; they will be more forward and stronger if placed on a hot-bed.

COMMEMORATION, the remembrance of any one; or something done in honour of a person's memory.

Among the Romanists, it is a practice for dying persons

to leave a legacy to the church, for the rehearsing so many masses in commemoration of them.

The eucharist is a commemoration of the sufferings of Jesus Christ.

COMMEMORATION is also the name of two religious feasts, otherwise called *all-joints* and *all-souls*. The occasion of their institution is variously related. See the articles.

COMMEMORATION of *Handel*, in *Music*. In order to record an event so honourable to a liberal art, we shall draw our information from the history of that art, and from the account itself of the commemoration written expressly at the time, and published in 4to. by the same author, an attentive auditor of all the performances, whose sensations and memory were more fresh then than at the distance of 22 years.

In the "History of Music," vol. iv. p. 518. it is laid, that "The year 1784 was rendered a memorable æra in the annals of music, by the splendid and magnificent manner in which the birth, genius, and abilities of Handel, were celebrated in Westminster Abbey and the Pantheon, by five performances of pieces selected from his own works, and executed by a band of more than 500 voices and instruments in the presence and under the immediate auspices of their majesties and the first personages in the kingdom. This event so honourable to the art of music and an illustrious artist, and so worthy of a place here, having been minutely recorded already in a distinct work, *viz.* "Account of their usual performances in commemoration of Handel," by the author of this history, written and published for the benefit of the musical fund; an establishment which his majesty having since deigned to honour with his patronage, the members and guardians have been permitted to incorporate themselves under the title of Royal Society of Musicians: We shall only add, that this celebration has been since established into an annual musical festival for the benefit of the fund, in which the number of performers, and perfection of the performances, as well as favour of the public, have continued to increase. In 1785, the vocal and instrumental band amounted to six hundred and sixteen. In 1786, to seven hundred and forty-one; and in 1787, to eight hundred and six vocal and instrumental performers."

And in the same "History of Music," at the end of the same vol. the author tells us, that "The commemoration of Handel, in 1784. having been crowned with a success equally honourable to that great artist and to the nation, since its performance has since been annually repeated, to still more numerous audiences, for charitable purposes, in Westminster-Abbey, under the title of a "Grand Musical Festival." In 1787, the band of vocal and instrumental performers amounted to eight hundred and six musicians, exclusive of the principal singers, consisting of twenty-two, with Madame Mara, Rubinelli, Harrison, and Morelli at their head. And such is the state of practical music in this country, that the increase of performers, instead of producing confusion, as might have been expected, has constantly been attended with superior excellence of execution; as experience, the best of a teachers, has so guided the zeal of the directors, and the science of the conductor and leader of this great enterprise, that a certain road to full perfection in every department seems to have been attained.

Though this celebration happened so recently, and is so well known as scarcely to need being mentioned here for the information of the present race, among musical articles; yet as our plan extends to history and biography, as well as definitions and scientific explanations, a record of a musical event of such magnitude seems necessary for the information of distant times, if we may dare hope to reach them. The origin and progress of the plan, as related in

the introduction to the printed narrative, dedicated by permission to the king, is the following.

“ It was in the year 1783, that the idea of this great enterprise was conceived in a conversation between lord viscount Fitzwilliam, the late sir Watkin Williams, and Joah Bates, late commissioner of the victualling office, on observing how much more London abounded with great musicians, vocal and instrumental, foreigners and natives, than any other city in Europe: but so dissipated and dispersed at the operas, oratorios, theatres, and public and private concerts, that they can never be heard in the aggregate, nor can the effects which may be produced by such a united band as our capital could furnish, ever be known, unless some plan was formed of a public periodical occasion for collecting and consolidating them into one band; by which means a performance might be exhibited on so grand and magnificent a scale as no other part of the world could equal. The birth and death of Handel naturally occurred to three such enthusiastic admirers of that great master, and it was immediately recollected, that the next (now the present) year, would be a proper time for the introduction of such a custom: as it formed a complete century since his birth, and an exact quarter of a century since his decease.

The plan was soon after communicated to the governors of the Musical Fund, who approved it, and promised their assistance. It was next submitted to the directors of the concert of Ancient Music, who, with an alacrity which does honour to their zeal for the memory of the great artist Handel, voluntarily undertook the trouble of managing and directing the celebrity. At length, the design coming to the knowledge of the king, it was honoured with his majesty's sanction and patronage. Westminster Abbey, where the bones of the great musician were deposited, was thought the properest place for the performance: and application having been made to the bishop of Rochester for the use of it, his lordship, finding that the scheme was honoured with the patronage of his majesty, readily consented; only requesting, as the performance would interfere with the annual benefit for the Westminster Infirmary, that part of the profits might be appropriated to that charity as an indemnification for the loss it would sustain. To this the projectors of the plan acceded; and it was afterwards settled, that the profits of the first day's performance should be equally divided between the musical fund and the Westminster Infirmary; and those of the subsequent days be solely applied to the use of that fund which Handel himself so long helped to sustain, and to which he not only bequeathed a 1000*l.*, but which almost every musician in the capital annually contributes his money, his performance, or both, to support.

Impressed with a reverence for the memory of Handel, no sooner was the project known, but most of the practical musicians in the kingdom eagerly manifested their zeal for the enterprise; and many of the most eminent professors, waving all claims to precedence in the band, offered to perform in any subordinate station, in which their talents could be most useful.”

“ By the latter end of February, the plan and necessary arrangement were so far digested and advanced, that the directors ventured to insert in all the newspapers, the following advertisement.

Under the Patronage of His Majesty,
In Commemoration of Handel, who was buried in
Westminster Abbey, on the 21st of April, 1759.

On Wednesday the 21st of April next, will be performed in Westminster Abbey, under the management of the

Earl of Exeter	Lord Paget
Earl of Sandwich	Right Hon. H. Morrice
Vicount Dudley Ward	Sir W. Williams Wynn, Bart.
Vicount Fitzwilliam	Sir Richard Jebb, Bart.

Directors of the concert of Ancient Music;

Some of the most approved pieces of sacred music, of that great composer.

The doors will be opened at 9 o'clock, and the performance will begin precisely at twelve.

And on the evening of the same day, will be performed, at the Pantheon, a grand miscellaneous concert of vocal and instrumental music; consisting entirely of pieces selected from the works of Handel.

The doors will be opened at 6 o'clock, and the concert will begin exactly at eight.

And on Saturday morning, April 24th, will be performed, in Westminster Abbey, the sacred oratorio of the Messiah.

Such is the reverence for this illustrious master, that most of the performers in London, and a great many from different parts of the kingdom, have generously offered their assistance; and the orchestra will consist of at least 400 performers, a more numerous band than was ever known to be collected in any country, or on any occasion whatever. The profits arising from the performances, will be applied to charitable purposes.

In order to render the band as powerful and complete as possible, the trombone, fagot, or double curtle, and double kettle drums, were sought and their use revived.

In preparing Westminster Abbey for the reception of their majesties and the royal family, as well as the archbishops and bishops, judges, great officers of state, and principal nobility and gentry in the kingdom, to the amount of three or four thousand, Mr. James Wyatt, the admirable architect of the ill-fated Pantheon, furnished the elegant drawings for the orchestra, throne, and galleries.

As this commemoration is not only the first instance of a band of such magnitude being assembled together, but of any band, at all numerous, performing in a similar situation, without the assistance of a conductor, to regulate the measure, the performances in Westminster Abbey may be safely pronounced, no less remarkable for the multiplicity of voices and instruments employed, than for accuracy and precision. When all the wheels of that huge machine, the orchestra, were in motion, the effect resembled clock-work in every thing, but want of feeling and expression.

And, as the power of gravity and attraction in bodies are proportioned to their mass and density, so it seems as if the magnitude of this band had commanded and impelled adhesion and obedience, beyond that of any other of inferior force. The pulsations in every limb, and ramifications of veins and arteries in an animal, could not be more reciprocal, isochronous, and under the regulation of the heart, than the members of this body of musicians under that of the conductor and leader. The totality of sound seemed to proceed from one voice, and one instrument; and its powers produced, not only new and exquisite sensations in judges, and lovers of the art, but were felt by those who never received pleasure from music before.

This celebration was at first designed to be extended to no more than two performances on the same day: one at noon in Westminster Abbey, for sacred music; and the other in the evening of the same day at the Pantheon, for secular compositions, selected from the operas and miscellaneous works of the hero whose apotheosis was the efficient cause of this extraordinary undertaking. But being countenanced by his majesty, the directors of the concert of ancient music,

the governors of the musical fund, and eagerly patronized by the public in general, while the plan was digesting, it determined the projectors, at the instigation of his majesty, to have three performances. The first and third in the morning, at Westminster Abbey, and the second at the Pantheon.

These performances having given such entire satisfaction to all that were present, and becoming, of course, the general subject of discussion and praise, excited a great desire in all lovers of music, and even of splendid spectacles, who were absent, to be enabled to judge and speak of transactions so memorable, from the conviction of their own senses. But even these were not more eager in wishing there might be a repetition of the performances, than those who had already attended them. Luckily for all parties, the wishes of their majesties coincided with those of their subjects; and as the scaffolding was still standing, and the band not yet dispersed, two more opportunities were given for the display of Handel's wonderful powers, and the gratification of public curiosity.

The fourth day was supplied with a well chosen selection of Handel's most grand and captivating compositions, from his oratorios and anthems; and on the fifth, that sublime production, the Messiah, was repeated; and though it had been performed in the Abbey but a week before, in so perfect and magnificent a manner, that no rehearsal, previous to its repetition, was necessary to the band; yet, to gratify the wishes of many timid and infirm lovers of music, who dreaded the crowd that was likely to be assembled at a public performance, as well as to raise money for charitable purposes, another rehearsal would certainly have been announced, if it had not been prevented from taking place by the celebration of his majesty's birth day, on which occasion there was a certainty that the chief part of the performers and company would be engaged.

Those who attended this day's commemoration at the Abbey were, seemingly, of a higher class than had yet appeared there; so that though the crowd was somewhat less than at the preceding performance of the same oratorio, the exhibition was more splendid. Indeed, as a spectacle, it was so magnificent to the sight, and, as a musical performance, so mellifluous and grateful to the ear, that it will be difficult for the *mind's eye* of those who were absent, to form an adequate idea of the show, or the *mental ear* of the found, from description. Every one present must have found full employment for the two senses which afford us the most refined pleasure; as it is from the eye and the ear that intellect is fed, and the mind furnished with its best intelligence.

At the first performance of the Messiah, his majesty expressed a desire to the earl of Sandwich of hearing the most truly sublime of all choruses, "Allelujah! for the Lord God omnipotent reigneth," a second time; and this gracious wish was conveyed to the orchestra, by the waving of his lordship's wand. At this second performance of that matchless oratorio, his majesty was pleased to make the signal himself, with a gentle motion of his right hand, in which was the printed book of the words, not only for the repetition of this, but of the final chorus, in the last part, to the great gratification of all his happy subjects present; and, perhaps, the subjects of no sovereign prince on the globe were ever before so delighted with the effects of a royal mandate.

Thus ended the fifth and last of the performances for this memorable celebration; and so great and perfect was the pleasure which the audience had received, that those who

had attended all the five exhibitions seemed most to regret this final close.

The whole receipts at the five performances of this most splendid and magnificent celebration amounted to 12,73*l.* 12*s.* 10*d.* Of which, after all disbursements for building, band, and other incidental expences, to the amount of 57,36*l.* 12*s.* 10*d.*, 6000*l.* remained for the fund of the society of decayed musicians, and 1000*l.* for the Westminster hospital.

At the end of the printed account of the first year's Commemoration of Handel, is added in the Appendix, a "History of the Rise and Progress of the Fund for the Support of decayed Musicians and their Families, established in 1738," which has been since laudably imitated by other professions, and in other countries; and it appeared in 1784, after these performances, that by the great accession to the fund from the commemoration, its capital became a serious and weighty concern, amounting to upwards of 22,000*l.*, in South-sea annuities and three per cents.; which realizes and ascertains an income of 678*l.* a year, exclusive of benefits or subscription.

The path therefore which the governors and court of assistants have now to pursue, is perfectly plain and pleasant; the power of alleviating distress and misery, of feeding the hungry, clothing the naked, and administering comfort to age and infirmities, is placed in their hands, without the trouble of providing the means.

COMMENASA, in *Ancient Geography*, a river of Asia, according to Arrian, who says that it ran into the Indus.

COMMENDAM, in the *Canon Law*, expresses the charge, trust, and administration of the revenues of a benefice, given to a layman to enjoy, by way of depositum, for the space of six months, in order to its being repaired, &c. or to another bishop, or ecclesiastic, to perform the pastoral offices thereof, till such time as the benefice is provided of a regular incumbent. See BENEFICE.

Anciently, the administration of vacant bishoprics belonged to the nearest neighbouring bishop; which continued to be practised between the archbishopric of Lyons, and the bishopric of Autun: on this account they were called *commendatory bishops*.

This custom appears to be very ancient: St. Athanasius says of himself, according to Nicephorus, that there had been given him in *commendam*, i. e. in administration, another church besides that of Alexandria, whereof he was styled bishop.

The care of churches, it seems, which had no pastor, was committed to a bishop, till they were provided with an ordinary: the register of pope Gregory I. is full of these commendations, or commendams, granted during the absence or sickness of a bishop, or the vacancy of a see. Some say, that pope Leo IV. first set the modern commendams on foot, in favour of ecclesiastics who had been expelled their benefices by the Saracens; to whom the administration of the vacant churches was committed for a time, in expectation of their being restored: though St. Gregory is said also to have used the same, while the Lombards desolated Italy.

In a little time, the practice of commendams became exceedingly abused: and the revenues of monasteries were given to laymen for their subsistence. The bishops also procured several benefices, or even bishoprics, in commendam, which served for a pretext for holding them all without directly violating the canons. Part of the abuse has been retrenched; but the use of commendams is still retained, as an expedient to take off the incompatibility of the persons, by the nature of the benefice.

When a parson is made bishop, his parsonage becomes vacant; but if the king by special dispensation give him power to retain his benefice, notwithstanding his promotion, he shall continue parson, and is said to hold it in *commendam*; but this must be done before consecration, for afterwards it comes too late, because the benefice is then absolutely void. There are several sorts of commendams founded on the stat. 25 Hen. VIII. cap. 21. as a *commendam fensivis*, which is for the benefit of the church, without any regard to the commendatary, being only a provisional act of the ordinary, for supplying the vacation of 6 months, in which time the patron is to present his clerk, and only implies a sequestration of the cure and fruits till the clerk is presented: *commendam retinere*, by means of which a bishop retains benefices on his preferment, which has operated for a certain number of years, or even as long as the *commendatary* lived, and continued bishop; and these commendams are granted on the king's mandate to the archbishop, expressing his consent, which continues the incumbency, so that there is no occasion for institution: a *commendam recipere*, which is to take a benefice *de novo*, in the bishop's own gift, or of some other patron, whose consent is obtained; and for life, when it is equal to a presentation, without institution, or induction. But all dispensations beyond 6 months were only permissive at first, and granted to persons of merit; the *commendam retinere* is for one or two years, &c. and sometimes for three or six years, and doth not alter the censure which the incumbent had before; and this, as long as the commendatary should live and continue bishop, hath been thought good. Vaugh. 18. The *commendam recipere* must be for life, as other parsons and vicars enjoy their benefices; and as a patron cannot present to a full church, so neither can a *commendam recipere* be made to a church that is then full. Show. 414.

A benefice cannot be *commended* by parts, any more than it may be presented unto by parts; so that one shall have the glebe, another the tythes, &c. Nor can a commendatary have a *juris utrum*, or take to him and his successors, sue or be sued, in a writ of annuity, &c. But a *commendam perpetua* may be admitted to do it. 11 Hen. IV. Compl. Incomb. 360. (See Nels. Abr. 454.)

These commendams are now in fact seldom or never granted to any but bishops; and in that case the bishop is made commendatary of the benefice while he continues bishop of such a diocese, as the object is to make an addition to a small bishopric; and it would be unreasonable to grant it to a bishop for life, who might afterwards be translated to one of the vacant sees.

COMMENDAM, in popish countries, is a real title of a regular benefice; as an abbey, or priory given by the pope to a secular clerk, or even to a layman, with power to dispose of the fruits thereof during his life.

No benefice that has a cure of souls, i. e. no parsonage, or bishopric, can be given in *commendam*. This practice being entirely contrary to the canons, none but the pope, who has a power of dispensing with the canons, can confer it.

When the commendam becomes vacant by the death of the *commendatary*, it is not esteemed vacant by his death; but as it was before the commendam was granted: that making no alteration in the thing; yet the pope gives the same benefice in *commendam* again, by a privilege which he still continues.

By the pope's bulls, a *commendatary* abbot has the full authority of the regular abbot to whom he is substituted. For this reason, the bulls expressly require, that he be a priest; or, that if he have not yet attained the age of priest-

hood, he shall take orders as soon as he has. But this is a mere formality, or matter of style, the thing is never executed.

Indeed, the spiritual direction of the abbey, while it is in *commendam*, is lodged wholly in the claustral priors.

The commendatary abbots have not any authority over the religious in *spiritualibus*: they even cannot either appoint or set aside the claustral priors, who are nominated in the bulls the administrators of the spiritualities; in which, however, this restriction is added, viz. till the abbot arrive at the age of twenty-five years, to assume the priesthood.

The popes grant benefices in *commendam*, not only to clerks, by dispensing with their age, and other qualifications required; but they also dispense with the clericate even in children yet in the cradle, till they become of age to take the tonsure: it being sufficient to obtain a bull, that it be represented at Rome, that the child is declined for the ecclesiastical state. In this case there is an *oeconomus*, or steward, appointed to take care of the temporal concerns.

COMMENDATARY, a person who holds a church living or preferment in *commendam*.

COMMENDATARY Letters, are such as are written by one bishop to another in behalf of any of the clergy, or others of his diocese traveling thither; that they may be received among the faithful; or that the clerk may be promoted; or necessaries may be administered to others, &c. Several forms of these letters may be seen in our historians; as in Bede, lib. ii. cap. 18.

COMMENDATUS, one that lives under the protection of a great man.

Commendati homines were persons who, by a voluntary homage, put themselves under the protection of any superior lord; for ancient homage was either predial, due for some tenure, or personal, which was by compulsion, as a sign of necessary subjection; or voluntary, with a desire of protection. And those who by voluntary homage put themselves under the protection of any men of power, were sometimes called *homines ejus commendati*, sometimes only *commendati*, as often occurs in Domesday. *Commendati dimidii* were those who depended on two several lords, and paid one half of their homage to each; and *sub-commendati*, were like under-tenants, under the command of persons who were dependants themselves on a superior lord. There were also *dimidii sub-commendati*, who bore a double relation to such depending lords. Domesday. This phrase seems to be still in use, in the usual compliment, *commend me to such a friend*, &c. which is to let him know I am his humble servant. Spelm. of Feuds, cap. 20.

COMMENDO, called also *Commani*, *Kommani*, *Aguello*, and *Guaffo*, in *Geography*, a kingdom of Africa, on the Gold coast, bordered on the west by the countries of Jabani Jaben, on the north-west by Adomi, by Ambramo on the north; on the east, by a little republic lying between Commendo and Fetu, called Addena, or Elmna; and by the ocean on the south. The dimensions are about five miles along the sea-coast, and about as many up the country. In the centre, on the strand, stands Little Commendo, or *Commani*, called by the negroes Ekki Tekki, having cape Aldea das Terras on the west, and Ampani on the east, with some small hamlets in the intermediate spaces. Commendo had formerly been a part of Saba and Fetu, but of late years it has been erected into a separate monarchy. The chief city, or residence of the king, is called "Guaffo," which is large and well inhabited, containing no less than 400 houses, and situated on high ground, at the distance of four miles from Little

Little Commendo; the Dutch distinguish both by the name of Great and Little Commendo. This kingdom produces but little rice; nevertheless, the valleys are no less fertile than agreeable, and the hills covered with wood, which affords a very delightful prospect. Behind Little Commendo, the land rises by a gentle ascent into little hills, beautifully sheltered with woods of a perpetual verdure; and at the bottom are meadows and plains disposed in the most agreeable manner, and abounding with various kinds of fruit-trees. The natives are warlike, and so numerous, that in this little kingdom, the sovereign is able to raise an army of 20,000 men. His ordinary body-guard is composed of 500 stout fellows, well armed, resolute, and loyal. It has been said that Commendo abounds in gold mines, but that the king, for fear of exciting the avarice of the Europeans, prohibits the working of them. This country is divided into two distinct provinces. We shall content ourselves with describing Little Commendo. This province is called by the Portuguese Aldea das Terras, and by the natives Ekki Tekki. The town is said to contain at least 100 houses. It is situated on the banks of a fine rivulet, that empties itself into the sea on the southward, which forms a kind of canal, or little oblong harbour for canoes. The N.E. side of the town, where the French had formerly a settlement, is bordered by little hills, at the foot of which lie fine rich meadows and pasture, as well as fertile fields, every where interspersed with groves of fruit-trees. Little Commendo, which was once a place of great note, and one of the finest towns in Guinea, has since exhibited only the remains of a town destroyed by fire, and the well peopled ruins of a once flourishing and great city. The natives of Little Commendo are in general turbulent, cunning, and deceitful; much addicted to lying and stealing. Their employment consists either in fishing or in commerce, and their neighbours employ them as brokers and factors, particularly the people of Akamen, who carry on a considerable trade. Every morning 70 or 80 large canoes may be seen upon the coast fishing, or trading with the European shipping in the road. About the middle of the day they put to shore when the south-west winds begin to blow, both for facility of unloading, and for securing a market for their cargoes, either at Great or Little Commendo, where the inland negroes assemble with the commodities of their principal countries. No markets on earth are better supplied with all sorts of grain, roots, fruits, pulse, and fish, than these, nor at a more reasonable price. Here the English and Dutch have forts. Next to Cape Coast, the English fort is said to be the principal which they possess in Guinea, at least on the Gold Coast. The Dutch fort of Wodenborough, lies at the distance of a musket shot, and was built in the year 1688. N. lat. $4^{\circ} 54'$. E. long. $0^{\circ} 34'$.

The principal commodities for which there is a demand by the negroes of Commendo, are galls beads, brass bells, and buttons, long linen cloths and woollen stuffs. They are very dextrous in the adulteration of gold, and the practice is very common. When the people of Commendo are at war, they have usually a slave-market at Little Commendo, for the more quick dispatch of their business. Here also they keep quantities of gold in the hands of certain agents employed to carry on trade, while the rest are fighting the enemy in the field. The gold trade, however, is not very considerable.

COMMENDONE, GIANFRANCESCO, in *Biography*, an eminent prelate in the church of Rome, was born at Venice in 1524, and began, at the early age of ten years, to compose verses. He pursued his studies at Padua, and in the year 1550, he was introduced to pope Julius III., by whom he

was made chamberlain, and afterwards employed on public business. In 1553, he accompanied the legate cardinal Baddino to Flanders, and from thence he was dispatched secretly to England, to enquire into the state of religion under queen Mary. Paul IV. made him bishop of Zart, and commissioned him to excite the different states of Italy to unite with him in a common league. By Pius IV. he was raised to the office of cardinal in 1565, while he was nuncio in Poland. He was employed in various other missions to foreign states, and in all these he acted with zeal for his church, and executed whatever was committed to his charge with the utmost dispatch and fidelity. Under Gregory XIII. he was promoted by the imperial faction for having too great a partiality towards France; his own party was, however, so strong, that he was not only acquitted, but upon a dangerous illness of the pope, it was projected to raise him to the papal crown. The pope, by recovering his health, disappointed his expectations, and Commendone himself died at Padua, in December, 1584. He is not celebrated as an author, having left behind him only some Latin poems, among those of the Academy of Occulti, of which he was the zealous patron, and some letters inserted in the notes to those of Julio Poggiano. Commendone was reckoned one of the ablest politicians of his own time, a man of great learning, and a friend to literature. He cultivated an intimate friendship with many of the most eminent scholars in Italy, and to him were addressed some letters of Annibal Caro. Gen. Biog.

COMMENSURABLE *Quantities*, in *Geometry*, are such as have some common aliquot part, or which may be measured or divided without leaving a remainder, by some measure or divisor, called their common measure. Thus, a foot and a yard are commensurable; there being a third quantity which will measure each, viz. an inch; which taken 12 times makes a foot, and 36 times a yard.

Commensurables are to each other as one rational whole number to another. In incommensurables it is otherwise. The ratio of commensurables, therefore, is rational; that of incommensurables irrational: hence, also, the exponent of the ratio of commensurables is a rational number.

COMMENSURABLE *Numbers*, in *Arithmetic*, whether integers or fractions, are such as have some other number which will measure or divide them without any remainder. Thus, 6 and 8, both divided by 2, are respectively commensurable numbers: $\frac{2}{3}$ and $\frac{4}{3}$, or $\frac{1}{3}$ and $\frac{2}{3}$, are commensurable fractions, because the fraction $\frac{1}{6}$ or $\frac{1}{12}$ will measure them both; and in this sense all fractions may be said to be commensurable.

COMMENSURABLE in *Power*. Right lines are said to be commensurable in power, when their squares are measured by one and the same space, or superficies.

COMMENSURABLE *Surds*, are such surds as, being reduced to their least terms, become true figurative quantities of their kind; and are therefore as a rational quantity to a rational: such are $3\sqrt{2}$ and $2\sqrt{2}$ being one to the other as 3 to 2. See *Surd*.

COMMENTACULA, among the Romans, the rods which the flamens carried in their hands when going to sacrifice.

COMMENTARIENSIS, in *Ancient Military Language*, the person who was gaoler of the soldiers' prison among the Romans, and kept its registers. He was subject to the "triumviri capitales."

COMMENTARY, or COMMENT, a gloss, or interpretation, affixed to some ancient, obscure, or difficult author, to render him more intelligible, or to supply what he has left undone. The biblical student may find some judicious and useful remarks on commentators, or those who have written commentaries on the Sacred Scripture, in Mr. Locke's Preface

face to his Paraphrase and Notes on the Epistles of St. Paul.

COMMENTARY is also used for a sort of history, written by a person who had a chief hand in the transactions related.

Such are the commentaries of Cæsar, of Sleidan, Montluc, &c.

The word is also used for certain books written on some particular subject: Kepler has an excellent book of commentaries on Mars, containing observations on the motion of that planet.

COMMEQUIERS, in *Geography*, a town of France, in the department of the Vendée, 15 miles N. of Sables d'Olonne.

COMMERAGH, or CUMMERAGH, the name of a high ridge of mountains which lie between Dungarvan and Clonmel, in the county of Waterford, Ireland. On the sides of this chain, says Dr. Smith, are many horrid precipices and steep declivities, and the vallies are full of large fragments intermixed with sand and gravel. On the tops of most of them are also large heaps of stones. Smith's Waterford.

COMMERCE, the interchange of commodities, or the disposal of produce of any kind for other articles, or for some representative of value for which other articles can be procured, with the view of making a profit by the transaction. The term is usually restricted to the mercantile intercourse between different countries; the internal dealings between individuals of the same country, either for the supply of immediate consumption, or for carrying on manufactures, being more commonly denominated *trade*.

The mutual convenience of an exchange of commodities, must have been evident almost as soon as any part of mankind had acquired an idea of distinct property; the difficulty of communication between different countries must, however, have long rendered commercial intercourse very limited and uncertain. The dangers attending long journeys induced those who engaged in trading to distant parts, to associate together for mutual assistance and defence; and these companies of merchants, or caravans, were well adapted for the improvement of commerce, from the information which the individuals composing them would communicate to each other, and the connections they might occasionally form. In the book of Genesis, mention is made of the companies or caravans of Ishmaelite merchants trading in spices from Gilead into Egypt; to one of whom Joseph was sold, about 620 years after the flood. But this mode of communication between different countries was insufficient for the enterprising spirit of commercial adventurers; remote countries cannot convey their commodities by land to those places where, on account of their rarity, they are most desired, and consequently become most valuable. It was not till some progress had been made in the art of navigation, that the power was acquired of transporting with facility the superfluous stock of one part of the earth to supply the wants of another part, and that the active spirit of commerce could extend its multifarious concerns to all the known parts of the globe.

The Egyptians, soon after the establishment of their monarchy, are said to have opened a trade between the Arabian Gulph or Red Sea, and the western coast of the great Indian continent. The commodities which they imported from the east, were carried by land from the Arabian Gulph to the banks of the Nile, and conveyed down that river to the Mediterranean: but the maxims and manners of Egypt were inimical to commerce, and this profitable traffick soon declined.

The situation and circumstances of the Phenicians naturally led them to look to commerce as the only source from which they could derive opulence or power; and accordingly, the foreign trade carried on by them, particularly from Sidon and Tyre, became more extensive and important than that of any state in the ancient world. Their ships not only frequented all the ports in the Mediterranean, but they were the first who ventured beyond the ancient boundaries of navigation, and passing the straits of Gibraltar, visited the western coasts of Spain and Africa. They revived a commercial intercourse with Arabia and the continent of India, on the one hand, and with the eastern coast of Africa on the other; the cargoes which they purchased in Arabia, Ethiopia, and India, being landed at Elath, the safest harbour in the Red Sea towards the north: thence they were carried by land to Rhinocolura, the distance not being very considerable, and being re-shipped in that port, were transported to Tyre, and distributed over the world.

The wealth which the Phenicians acquired by monopolizing the commerce of the Red Sea, incited their neighbours, the Jews, under the prosperous reigns of David and Solomon, to aim at being admitted to some share of it. Solomon fitted out fleets, which, navigated by Phenician pilots and mariners, sailed from the Red Sea to Tarshish and Ophir, from whence they brought such valuable cargoes as suddenly diffused wealth and splendour through the kingdom of Israel. But the institutions of the Jews were by no means favourable to commerce, which was never carried to any great extent by them while they inhabited Judea.

The Carthaginians applied themselves to commerce and navigation with ardour, ingenuity, and success; but as the Phenicians had engrossed the commerce of India, their adventures were chiefly made to the west and north. Following the course which the Phenicians had opened, they extended their voyages beyond the shores of the Mediterranean, visiting not only all the coasts of Spain, but those of Gaul, and penetrating at last to Britain. They made voyages of discovery in different directions, and thus established a commercial intercourse with places which before were wholly unknown; but whatever knowledge of this kind they acquired, it was concealed from the inhabitants of other states with the utmost care.

The Greeks, although their country was almost encompassed by the sea, which formed many spacious bays and commodious harbours, and though it was surrounded by a number of fertile islands, were, notwithstanding such a favourable situation, a long time before they attained any degree of perfection in navigation. They scarcely carried on any commerce beyond the limits of the Mediterranean. Their chief intercourse was with the colonies of their countrymen planted in the lesser Asia, in Italy, and in Sicily. They sometimes visited the ports of Egypt, of the southern provinces of Gaul, and of Thrace, or passing through the Hellespont, they traded with the countries situated around the Euxine sea. The expedition of Alexander into the east considerably enlarged the geographical knowledge of the Greeks. He had observed the resources which commerce creates, in the exertions of the republic of Tyre, and therefore it became part of his plan to render the empire which he proposed to establish, the centre of commerce as well as the seat of dominion. With this view, he founded Alexandria near one of the mouths of the Nile, that by the Mediterranean sea, and the neighbourhood of the Arabian gulph, it might command the trade both of the east and west. This situation was so judiciously chosen, that Alexandria soon became the chief commercial city in the world. Not only during the subsistence of the Grecian empire in Egypt and

in the east, but amidst all the succeeding revolutions of those countries, commerce, particularly that of the East Indies, continued to flow in the channel which the sagacity and foresight of Alexander had marked out for it, till the discovery of the navigation by the Cape of Good Hope opened a more expeditious and independent channel to all the maritime states of Europe.

In the early periods of the Roman history, commerce appears to have been much neglected and undervalued; it seems to have been thought a degrading employ by this military people, and to have been left almost entirely in the hands of the natives of the countries they conquered. The extent, however, of the Roman power, which included the greatest part of the known world, the vigilant inspection of the Roman magistrates, and the spirit of the Roman government, no less intelligent than active, gave such additional security to commerce, as animated it with new vigour; and, as soon as the Romans acquired a taste for the productions of other countries, commerce, particularly the trade with India through Egypt, was pushed with new vigour, and carried on to a greater extent. The pilots who sailed from Egypt to India first ventured to quit sight of the shore, and depending wholly on the trade winds, boldly sailed from Ocellis at the mouth of the Arabian gulph, across the ocean, to the coast of Malabar, returning with the eastern monsoon, and thus procuring the spices and other rich commodities of the continent and islands of the farther India, which were brought to the port of Muziris by the Indians themselves. The commerce thus carried on will appear considerable even in the present age, as the trade with India is said to have drained the Roman empire every year of more than four hundred thousand pounds, and that one hundred and twenty ships sailed annually from the Arabian gulph to that country. The reign of Augustus was very favourable to commerce, as the peace which then prevailed over the civilized parts of the world, enabled the merchants to pursue it unmolested. Under Tiberius we find the Romans extending their protection to the north, and the town of Havern, the most ancient in Friesland, founded. Under Nero, the capital of England is first mentioned as a considerable place. Tacitus, who lived for some time at London, says it was famous for its many merchants, and plenty of its merchandize. Rome, however, as the seat of wealth and luxury, continued to be the metropolis of the commercial world, until the fourth century, when Constantine removed the seat of empire to Constantinople, and made it the emporium of commerce. This city was undoubtedly well adapted for that honour; it was favoured by nature with a fine climate, and in a most advantageous situation for carrying on an extensive correspondence with every part of the world then known.

The invasion by the northern nations in the fifth century, not merely arrested the progress of commerce, but effectually dissolved all commercial connections, and deprived the merchants of any market for their commodities. Europe became parcelled out into many small and independent states, differing from each other in language and customs; no intercourse subsisted between the members of these divided and hostile communities; their mode of life was simple, they had few wants to supply, and few superfluities to dispose of. Cities, in which alone an extensive commerce can be carried on, were few, inconsiderable, and destitute of those immunities which produce security or excite enterprise. It became disagreeable and dangerous to visit any foreign country, and thus the knowledge of remote regions was lost; their situation, their commodities, and almost their names, were unknown. The preservation of Constantinople from

the general destruction, however, prevented commercial intercourse with distant nations from ceasing altogether. In that city the knowledge of ancient arts and discoveries was preserved; a taste for splendour and elegance subsisted; the productions of foreign countries were in request; and commerce continued to flourish there when it was almost extinct in every other part of Europe. The merchants of Constantinople did not confine their trade to the islands of the Archipelago, or to the adjacent coasts of Asia; they took a wider range, and following the course which the ancients had marked out, imported the commodities of the East Indies from Alexandria. When Egypt was torn from the Roman empire by the Arabians, the industry of the Greeks discovered a new channel, by which the productions of India might be conveyed to Constantinople. They were carried up the Indus, as far as that great river is navigable; thence they were transported by land to the banks of the river Oxus, and proceeded down its stream to the Caspian sea. There they entered the Volga, and sailing up it, were carried by land to the Tanais, which conducted them into the Euxine sea, where vessels from Constantinople waited their arrival. This extraordinary and tedious mode of conveyance, Dr. Robertson observes, is a proof not only of the violent passion which the inhabitants of Constantinople had conceived for the luxuries of the east, and of the ardour and ingenuity with which they carried on commerce, but it demonstrates, that during the ignorance which reigned in the rest of Europe, a knowledge of remote countries was still preserved in the capital of the Greek empire. Robertson's Hist. Amer. vol. i.

The devastations of the Huns in Italy induced many of the richest inhabitants of the country near the bottom of the Adriatic, to fly with their best effects into the numerous small sandy isles lying amongst the shallow waters near the shores of the continent; on which isles, about seventy-two in number, they built such habitations as their circumstances would admit; and here by degrees arose the celebrated commercial city of Venice. Necessity first obliged them to devote themselves to commerce, the earliest branch of which was naturally the fisheries. Their next commercial object was the manufacture and exportation of salt. Thus by the application of its inhabitants, and the security of its situation, Venice gradually became the general magazine for the merchandize of the neighbouring continent, to which the many rivers that fall into the Adriatic sea greatly contributed; and as the Venetians in time became the carriers of this merchandize into distant countries, they were enabled to bring back raw materials for various manufactures which greatly enlarged their commercial dealings.

In this manner, Venice first, and Genoa, Florence, and Pisa afterward, from inconsiderable places became populous and wealthy cities, and laid the foundation for the revival of commerce throughout the Mediterranean, which, in process of time, was extended to the countries of Europe without the freights of Gibraltar. The free cities of Italy, were, for several centuries, the only places in Europe, west of the Eastern or Greek empire, which had any considerable commerce, or any valuable manufactures for the supply of other nations. Their merchants frequented Aleppo, Tripoli, Alexandria, and other ports of Syria and Egypt, where they procured the produce of India; and visiting the maritime towns of Spain, France, the Low Countries, and England, by distributing their commodities over Europe, communicated to its various nations some taste for the valuable productions of the east, as well as some ideas of manufactures and arts, which were then unknown beyond the precincts of Italy.

The first mention of the city of Antwerp, afterwards so famous for its trade, is in the year 517, when Theodorick expelled the Danes from it. Some towns in England, as Clichelster and Abingdon, are said to have been founded about this time, which shews that trade and manufactures were gaining ground in this country.

The unsettled state of Europe, arising from the fierce and restless disposition of the barbarous tribes who had taken possession of the western empire, caused for several centuries a great stagnation of commercial intercourse. Venice however continued to improve its commerce, and London became "a mart town of many nations, which repaired thither by sea and land." Some of the Italian cities began to assume a degree of independence, and several towns were founded in Germany and Flanders, which afterwards became of much commercial importance. The commerce of Europe revived a little under the government of Charlemagne, who, among other endeavours to promote it, is said to have formed a project for uniting the two great rivers of the Rhine and the Danube, and thus forming a communication between the German ocean and the Black sea, without failing up the Mediterranean. But his engineers had not sufficient skill to overcome the difficulties they met with, and the undertaking was soon relinquished. In a letter from this prince to Ossa, king of Mercia, he grants leave for such English as went in pilgrimage to Rome, to pass through his dominions free; but such as travelled for the purposes of trade were to pay the customary tolls; and promises that the merchants should have legal patronage and redress of grievances. These merchants were probably persons who carried their whole stock with them, which of course could not be of any very great amount.

The establishment of Christianity in Germany produced a much more intimate and regular correspondence between the north of Europe, and the earlier Christianized countries of Italy, France, Spain, and Britain; so that their superfluities and produce were mutually communicated to each other, while Germany received by degrees, from its intercourse with those countries, considerable improvements with respect to agriculture, mining, vine-dressing, manufactures, and the arts, more immediately conducive to the comforts of civilized life. It considerably increased the cities and towns, where cathedral churches and houses for the bishops and clergy were erected. Thus the propagation of Christianity greatly favoured the advancement of commerce in the north of Europe; while Charlemagne by his conquest of Italy, and by rebuilding and restoring many of the decayed cities of that country, inspired those cities with the spirit of commerce, manufacture, and navigation, for which they became in after times so justly famous. This period may be considered as the first dawn of the revival of commerce in Europe; for although subsequent to this time the Saracens or Moors, and the Normans, by their ravages and conquests in various parts, greatly obstructed and retarded its progress, yet in spite of all opposition, the free cities in both the extreme parts of Europe in consequence of the increase of their wealth and population from the encouragement of commerce, gradually arose to very considerable importance.

In the tenth century, the commercial intercourse which the Germans had previously cultivated with the neighbouring states was much increased by the discovery of valuable silver mines at Goslar in Saxony, which occasioned other parts of Germany to be explored for mines with considerable success. The woollen manufacture of Flanders began to acquire some degree of importance, being much encouraged by Baldwin, third earl of Flanders, who invited into

the country all manner of handicraftsmen for making all sorts of manufactures, to whom he granted great privileges. He also established annual fairs, and fixed markets on stated days of the week at Bruges, Courtray, Tournout, Mont-Cassel, and other places, where merchants could exchange their goods for others; for "by reason of the scarcity of money at that time, the Flemings dealt mostly by permutation, or barter of one kind of merchandize for another; which we read was also the practice of almost all the Germans and Sarmatians."

The republic of Venice had now acquired so much wealth and strength by the great extension of her commerce, as to have become a formidable political state, and having annexed to their dominions many cities and towns on the east coast of the Adriatic sea, the doge of Venice assumed the title of duke of Dalmatia. They established a regular commercial intercourse with the Saracens of Egypt and Syria, "countries ever famous for the production of rice, sugar, dates, senna, cassia, flax, linen, balm, perfumes, galls, wrought silk, soap, &c. besides the rich spices and precious stones of India, brought to those two countries; with all this rich merchandize, the Venetians now traded all over the western parts of Europe, to their immense profit." They obtained from the Greek emperors a freedom from all customs and taxes in their empire; and in the year 996 the emperor Otho III. likewise granted them various privileges, with a right to set up fairs in several parts of Germany, where they carried on a vast commerce.

The crusades contributed materially to the extension of commerce during the 11th and 12th centuries. The Genoese, the Pisans, and the Venetians, furnished the transports necessary to carry the vast armies that embarked on these wild enterprises; they also supplied them with provisions and military stores. Besides the immense sums which they received on this account, they obtained commercial privileges and establishments of great consequence, in the settlements which the crusaders made in Palestine, and in other provinces of Asia. From these sources they acquired great wealth, and a proportionate increase of power. By the expeditions into Asia, the inhabitants of all the states of Europe had an opportunity of observing the manners, the arts, and the accommodations of people more polished than themselves. The adventurers who returned from Asia communicated to their countrymen the ideas which they had acquired, and the habits of life they had contracted by visiting more refined nations. The Europeans began to be sensible of wants with which they were formerly unacquainted; and such a taste for the commodities and arts of other countries gradually spread among them, that they not only encouraged the resort of foreigners to their harbours, but began to perceive the advantage and necessity of applying to commerce themselves.

The great commercial progress of the city of Lubeck soon caused other towns to be founded in the neighbourhood of the Baltic; which, suffering much from the occasional attacks of neighbouring powers, and the depredations of pirates, were induced to enter into an association for their mutual safety, and the protection of their navigation. This was gradually formed the famous Hanseatic confederacy, which made so great a figure in the commercial history of several succeeding centuries, and of which Lubeck was from the first considered as the director or head. Werdenhagen fixes on the year 1169 for the first of this confederacy, which consisted of the twelve following towns on the Baltic shore: viz. Lubeck, Wismar, Rostock, Straelsund, Grypswald, Anclam, Stetin, Colberg, Stolpe, Dantzick, Elbing,

and Königsberg; though probably not all of them at the first; as some of them do not appear to have been founded till a later period. Lambecius, librarian to the emperor Leopold, is of opinion, that the Han-league did not properly commence till after the league between Lubeck and Hamburgh in 1241, at which time the towns comprehended in this association were in possession of all the commerce of the fourth shores of the Baltic, from Denmark to the bottom of the gulph of Finland, besides an extensive commerce to more distant parts. About this time the commerce of Norway began to acquire some degree of importance, and in a treaty between the monarch of that country and Henry III. of England, in 1217, it was agreed that their respective states should be free for merchants and others on both sides.

At the beginning of the 13th century, the German merchants of the Steel-yard engrossed all the foreign commerce which then existed in England, which at that time had very few merchants, and fewer ships of her own. About 1250, however, a society of English merchants was formed, who are said to have had privileges granted to them in the Netherlands, by John duke of Brabant; whither they had begun to resort with English wool, lead, and tin, bringing in return fine woollen cloths, linen, and other articles. From this society, the company styled "Merchants of the Staple of England" took its rise. In 1274, a treaty was concluded with the earl of Flanders for the settlement of some commercial disputes which existed between the two countries.

France at this period possessed very little foreign commerce, but in the cities of Italy it had increased greatly. The republic of Genoa was in its meridian glory, being the greatest maritime power then existing. Even Venice, great as it was now become, was eclipsed by Genoa, which, towards the conclusion of this century, had reduced the republic of Pisa, till then also powerful at sea, to the lowest ebb of fortune, never again to rise to greatness, and soon to lose her independence.

A new era was now about to commence in commercial history. The discovery of that valuable, but now familiar instrument, the mariner's compass, Dr. Robertson observes, may be said to have opened to man the dominion of the sea, and to have put him in full possession of the earth, by enabling him to visit every part of it. But the effects of this discovery were not so sudden or extensive as might be expected. The use of the compass enabled the Italians to perform the short voyages to which they were accustomed, with greater security and expedition, but near half a century elapsed, before navigators ventured into any seas which they had not been accustomed to frequent. One of the first fruits of such adventures, was the discovery of the Canary islands by the Spaniards.

Many of the princes of Europe were now becoming more sensible of the importance of commerce, which led them to enter into treaties for its regulation and defence. Edward I. in 1302 published his famous charter styled Charta Mercatoria, by which "The merchants of Almaine, France, Spain, Portugal, Navarre, Lombardy, Florence, Provence, Catalonia, Aquitaine, Thouloufe, Flanders, Brabant, and of all other foreign parts, who shall come to traffic in England, shall and may safely come with their merchandize into his cities, towns, and ports, and sell the same, by wholesale only, as well to natives as to foreigners." Some particular articles they were allowed to sell by retail; and they were to export any goods they might want from England on paying the usual customs, except wine, which could not be exported without a special licence. The countries here mentioned shew the

parts to which the commerce of England was at that time chiefly confined; and a very good idea of its extent may be gained from the following account of the exports and imports, in the 28th year of Edward III. from a record in the Exchequer.

<i>Exports.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
31,651½ sacks of wool, at six pounds per sack, and 3036 hundred weight and 65 fells, each hundred weight being 6 score, at forty shillings per hundred weight, with the customs, &c. thereon, amounted to	277,605	2	9
Leather, with its custom	95	2	6
477½ coarse cloths, at 40 shillings each, and 8061½ pieces of worsted, at 16s. 8d. per piece	16,266	13	4
Customs thereon	-15	13	7
Total Exports, with the duties thereon	294,184	17	2

<i>Imports.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
1831 fine cloths, at 6l. per cloth, which, with the customs, comes to	11,033	12	0
397¾ hundred weight of wax, at 40 shillings per hundred weight, which, with the customs, comes to	815	7	5
1829½ tons of wine, at 40 shillings per ton, which, with the customs, comes to	3,841	19	0
Linen cloth, mercery, grocery, and all other wares whatever	22,943	6	10
On which the custom was	-285	18	3
Total Imports, with the duties thereon	38,970	3	6

Thus, as sir William Temple observes, "when England had but a very small foreign commerce, we were rich in proportion to our neighbours, by selling so much more than we bought." It is not very probable, however, that the excess of the exports was generally so great as is here stated.

The materials of commerce were now increasing by the improvement of manufactures in various parts of Europe; while the discoveries of the Portuguese on the coast of Africa, and in the adjacent seas, excited a more enterprising spirit of mercantile adventure, and at length, in 1487, led to the discovery of the Cape of Good Hope, which they doubled about ten years after, and thus accomplished the first regular voyage to the East Indies. About the same time also was accomplished the great discovery of the western continent. These events, which filled the world with astonishment, and gave rise to an infinity of new speculations, have since supplied it with a prodigious increase of wealth, and with many new and excellent materials for the immense additional commerce which has thus accrued to all the states of Europe.

The whole of the vast regions discovered in the East and West, was by the papal authority divided between the Spaniards and Portuguese. The former first made herself mistress of the islands, and next of the principal part of the continent of America; in consequence of which the cities of Seville and Cadiz became the store-houses for the riches of the newly-discovered western world. Portugal pursued her commerce and rapid conquests in the East Indies, so that

Lisbon

Lisbon soon became (what the now declining city of Venice had been for many centuries past) the great magazine for all the rich productions of the East. They had also discovered Brazil in South America, which soon became an almost inexhaustible fund of wealth to Portugal, which may be said to have been then at the height of its commercial greatness.

In the course of the 16th century many circumstances occurred which contributed greatly to the extension of commerce. The English in the pursuit of a north-west passage to India had discovered the whole coast of North America, where, after some years, they began to attempt settlements. They engaged in the Newfoundland fishery, and also in the whale fishery at Spitzbergen or Greenland. The continual jealousies and disputes between the English merchants and the German Hanseatic merchants of the Steel-yard in London, were at length terminated by the abolition of the peculiar privileges of the latter. The discovery of a passage to Russia round the north Cape of Lapland, opened a field for other new discoveries, and new branches of commerce; in consequence of which a company for trading to Russia was immediately formed and incorporated. The commerce with Turkey was encouraged by the incorporation of a company; and the intercourse with Guinea and other places on the coast of Africa, was also thought of sufficient importance to have a company established for carrying it on.

While the importance of the Italian cities was declining, and the commerce of the towns on the Baltic experiencing some diminution, the cities of Hamburg and Antwerp had risen into considerable importance. The latter in particular, from the convenience of its situation, might for some time be considered as the centre of the commerce of Europe, as well for the merchandize of both the Indies, as for the naval stores and other bulky commodities of the northern states. It was however soon to find a rival among its industrious neighbours in the United Provinces, who, from the time of their independence, applied themselves to manufactures and commerce with the utmost assiduity. France was at this time beginning to encourage the cultivation of the vine, and the improvement of her broad silk manufacture; while Spain, by expelling the protestants from the Netherlands, supplied England, Holland, and the Hanse-towns with great numbers of wealthy and industrious manufacturers and artificers, as well as with an accession of many ingenious and beneficial new manufactures.

The 17th century was the period in which the principles were adopted, and most of the establishments formed, which have contributed to advance the commerce of Europe to its present astonishing height. The interests of nations became better understood than in any former age; the utility of commerce had become evident to every one, from the wealth and power it had conferred on the states which had encouraged it; and commercial treaties became frequent between the different nations. Navigation was improved; new settlements were formed, and many of those before made were rising into importance; manufactures were advancing in many parts of Europe; shipping was increasing, and the intercourse between distant places, from the accumulation of knowledge and experience, becoming more expeditious and secure.

The lucrative commerce of the East became one of the leading objects of mercantile pursuit. An English East India company was formed in 1600; and the Dutch companies, which were united in 1602, became one of the most celebrated commercial establishments ever formed. The French visited the East Indies in 1601, but did not establish a regular company for carrying on the trade till 1664. The

Danes established an East India company in 1617, and in 1627 the king of Sweden issued letters patent for forming an East India company, but it was not carried into execution till some years after. The Spaniards and Portuguese, however, at this period, possessed by far the greatest share of the commerce of India, which had now become very considerable. The following account published by Mr. Munn, in 1621, of the quantity of Indian merchandize consumed annually in Europe, gives a very good idea of the proportion of the different articles of this branch of commerce: the prices affixed are the prime cost in India, including all charges till actually shipped for Europe.

	s.	d.
6,000,000 lb. pepper, at	0	2½ per lb.
450,000 lb. cloves, at	0	9 per lb.
150,000 lb. mace, at	0	8 per lb.
400,000 lb. nutmegs, at	0	4 per lb.
350,000 lb. indigo, at	1	2 per lb.
1,000,000 lb. raw silk, at	8	0 per lb.

This statement was probably meant to include only the principal articles; at least it is certain that about 1631 several other kinds of merchandize were usually imported from India, as taffaties, painted calicoes, druzs of various sorts, and China ware. Tea, the great object of commercial intercourse with China, was either not yet an object of commerce, or was imported in such small quantities, that in England at least, in 1660, it was not thought of sufficient consequence to be subjected to a duty.

Dr. Davenant, who published his "Discourses on Trade" in 1698, was of opinion, that from about the year 1556 to 1688, England had every year gradually increased in riches; and that about the last mentioned year, the increase or addition to the wealth, and general stock of the nation, arising from foreign trade and home manufactures, was at least two millions per annum. In this estimate the different branches of trade are stated as follows:

The plantation trade may bring in	-	£ 600,000
The East India trade may bring in	-	500,000
The European, African, and Levant trade, by our own product may bring in	-	600,000
Ditto, by re-exports of plantation goods	-	120,000
Ditto, by re-exports of East India goods	-	180,000
Total	-	2,000,000

This account is probably somewhat beyond the truth, with respect to the period to which it refers; but that there had been a considerable influx of wealth, is shewn by the observations of the same author, that from the year 1600 to 1688, the general rental of England was nearly trebled, and the purchase of land half doubled; that the stock of the kingdom was multiplied above five fold, and the money in circulation above four fold. This rapid advance in wealth, can be ascribed to no other cause than the improvement of commerce, which was now becoming of the utmost importance to all the European states, particularly to such as were desirous of maintaining any degree of naval power.

The increase of wealth arising from the extension of commerce, gave rise to the establishment of banks, by which its operations have of late years been so much facilitated. The commercial cities of Venice and Genoa had long experienced the utility of such institutions, which were now adopted in other states. The banks of Amsterdam, of

COMMERCE.

Hamburgh, and of Rotterdam were established; and in 1694, the bank of England, and the bank of Scotland. The business of private bankers likewise took its rise, and had become considerable, when it received a severe check from the unjustifiable conduct of Charles II. in seizing the money which the bankers had advanced on credit of the tax. This branch of mercantile intercourse has however been since carried to an extent which in former times would have been deemed wholly incredible.

This, with its principles generally understood; with most of the establishments formed which are necessary to facilitate its operations; with laws and treaties in force for its encouragement and protection; markets established for the purchase or sale of commodities in almost every part of the globe; navigation brought to a high degree of perfection, vast improvements in arts and manufactures; and a great increase of artificial wants from the progress of luxury and refinement; the commerce of the world, and particularly of Europe, has, during the 18th century, expanded in an astonishing degree, and become intimately connected with the political existence of almost every state.

COMMERCE of Great Britain. The most authentic materials from which an idea can be formed of the progress and extent of the commerce of Great Britain, are the accounts kept in the office of the inspector-general of exports and imports, at the custom-house of London. These accounts do not shew the current value of the commodities exported or imported, but are formed from their quantities, according to certain rates of value, affixed to the several articles of foreign trade in 1696, by which they have been rated ever since. It is evident, therefore, that, as the price of all kinds of merchandize is subject to great fluctuation, and in general has much increased in this country within the last hundred years, these accounts are far from shewing the actual values in the later years; they are, however, from this very circumstance of being uniformly made up at the same rates, the better adapted to a comparative view, and shew a progressive increase which has arrived to an amount never before known in the commerce of any nation. According to these estimates the total amount of the exports and imports of Great Britain have been as follows:

Years.	Imports.	Exports.
1700	£ 5,970,175	£ 7,302,716
1701	5,869,606	7,621,053
1702	4,159,304	5,235,874
1703	4,526,596	6,644,103
1704	5,383,200	6,552,019
1705	4,031,649	5,501,077
1706	4,113,933	6,512,086
1707	4,274,055	6,707,178
1708	4,638,663	6,069,089
1709	4,510,593	6,027,045
1710	4,011,341	6,090,828
1711	4,685,785	6,447,170
1712	4,454,682	7,468,857

At the conclusion of the war, by the peace of Utrecht, a commercial treaty with France was likewise negotiated; but when the particulars of it came to be discussed, two of the articles, by which the produce and manufactures of France were to be admitted into this country on the same terms as those of the most favoured nation, excited such general disapprobation, that the bill for carrying it into effect was rejected by the house of commons. The strongest objections to the principle of the treaty, was that it might ruin the trade then carried on with Portugal, which was

considered as the most valuable branch of our European commerce.

It is evident, that from the year 1705, notwithstanding the disadvantages it always labours under in time of war, commerce had been gradually increasing; but when peace enabled it to return to its usual channels, and restored some branches which had been considerably interrupted, its general advancement became more obvious, and although from the mode then usually adopted, of judging of the profits of commerce merely by the excess of the value of the exports, the balance appeared less than it had been in former years, the wealth which flowed into the country from foreign trade, being no longer absorbed in public loans, soon enabled the government to make a permanent reduction in the legal rate of interest. The war with Spain in 1718, did not cause much interruption of commercial intercourse, except in the direct trade with that country.

Years.	Imports.	Exports.
1713	£ 5,811,077	£ 7,352,055
1714	5,929,227	8,361,638
1715	5,640,943	7,379,409
1716	5,800,258	7,614,025
1717	6,346,778	9,147,700
1718	6,609,390	8,555,202
1719	5,507,499	7,295,528
1720	6,090,083	7,936,728
1721	5,768,510	8,681,200

At this period the judicious principle of promoting the exportation of British manufactures, which had hitherto been applied only to woollen goods, was extended to British manufactures and produce in general; which were allowed to be exported duty free, except a few articles chiefly materials for manufactures, the exportation of which it would not have been proper to encourage; while drugs and other materials used for dyeing, were, upon being first duly entered, to be imported duty free, but upon re-exportation were to pay specific duties. For this highly beneficial regulation, so simple in its principle, and so comprehensive in its extent, the country was indebted to the enlightened wisdom of Mr. Walpole: the experiment excited much doubt and solicitation as to its success, but it soon appeared that the loss of revenue in the duties thus given up, was a mere trifle in comparison with the stimulus it gave to manufactures and the consequent extension of commerce.

Years.	Imports.	Exports.
1722	£ 6,378,098	£ 9,650,789
1723	6,505,676	9,489,811
1724	7,394,405	9,143,356
1725	7,094,708	11,352,480
1726	6,677,805	9,406,731
1727	6,798,908	9,553,043
1728	7,569,299	11,631,383
1729	7,540,620	11,475,771
1730	7,780,019	11,974,135
1731	6,991,500	11,167,380
1732	7,087,914	11,786,658
1733	8,016,814	11,773,206
1734	7,095,861	11,000,645
1735	8,160,184	13,544,144
1736	7,307,966	11,616,356
1737	7,073,638	11,842,320
1738	7,438,960	12,289,495

The above period was almost wholly a time of peace, during which the commerce of Great Britain was gradually advancing,

advancing, both from the improvement of several of the existing branches, and the acquisition of new ones. The South-Sea company undertook the Greenland whale fishery, which had been entirely relinquished by this country for some years past; and encouragement was given to fisheries on the coast of America. Attempts were made to obtain a share of the fur trade of north America, which was almost entirely in the hands of the French. The Ostend East India company, which had been found prejudicial to the English trade in those parts, was suspended; while our trade with China increased considerably, particularly in the article of tea. The trade of the Levant company was very flourishing; as was likewise that of the Hudson's bay company, though the latter was but of small extent. The produce of several valuable commodities was at the same time augmenting, from an increased cultivation of rice in the American colonies, and of coffee in the West India islands, while great quantities of corn were annually exported from Great Britain to France, Portugal, Spain, and Italy.

The war which began in 1739, was occasioned chiefly by disputes respecting our commerce in the West Indies, which had been much interrupted by the Spaniards. It ceased, at first, some decline of foreign trade, which however soon regained the extent to which it had been carried during the preceding peace.

Years.	Imports.	Exports.
1739	£ 7,829,373	£ 9,495,366
1740	6,703,778	8,809,939
1741	7,936,084	11,469,872
1742	6,866,864	11,584,427
1743	7,802,353	14,623,653
1744	6,362,971	11,429,628
1745	7,847,123	10,497,329
1746	6,205,687	11,360,792
1747	7,116,757	11,442,049
1748	8,136,408	12,351,433

At this time, a much greater proportion of the exports consisted of unmanufactured produce than it has since; as it appears there had been exported from England in five years, from 1744 to 1748, no less than 3,768,444 quarters of corn, which at medium prices was worth 8,007,048 l.

That a considerable increase of commerce had taken place, is evident from the quantity of shipping employed. The total tonnage of vessels that cleared outwards on an average of three years preceding the war, had been 503,568 tons; the average of the three years, ending with 1751, was 661,184 tons. The encouragement of the fisheries, and the regulation of the Guinea or African trade, which had been in the hands of an exclusive company, but was now in a great measure laid open; caused some extension of foreign trade, although the Levant, or Turkey trade, which had been considered as one of the most valuable branches, was beginning to decline rapidly, from the French improving the natural advantages they possess for a trade with those parts.

Years.	Imports.	Exports.
1749	£ 7,917,804	£ 14,099,366
1750	7,772,039	15,132,004
1751	7,943,436	13,967,811
1752	7,889,379	13,221,116
1753	8,625,029	14,264,614
1754	8,093,472	13,396,853
1755	8,772,865	12,182,255
1756	7,961,603	12,517,640
1757	9,253,227	13,438,285
1758	8,415,025	15,034,994

Years.	Imports.	Exports.
1759	8,622,576	14,606,892
1760	9,832,802	15,579,073
1761	9,543,601	16,365,933
1762	8,870,234	14,134,093

It is evident that commerce had not been very materially affected by the war. The years 1755 and 1756 marked the lowest point of its depression; whence it gradually rose, till it had gained a superiority over the unexampled traffic of 1750, a year of establishment peace and security.

By the peace of 1763, although many islands which had been taken in the West Indies were restored, Great Britain retained a number of newly acquired islands, perhaps more than could be immediately brought into cultivation with advantage. The arrangements respecting Asia were very favourable to the East India company, and in Africa an exclusive trade was secured in the article of gum Senegal, a material indispensably necessary to the perfection of many of our manufactures. The immediate consequence, however, of the acquisition of additional territories, was, that a wide field was opened for speculation and commercial enterprise, which caused much productive capital to be withdrawn from the trade and manufactures of Great Britain; yet our merchants were not only able to maintain their own credit, but also to assist their correspondents during the commercial embarrassments in Holland and other parts of the continent.

In 1765, the principles and measures were adopted which soon involved the country in disputes with its American colonies. Impolitic restrictions were laid on a beneficial intercourse which had long subsisted between the British colonies and the Spanish West India settlements; which being soon followed by other causes of discontent, drove the Americans into public resolutions to make no further importations from Great Britain, but such as were unavoidably necessary, and to encourage, to the utmost of their power, every kind of manufacture that was practicable among themselves. This step soon produced serious effects in Great Britain; the merchants connected with America found themselves unable to fulfil their engagements by the stoppage of large sums due to them from that country; the whole system of their business was deranged, and general distress spread through the circle of their connections; the manufacturers suffered by the want of regular payments from the merchants, while their materials, and made up goods, to an alarming amount, were becoming a dead stock upon their hands; in consequence of which, great numbers of workmen were thrown out of employ. Petitions were presented to parliament from all the trading and manufacturing towns, which probably had some effect in procuring a temporary adjustment of the dispute.

The non-importation agreement in America, was renewed in 1766 and 1770; yet the commerce of Great Britain, notwithstanding these interruptions of an important branch of it, continued to increase; and previous to the war which followed, had attained to a greater extent than in any former years.

Years.	Imports.	Exports.
1763	£ 11,665,036	£ 16,160,181
1764	10,364,307	16,512,403
1765	10,889,742	14,550,507
1766	11,475,775	14,024,964
1767	12,073,950	13,844,511
1768	11,878,601	15,117,982
1769	11,908,562	13,438,236

C O M M E R C E.

Years.	Imports.	Exports.
1770	12,216,937	14,266,653
1771	12,821,695	17,161,146
1772	14,508,715	18,732,379
1773	12,522,643	16,654,052
1774	14,548,902	17,607,447

Years.	Imports.	Exports.
1783	£ 13,122,235	£ 15,450,778
1784	15,272,802	14,601,074
1785	16,279,490	16,772,239
1786	15,786,072	16,300,730
1787	17,804,244	16,876,114
1788	18,027,170	17,472,408
1789	17,821,102	19,340,548
1790	19,130,886	20,120,121
1791	19,669,783	22,731,993
1792	19,659,353	24,965,200

The prohibition of all trade and intercourse with the American colonies excited serious alarms, not only on account of the loss of a valuable branch of trade, but from the supposed encouragement which the acquisition of it would give to the trade of those powers who afflicted the colonies. These apprehensions, however, in a few years appeared to be in a great measure groundless, many British manufactures found their way to America, though not imported directly from hence; and Mr. Chalmers observes, that "there was an evident tendency in our traffic to rise in 1779, till the Spanish war imposed an additional burthen. There was a similar tendency in 1780, till the Dutch war added, in 1781, no inconsiderable weight. And the year 1781, accordingly, marks the lowest degree of depression, both of our navigation and our commerce, during the war of our colonies. But with the same vigorous spirit, they both equally rose, in 1782, as they had risen in former wars, to a superiority over our navigation and commerce, during the year wherein hostilities with France began."

The total number of vessels which belonged to the several ports of the British empire on the 30th September 1792, was 16,079; the amount of their tonnage 1,540,145 tons; and the number of men and boys usually employed in navigating them 118,285. The number of vessels that entered inwards at the several ports of Great Britain (including their repeated voyages) was as follows:

	Ships.	Tons.
British - - -	12,030	1,587,645
Foreign - - -	2,477	304,074
Total	14,507	1,891,719

At this period, the commerce of Great Britain, was generally admitted to be in a very flourishing state. The application and improvement of machinery in almost every branch of manufacture, had reduced the charges of workmanship so far, as to enable our manufacturers to supply foreign markets on better terms than any other country could offer; while the increase of capital, arising from the accumulation of the profits of successful commerce during a period of peace, gave our merchants the means of allowing longer credit than could be obtained elsewhere. The high price of the public funds, led many persons to employ their money in discounting private securities, which greatly facilitated the extension of commercial credit, but probably tempted some to trade much beyond the amount which their capital justified, or to speculate largely without any real property of their own; so that when the apprehension of war produced a greater degree of caution, and began to affect particular branches of trade, many were involved in embarrassments; and on the commencement of the war in 1793, commercial concerns, in general, experienced a serious shock. The assistance afforded by government to such houses as appeared to be really solvent, by lending them exchequer bills for a certain time, operated very successfully, and averted the consequences that were apprehended; credit revived, and as the war in its progress almost annihilated the foreign trade of some of the powers engaged in it, the commerce of Great Britain received a considerable augmentation; and, protected by its naval superiority, continued to increase, notwithstanding all the measures which political animosity could devise to obstruct or destroy it.

Years.	Imports.	Exports.
1775	£ 14,816,955	£ 16,946,523
1776	12,449,189	15,685,107
1777	12,643,834	24,152,243
1778	10,975,533	12,375,712
1779	11,435,263	13,597,771
1780	11,714,067	13,689,073
1781	12,723,613	11,470,388
1782	10,341,628	13,224,637

The opportunity of renewing the commercial connections between this country and America, from the conclusion of peace, was eagerly embraced; but subsequent experience proved, that a greater degree of caution had now become necessary to render it a beneficial trade. The arrangements relative to the commerce of Ireland, had a very beneficial effect in that country, which had hitherto been excluded from almost every species of commerce, and refrained from sending the produce of her own soil to foreign markets. The convention with Spain settled more accurately the limits within which British subjects were allowed to cut logwood on the Musquito coast, and consequently gave greater certainty and security to the trade with those parts. The commercial treaty with France, by discontinuing many of the prohibitions and prohibitory duties which had existed for almost a century between the two nations, opened a wide field for speculation and adventure. The consolidation of the customs by the abolition of all the confused and complex duties which then existed, and the substitution of a single duty on each article in their stead, was a measure of great convenience to all persons engaged in mercantile transactions. Under all these circumstances, supported by the improvements which had taken place in several of the principal manufactures, the foreign trade of Great Britain increased greatly during the peace, and in the year 1792, had attained to an unparalleled height, both in point of value, and with respect to quantity of shipping employed in it.

Years.	Imports.	Exports.
1793	£ 19,256,717	£ 20,399,180
1794	22,288,894	27,748,967
1795	22,736,889	27,312,338
1796	23,187,319	30,424,184
1797	21,013,956	28,917,010
1798	27,857,889	33,591,777
1799	26,837,432	35,991,329

C O M M E R C E.

Years.	Imports.	Exports.
1800	30,570,605	43,152,019
1801	32,795,557	42,317,011

In 1803	£ 40,100,870
1804	40,349,642
1805	41,063,942
1806	43,242,176

The increase during the above period, though really very great, was not however equal to what it would appear from the above accounts to have been. This irregularity in the comparative view which the account of imports and exports generally furnishes with sufficient accuracy, of the commerce of Great Britain, arises from the article of coffee, the import of which was formerly little more than sufficient to supply its small consumption in this country. But the interruption of the trade of France, the conquest of their West India islands, and the greatly increased cultivation of coffee in Jamaica, caused nearly the whole supply of the continent with this commodity to depend during the war on Great Britain. In the inspector-general's book of rates, coffee is valued on importation at 7*l.*, and on exportation, at no less than 14*l.* 10*s.* per cwt.; while, during the above period, the real average value was about 5*l.* per cwt. when imported, and 5*l.* 10*s.* when exported. The official account, therefore, from 1794, when coffee suddenly became a very considerable article of exportation, requires some correction; and if the over-estimated value of this article is deducted, the exports of the year 1800 will appear to have been 38,120,120*l.*, and of 1801, 37,786,856*l.*

The short interval of peace in 1802, produced an immediate extension of foreign trade; and Mr. Addington thought himself justified "in pronouncing the commerce of the country to be in a state of unrivalled and unexampled prosperity." The value of British manufactures exported, considerably exceeded the preceding year, and the total amount of the exports, according to the official values, was 46,120,962*l.* But in this and the succeeding years, it will be proper to adopt the correction just mentioned, which will give the amount of the imports and exports as follows:

Years.	Imports.	Exports.
1802	£ 31,442,318	£ 41,411,966
1803	27,992,464	31,578,495
1804	29,201,490	34,451,307
1805	30,344,028	34,954,845
1806	31,094,089	36,528,132

The account of imports for the last year is not quite correct; the imports from the East Indies for that year being incomplete.

Almost every article being greatly under-valued in these accounts (except in one or two instances) the total must give a very inadequate idea of the real extent of the commerce of Great Britain. Some idea may be formed of the undervaluation of the imports by those of the East India company, taking the account of their sales as the importation; the medium value of which, on an average of three years, was 6,100,000*l.*; whereas, the medium value by the accounts of the inspector-general, for the same three years, was 4,572,000*l.* Of the actual value of British produce and manufactures exported, which usually constitutes about two-thirds of the total export, we have more correct information. By an act passed in 1798, and revived in 1802, called the convoy act, the exporters were required to declare the real value of British manufactures exported, in order to ascertain the amount of duty chargeable thereon; and from these declarations, the actual value of British produce and manufactures exported has been ascertained as follows:

The extent of shipping employed in commercial intercourse at this period, will be seen in the following account of the number of vessels which belonged to the several ports of the British empire, on the 30th September 1805.

	Ships.	Tons.	Men & Boys.
England - - -	14,790	1,799,210	117,668
Jersey & Guernsey	185	16,528	2,011
Isle of Man - -	404	9,050	2,316
Scotland - - -	2,581	210,295	15,162
Ireland - - - -	1,067	56,806	5,072
The Plantations -	3,024	190,953	15,497
	<u>22,051</u>	<u>2,283,442</u>	<u>157,712</u>

The commerce of Great Britain with Ireland, has increased with the improvement of that country, particularly since the year 1780, when a more liberal system of policy was adopted with respect to the foreign trade of Ireland. The imports from thence consist chiefly of butter, beef, pork, bacon, lard, tallow, cattle, hides, feathers, starch, rape-seed, linens, linen-yarn, wool-en-yarn, pearl-shells, copper-ore, and a few other articles of less importance. The exports are coals, ironmongery and hardware, hoops for barrels, beer, cyder, dried cod, herrings, chiefly from Scotland, earthenware, bottles and window-glasses, refined sugar, hops, lead, tin-plates, sail-cloth, cabinet-ware, wearing apparel, apothecaries-ware, books and stationery, painters' colours, hats, haberdashery, woollen, cotton, and silk manufactures of all kinds; with rum, brandy, geneva, wines, groceries, drugs, dye-stuffs, flax and hemp, raw and thrown silks, and other foreign produce.

Years.	Imports.	Exports.
1798	£ 2,735,686	£ 2,974,353
1799	2,770,731	4,086,986
1800	2,312,824	3,714,499

Considerable endeavours have been made to improve the manufactures of Ireland, but with little success, except in the linen manufacture, which probably proceeds from the want of sufficient capital, and from the facility with which British manufactures can be procured at a very small additional expence; the latter will, therefore, for a long time, continue to constitute a large proportion of the imports of Ireland.

Value of British manufactures exported from Great Britain to Ireland.

In 1791	£ 1,470,972	In 1796	£ 1,781,789
1792	1,511,844	1797	1,310,996
1793	1,055,276	1798	1,657,954
1794	1,281,316	1799	2,405,999
1795	1,612,270	1800	1,787,966

The trade between Great Britain and Russia has been considered highly beneficial to both countries; to Russia in point of profit, and to Great Britain, as supplying articles essential to the support of its navy. The capital employed must be much greater than formerly, from the increased value of the principal articles; and the balance of trade, which is considerably

ably in favour of Russia, is paid by means of the commercial transactions between Great Britain and other countries. The articles imported are iron, hemp, flax, tallow, pot-ashes, deals, and lath-wood, coarse linens, hog's bristles, &c. The exports are principally broad-cloths and woollen stuffs, refined sugar, cotton, lead, tin, iron and steel wares, earthen ware and glass, coals, alum, salt, horses, London porter, with articles of less importance.

Years.	Imports.	Exports.
1800	£ 2,332,098	£ 1,025,335
1801	2,246,877	919,843
1802	2,182,432	1,379,399

The total number of vessels that entered inwards from Russia, and that cleared out for that country from Great Britain in three years, ending with 1806, was as follows:

Years.	Inwards.		Outwards.	
	British.	Foreign.	British.	Foreign.
1804	830	29	558	53
1805	966	14	927	52
1806	1101	21	677	32

The trade to Denmark and Norway, though of ancient date, is not of very great extent; the imports consist chiefly of timber and corn; and the exports, of West India produce and other foreign merchandize; the quantity of British manufactured goods which those countries take being of small amount.

Years.	Imports.	Exports.
1800	£ 241,563	£ 540,698
1801	208,794	416,475
1802	155,672	537,517

The total number of vessels which entered inwards from Denmark and Norway, in the year 1806, was 1607, of which 529 were British ships: the total number which cleared outwards was 1690, of which 790 were British.

The trade with Sweden, which is carried on chiefly in ships of that country, has not varied materially in its extent during the last twenty years. The imports consist chiefly of iron of a superior quality, pitch, tar, deal boards, and sail-cloth. The exports are principally colonial produce.

Years.	Imports.	Exports.
1800	£ 309,280	£ 78,840
1801	295,645	111,254
1802	327,350	108,266
1803	288,651	98,245

The total number of vessels which entered inwards from Sweden, in the year 1806, was 353, of which 187 were British ships: the total number which cleared outwards was 362, of which 142 were British.

The imports from Prussia, consist of all kinds of grain, hemp, flax, madder, lintseed, goose-quills, bristles, pearls, affes, mill-stones, and timber of various descriptions. The exports are chiefly alum, coppers, coals, beer, salt, wrought brass and iron, lead, tin plates, earthen-ware, glass, woollen and cotton goods, some cotton yarn, India goods, raw and refined sugar, drugs, dye-stuffs, pepper and other spices, coffee, rum, tobacco, &c.

Years.	Imports.	Exports.
1800	£ 1,340,904	£ 794,452
1801	1,357,140	660,739
1802	1,057,602	1,071,896
1803	831,225	1,916,502

The total number of vessels which entered inwards from

Prussia in the year 1805 was 1946, of which 937 were British ships: the total number which cleared outwards was 1627, of which only 482 were British. In 1806 the total numbers were much less, in consequence of Prussia being involved in the war.

The trade with Germany had not experienced any considerable variation with respect to its extent, from the commencement of the last century, till on the extension of the war with France in 1794, it suddenly became the channel through which the principal part of the continent received the goods they had before obtained direct from Great Britain. The following account of exports to Germany shows the rapid increase of trade with that country during the war.

Years.	British Manufactures.	Foreign Merchandize.
1793	£ 718,474	£ 1,764,221
1794	1,634,530	4,308,695
1795	1,763,133	6,311,876
1796	1,591,810	6,582,179
1797	1,964,967	6,419,587
1798	2,042,774	8,646,691
1799	2,032,567	6,640,729
1800	4,364,120	8,300,470
1801	4,928,617	6,186,687

The total number of vessels which entered inwards in the several ports of Great Britain from Germany (including Hamburgh) and which cleared outwards for that country, was as follows:

Years.	Inwards.		Outwards.	
	British.	Foreign.	British.	Foreign.
1793	217	54	292	77
1794	258	108	443	152
1795	259	222	257	406
1796	347	342	333	415
1797	237	257	314	371
1798	408	113	647	187
1799	409	126	426	181
1800	435	459	574	458

The total number of vessels which entered inwards from Germany (including Hamburgh) in the year 1806 was 604; the total number which cleared outwards for that country 956.

The imports from Holland are butter and cheese in large quantities, geneva, juniper berries, flax, hemp, oak barks, rags, flower-roots and seeds, books, maps and prints. The exports are raw and refined sugars, train oil, coppers, a few cotton goods, some woollen goods, coffee, rice, and foreign merchandize of various kinds: their amount, as follows:

Years.	Imports.	Exports.
1800	£ 972,600	£ 3,208,613
1801	1,025,958	3,496,744
1802	974,537	4,957,997
1803	630,403	1,565,355

The total number of vessels which entered inwards from Holland in the year 1804 was 790, and the number which cleared outwards 521. The number which entered inwards in 1805, was 709; outwards 323; which, from the two countries being at war, were of course nearly all neutral vessels.

France possesses such natural advantages in the produce of its soil, and the convenience of its situation for procuring the commodities of all other countries, that while its manufac-

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tures were encouraged, and it retained possessions in the East and West Indies, little inducement remained for commercial intercourse with Great Britain, and even this limited traffic was much impeded by the high duties and prohibitions which mutual jealousy had imposed. In 1786 a more liberal system was adopted by a treaty of commerce, in consequence of which the trade between the two countries increased considerably. In the year 1792, the exports to France amounted to 1,228,166*l.* 3*s.* 9*d.* of which 743,280*l.* 12*s.* 1*d.* was British manufactures, and 484,885*l.* 11*s.* 8*d.* foreign merchandize. In the following year, the trade with France was suspended by war, on the termination of which, in 1802, commissioners were appointed for adjusting the conditions of a new commercial treaty, but its completion was prevented by the renewal of hostilities.

The trade with *Portugal* was formerly a very beneficial branch of our commerce, but has declined very much. The imports consist chiefly of wine, cotton-wool, and indigo, with considerable sums in cash and bullion. The exports are almost wholly British produce and manufactures.

Years.	Imports.	Exports.
1798	£ 700,383	£ 750,918
1799	1,047,054	1,073,411
1800	916,848	1,011,593

The total number of vessels which entered inwards from *Portugal* in the year 1800 was 340, of which 270 were British vessels. The number which entered inwards in the year 1806 was 468; outwards 332.

The extent of the trade with *Spain*, previous to the war in 1796, will appear from the statement of imports and exports.

Years.	Imports.	Exports.
1792	£ 897,840	£ 794,101
1793	485,872	476,726
1794	748,546	634,554
1795	992,853	437,830
1796	809,881	546,126

The year 1806 being a year of war, the trade with *Spain* was of course confined to neutral vessels: the number which entered inwards was 222, and the number which cleared outwards 126.

The *Mediterranean trade* was subject to much interruption during the war which began in 1793, in consequence of which many of the goods usually imported from *Venice* and *Italy* were brought over-land through *Switzerland* and *Germany* to *Hamburg* and *Tonningen* to be shipped for *England*. The *Turkey and Levant trade* was formerly one of the principal branches of *English commerce*, but it is now of much less importance. The chief articles imported, are cotton-wool, mohair, goats' hair, opium, fenna, and other drugs, galls, madder, vullonea, and other dye-stuffs, currants, figs, raisins, goat skins, and box-wood; raw silk was formerly a principal article, but very little is now brought from *Turkey*, that of *Italy* being much superior. The exports consist of lead, tin-plates, wrought and cast iron, hardware, a considerable number of watches, some cotton goods, and a few woollen goods, India piece goods, coffee, sugar, cinnamon, cloves, pimento and other spices. The extent of the different branches of the *Mediterranean trade* will appear from the following statements.

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Years.	GIBRALTAR and the STREIGHTS.		Ships	
	Imports.	Exports.	inward.	outward.
1799	£ 62,992	£ 358,784	47	56
1800	35,665	294,558	20	43
1801	24,887	362,971	19	54
1802	21,792	530,537	32	48
1803	23,112	487,699	17	48
1804	33,860	560,399	27	62
1805	42,919	183,324	19	59

In the year 1806, the number of vessels which entered inwards was 24, outwards 83.

Years.	ITALY.		Ships	
	Imports.	Exports.	inward.	outward.
1799	£ 224,607	£ 367,173	69	81
1800	411,765	587,530	115	113
1801	165,042	378,007	44	94
1802	804,329	2,048,784	127	248
1803	748,020	656,607	182	74
1804	268,029	359,854	76	126
1805	393,517	507,535	106	117

In the year 1806, the number of vessels which entered inwards was 90, outwards 61.

Years.	MALTA.		Ships	
	Imports.	Exports.	inward.	outward.
1801	£ 114,448	£ 88,735	10	14
1802	16,698	12,023	36	4
1803	8,922	133,629	22	15
1804	32,913	114,021	20	23
1805	9,304	127,515	6	12

In the year 1806, the number of vessels which entered inwards was 26, outwards 26.

Years.	MINORCA.		Ships	
	Imports.	Exports.	inward.]	Ships outward.
1800	£ 13,500	£ 12,246	19	5
1801	6,768	39,130	16	15
1802	22,106	21,478	25	5

In the year 1803, the trade with *Minorca* ceased, from its having been restored to *Spain*.

Years.	TURKEY and LEVANT.		Ships	
	Imports.	Exports.	inward.	Ships outward.
1799	£ 33,091	£ 226,078	3	13
1800	199,773	166,804	19	6
1801	141,137	172,198	9	10
1802	182,424	180,000	20	18
1803	175,427	155,369	27	9
1804	148,277	81,625	16	1
1805	103,590	135,411	22	8

In the year 1806, the number of vessels which entered inwards was 23, outwards 3.

The articles imported from the coast of *Africa* into *Great Britain* are gum arabic, gum fandarach, and fenegal, camwood, red-wood, ebony, ivory, a few ostrich feathers, and some skins; their amount in the year 1800 was 82,280*l.* 5*s.* 8*d.* The exports have hitherto been of far greater value.

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bring principally intended for the purchase of slaves for the West Indies. They consist of bugles, cowries, spiritous liquors, a great number of guns and cutlasses, gunpowder, wrought brass, copper and iron, glass, earthen ware, rice, gr. cereals, apothecaries' ware, woollee, cotton, and linen goods, and large quantities of India piece goods. The total official value in the year 1800 was 1,017,365*l.* 11*s.* 5*d.* of which 514,922*l.* 19*s.* 11*d.* was British merchandise. The abolition of the infamous traffick in human beings, must cause a great revolution in the trade to this part of the world, as it appeared in the year 1789 that about 38,000 of the inhabitants of Africa were annually carried away in British ships for supplying the colonies with slaves, which of course employed a considerable number of vessels. The number of ships that cleared out from Great Britain for Africa, in the year 1804, was 176.

The *East India* trade furnishes a remarkable instance of an extensive branch of commerce carried on successfully in the hands of an exclusive company, while most other commercial monopolies have made very small profits, and generally soon expired. The trade to India, however, since the immense territorial acquisitions of the English in that part, can no longer be considered as a mere commercial adventure, as it is now in a great measure a business of agency, for transmitting to Europe the fortunes acquired by British individuals in the East. The quantity of merchandize brought from thence, consequently greatly exceeds the value of the exports to India. The latter consists chiefly of woollens, metals, and naval and military stores, the remaining articles being of trifling amount in comparison, and almost wholly for the use of Europeans, as the natives are peculiarly attached to the use of their own produce and manufactures. The exports to China include a considerable amount in bullion, the other articles are woollen cloths and camblets, lead, and tin; the articles exported in private trade are, skins and furs, glass of various descriptions, jewellery, toys, and watches, cuttings of cloth, a very few woollens, some cutlery and hard ware, and silver. The amount of the company's exports to India and China, will appear from the following statements.

INDIA.

Season.	Merchandize, or Manufacture.	Metals.	Stores.	Bullion.
1781	£ 200,808	£ 157,614	£ 163,878	
1782	123,834	183,356	133,773	
1783	95,251	122,855	77,237	
1784	92,205	93,806	55,256	
1785	74,683	80,152	104,226	
1786	122,709	97,899	85,179	
1787	108,388	137,194	153,603	
1788	119,449	99,028	152,587	
1789	80,184	273,104	100,435	
1790	75,141	191,944	120,525	
1791	86,680	124,889	108,500	

CHINA.

Season.	Merchandize, or Manufacture.	Metals.	Stores.	Bullion.
1781	£ 129,179	£ 10,349	£ 2,206	£ ———
1782	94,992	9,416	1,717	————
1783	113,763	4,579	1,743	————
1784	146,741	27,835	2,904	————
1785	224,612	37,939	7,503	724317

Season.	Merchandize or Manufacture.	Metals.	Stores.	Bullion.
1786	202,023	35,535	6,972	749,833
1787	323,107	38,046	7,289	646,798
1788	335,392	59,208	6,598	489,192
1789	354,717	107,995	7,769	787,078
1790	431,395	105,707	4,081	523,705
1791	486,993	99,448	4,000	4,2098

The imports from the East Indies consist of Bengal piece-goods, coat and Surat piece-goods, Congal and China raw-silk, tea, pepper, saltpetre, nankeen cloth, china, wrought silks, a small quantity of china ware, sugar, coffee, indigo, and various drugs. The total amount of the imports, on the company's account, and in private trade, according to the official rates of the inspector-general's office, was as follows:

Year.	Import.	Year.	Import.
1781	£ 2,526,339	1793	£ 3,499,023
1782	626,319	1794	4,458,475
1783	1,301,415	1795	5,760,810
1784	2,996,652	1796	3,374,689
1785	2,703,940	1797	3,942,384
1786	3,156,687	1798	7,616,930
1787	3,430,868	1799	4,384,505
1788	3,453,897	1800	4,542,775
1789	3,164,545	1801	5,424,441
1790	3,149,870	1802	5,794,006
1791	3,698,713	1803	6,348,887
1792	2,701,547	1804	5,214,621

But a more accurate idea of the real value of the imports from the East Indies, may be formed from the annual amount of the company's sales, which was

In 1801	£ 7,595,181	In 1803	£ 6,042,526
1802	6,626,347	1804	5,866,073

The *West India* trade is, in some respects, the most important branch of the commerce of Great Britain; as on the colonial produce which it supplies, much of the trade with different parts of Europe chiefly depends. The value of the British West India produce from the old islands, imported into Great Britain, on a medium of four years, preceding the 5th of January 1796, according to the current prices during that period, was estimated, exclusive of the duties, at about 6,800,000*l.* per annum. This sum is not wholly a return for goods exported, a part of it must be considered as remittances of the property of persons who possess estates in the West Indies; but who are wholly or occasionally resident in England; and of persons who have lent money on mortgage or otherwise in the West Indies, and receive their interest from the sale of the produce.

Official Value of Imports from the West Indies.

Years.	British West Indies.	Conquered Islands.	Total.
1801	£ 6,759,617	£ 4,105,839	£ 10,865,456
1802	7,293,316	2,699,504	9,992,820
1803	5,786,432	3,020,014	6,148,436

The value of the British West India islands, in a commercial view, will be very conspicuous from the following statement of the total quantities of sugar, rum, coffee, and cotton-wool, exported from them.

Years.

Years.	Sugar. Cwt.	Rum. Gall.	Coffee. Cwt.	Cotton Wool. lbs.
1793	2,129,750	4,997,051	92,016	9,173,583
1794	2,141,921	5,597,520	141,007	8,473,175
1795	1,743,939	4,173,734	144,800	11,675,495
1796	1,816,584	5,567,754	94,086	8,854,413
1797	1,636,631	4,279,164	114,947	6,918,153
1798	2,015,602	6,224,076	165,075	7,609,832
1799	2,628,470	6,270,449	132,259	7,529,881
1800	2,413,997	6,231,225	180,374	12,611,340
1801	2,959,958	8,148,571	199,359	11,261,014
1802	3,463,566	8,676,381	230,148	8,759,891
1803	2,886,479	8,781,496	173,883	5,650,615

The total number of vessels which entered inwards from the West Indies, in the year 1804, was 721, containing 204,411 tons, and navigated by 13,119 seamen. The number of vessels which cleared outwards was 790. The value of British produce and manufactures exported to the British plantations in the West Indies, exclusive of the Conquered islands, was 3,468,232*l*.

The trade with the United States of America, has rapidly advanced to very considerable importance; and Great Britain now supplies them with commodities to a far greater amount, than in the most favourable years previous to their independence, although the number of British ships employed is considerably less. In the year 1789 the number of British vessels which entered inwards in this trade was 53, the number outwards 358; in the year 1799, the number which entered inwards was only 42, the number outwards 57.

Years.	Imports.	Exports.
1798	£ 1,782,720	£ 5,580,370
1799	1,818,941	7,056,558
1800	2,357,922	6,885,597

The total number of vessels which entered inwards from the United States, in the year 1806, was 561, of which 53 were British; the total number which cleared outwards was 575, of which only 39 were British.

The remaining possessions of Britain in North America, being countries not very fertile or fully inhabited, the trade with them is not of very great extent. The following statement of the exports to those parts in the year 1800, will, however, shew that the trade is well worth preserving, independent of the consideration that it is the means of procuring articles of much importance in other branches of commerce.

To Hudsons bay	- -	£ 38,061	0	9
Newfoundland	- -	219,458	5	11
Canada	- - -	460,155	13	3
New Brunswick	- -	81,230	15	4
Nova Scotia	- - -	177,083	17	10
Total		£ 975,989	13	1

With respect to the general balance of trade, or the ultimate profit which Great Britain derives from its commerce with all other countries, Mr. Irving, the inspector-general of imports and exports, to whom the public have, for many years, been indebted for the judicious arrangement and explanation of the official documents relating to foreign trade, has justly remarked, that there are perhaps few questions to which the human attention can be directed more difficult to form an opinion upon, from the variety of considerations, and the vast statements with which it is

connected, and also from the materials on which conclusions are to be formed, being in some instances defective; he has, however, stated it as his opinion, that the balance of trade in favour of Great Britain, according to the true value of the goods exported and imported, amounted on a medium of the four years preceding 1796, to upwards of 6,500,000*l*. per annum, exclusive of the profits derived from the East and West India trades, which he estimated at upwards of 400,000*l*. per annum; and exclusive of the profits derived from the fisheries.

An accurate view of the progress and extent of commerce in all the European states, would furnish much information; but with respect to several, no authentic particulars of this kind have been made public, and the foreign trade of others has been so entirely turned out of its usual channels since the commencement of the war of the French revolution, that any account of its present state would be very incomplete and unsatisfactory.

With respect to domestic commerce, we may observe, that the king is the arbiter of it; as it pertains to his prerogative to establish public marts, as markets and fairs, to regulate weights and measures, and to give money, which is the universal medium of commerce, authority and currency.

A great part of the foreign commerce of England is now carried on by collective companies; some incorporated by the king's charters, with an exclusive privilege, as the East India company; others only private associations, as the Turkish and Hamburg companies. See COMPANY.

COMMERCE, *Chambers of*. See CHAMBER.

COMMERCE, *Characters in*. See CHARACTER.

COMMERCE, in *Geography*, a handsome town of France, and chief place of a district in the department of Meule, on the western shore of that river. E. long. 5° 24'. N. lat. 48° 20'. It has a sub prefect, and counts 3418 inhabitants. The district contains 181 communes, with a population of 73,103 individuals. There are several iron forges, paper mills, glue, violin, and linen manufactures.

COMMERSONA, in *Botany*. Sonnerat. See BARRINGTONIA.

COMMERSONIA, (so named by Forster, in memory of M. Commerçon, the celebrated French naturalist and traveller.) Forst. Gen. 22. Linn. jun. Suppl. 26. Schreb. 535. Willd. 596. Lam. Ill. 550. Gart. 586. Juss. 428. Vent. 4. 17. Clafs and order, *pentandria pentagynia*. Nat. Ord. Undetermined; Juss. Vent.

Gen. Ch. *Cal.* one-leaved, five-cleft, bearing the petals between the segments; segments egg-shaped, acute, longer and broader than the petals. *Cor.* Petals five, dilated at the base on each side, with an inflexed lobe, spreading. *Stam.* Filaments very short, situated at the base of the petals; anthers roundish, didymous. *Nectary* a five-cleft ring, between the petals and the germ, with five filiform villous small bodies between the divisions; divisions lanceolate, erect, shorter than the petals. *Pist.* Germ superior, globular, villous, with five projections; styles five, filiform, approximating, short. *Per.* Capsule roundish, hard, echinate with long soft brittle-shaped hairs, five-celled; two seeds in each cell. *Seeds* egg-shaped.

Eff. Ch. Calyx one-leaved, bearing the corolla. Petals five. Nectary five-cleft. Capsule five-celled, echinate.

Sp. C. *cebinata*. Linn. jun. Suppl. 26. Mart. Lam. Willd. Gart. tab. 94. Lam. Ill. tab. 218. (Rettbana; Rumph. Amb. 3. tab. 119.) A middle-sized tree. *Trunk* rarely the bulk of a man, with a diffuse head and smooth bark, easily separable from the wood; young branches woolly. *Leaves* alternate, petioled, obliquely egg-shaped, acuminate, serrated, a little wrinkled, shining, dark green

above, hoary underneath. *Flowers* very small, white, in axillary panicles. *Capsule* somewhat globular, with a coriaceous echinate rind, five-cocccous, five-valved; cocci inversely egg-shaped, narrowing downwards, femibilocular from the back, two-valved; valves of the contiguous cocci united and forming the proper partitions of the capsule. *Seeds* two in each cell, attached to the central angle of the cells, ovate-oblong, a little thicker upwards, slightly compressed, of a red-ferruginous colour, blackish at the top, incompletely arilled; aril membranous, very thin, whitish, lacerated, fixed to the umbilicus of the seed, covering its whole ventral, but not its dorsal part. *Germt.* A native of Otabeite, the Friendly Isles, and the Moluccas.

COMMIA, *Bofch. Nouv. Dict.* Clafs and order, *diacna monandra*.

Gen. Ch. *Male catkins.* Scales obtuse, each concealing a single filament. *Female catkins.* Calyx proper three-leaved; leaves acute, permanent. *Cor.* none. *Pist.* Germ superior; styles three, short; stigma thick. *Peric.* Capsule three-lobed, three-celled. *Seeds* one in each cell.

A tree. *Leaves* alternate, lanceolate, quite entire, smooth, recurved. *Flowers* in axillary and terminal catkins. A native of Cochinchina. A white gum exudes abundantly from its bark, which is sometimes used as a medicine in dropsies and obstructions, but is too violent in its effects to be taken without great caution.

COMMINATORY, a clause inserted in a law, edict, patent, &c. importing a punishment wherewith delinquents are menaced; which, however, is not to be executed in its rigour.

Thus, in France, when an exile is enjoined not to return on pain of death, it is deemed a *comminatory* penalty; since, if he do return, it is not strictly executed; but a second injunction is then laid on him, which is more than comminatory, and from the day of the date thereof, imports death without remedy.

COMMINES, PHILIP DE, in *Biography*, a celebrated historian, was born of a noble family in Flanders in 1445. He spent the early part of his life in the court of Charles the Bold, duke of Burgundy; but in 1472 he went over to the service of Louis XI. king of France, who adopted him as a favourite, and employed him in various important negotiations. He married an heiress of the house of Anjou, by whom he acquired considerable landed property. He accompanied his sovereign in many of his journeys and in some expeditions of a more serious nature; and he attended upon his successor Charles VIII. to the conquest of Naples. Under this prince he was accused of having espoused the cause of the duke of Orleans, for which he was arrested, and imprisoned in an iron cage for eight months. He was afterwards transferred to a prison at Paris, where he was eighteen months without being able to obtain a trial. Commines was at length honourably acquitted, but it does not appear that, either in the remainder of this reign, or in that of the duke of Orleans who succeeded, and for whom he had suffered, he was afterwards publicly employed. He died, at his seat of Argenton, in Poitou, of which he had been denominated the lord. Commines possessed various qualities well adapted to render him eminent as a statesman. He had a fine person, and an excellent understanding: he was a complete master of many modern languages, and had so great a command of his own powers that he could dictate to four secretaries at once. As a literary character he is chiefly known for his "Memoirs," which contain an account of the principal events of the reigns of Louis XI. and Charles VIII. during a period of thirty-four years. This work is highly esteemed on account of the personal knowledge and observation of the

author, who united a sincere and candid disposition, with simple and unaffected style. By the learned Lippius, Commines is regarded as equal to the historians of antiquity; his "Memoirs" he recommends as the vade mecum of princes. They have gone through many editions, which have been illustrated with notes by different learned men; but the most esteemed impression is that of the abbé Lenglet du Fresnoy, 1747, in 4 vols. 4to. printed at Paris, with London in the title page. *Nouv. Dict. Hist. Du Fresnoy.*

COMMINGES, in *Geography*, (in Latin *Comvengis*), was before the French revolution of 1789, a county in the province of Gascony, and forms now part of the department of Haute-Garonne in France.

COMMUNITION, the act of grinding, or breaking any matter into smaller particles.—The effect of chewing, or masticating our food is the communication thereof.

COMMIRE, JOHN in *Biography*, a Jesuit, was born in 1625 at Amboise, where his father kept a tennis-court. He received a good education, and applied himself chiefly to classical literature. He acquired great reputation as a poet, by a collection of pieces in Latin which appeared in 1678, but he was, at the same time, diligent in his profusion, as a teacher and director in theology. His poems consist of paraphrases on various parts of the scriptures, od 8. fables, epigrams, &c. of which the general character is facility, copiousness, and amenity. He is thought to have succeeded best in his odes, but his fables are in high repute. He died at Paris in 1702, leaving behind him the character of an open and upright disposition. An edition of his poems was published in 2 vols. 12mo. in the year 1754. *Nouv. Dict. Hist.*

COMMIS, Fr. A clerk, deputy, or subordinate person, who is employed in any of the war-departments of the French.

Commis general du parc des vivres, commis-general of the provision-park. This officer exercises his functions under the orders of the director-general of provisions. His employment requires a good deal of capacity and zeal, as well as of probity. His duties and relations are multifarious and extensive. He should always encamp in the centre of the baggage, to be able to have an eye to the whole, and to be less interrupted.

Commis General des travaux du parc des vivres, commis-general of labour and work in the provision-park. The duties of this employment are troublesome, and require much attention. It should never be bestowed on a man that does not possess experience, prudence, and firmness, without being too rigorous or severe, as he has authority over every thing connected with the different kinds of work in the park.

Commis des entrepreneurs pour la fourniture des lits, clerks of undertakers for the furnishing of beds. They have a right to visit and examine the beds and every thing connected with them, and to refuse or reject whatever is insufficient or defective.

Commis du tresorier de l'extraordinaire des guerres, clerks of the treasurer of the wars, or of the paymaster general of the army. They deliver the certificates to the troops who leave lodgings or quarters. They were under the jurisdiction of the high council.

COMMISERATION, in *Pathology* and *Ethics*, is frequently used as synonymous with *compassion*, which fee; but, in its general use, it is somewhat different. It is always preferred, when we wish to express our sympathy for misfortunes, which it is not in our power to remove, or for which there is no apparent remedy. Commiseration, ruminating upon the state and suffering of others, induces a permanent concern. In such cases it may be said, that we commiserate
the

the unfortunate sufferer, rather than that we have compassion upon him. But although this is a more helpless, it is not an useless affection. It soothes the mind of the afflicted, and greatly alleviates their sorrows, when every other consolation fails. *Condolence* is the expression of our commiseration. Cogan on the Passions, p. 124.

COMMISSAIRE, Fr. Commissary. This word or term was used in the old French service, to express a variety of occupations, and was annexed to a good many different appellations, of which the following are the principal.

COMMISSAIRE General des Guerres ou commissaire General des Armées, commissary general of the wars. This charge, office, or appointment, was created for *Besangon*, in 1637, and did not long exist, being suppressed in his person, because it gave too much authority, and too many privileges, to the person invested with it.

COMMISSAIRE Général de la Cavalerie légère. Fr. He was the third general officer of all the regiments of cavalry, and he had a regiment of his own under the name of the regiment of the *commissaire général*, or commissary general.

COMMISSAIRE Ordonnateur des Guerres. This appointment was superior to that of an ordinary or provincial commissary of war. It was commonly a sort of recompence and advancement granted in consideration of services rendered by the one or the other commissaries of war, whether of the armies or in the interior of the state. The *commissaire ordonnateur* is charged with objects of the first importance, and with a greater variety of them than the other commissaries are.

COMMISSAIRES des Guerres, commissaries of the wars, or multer-masters general. They enjoyed peculiar privileges, but were subordinate to the governors and commandants of towns and garrisons, without whose permission they could not multer any regiment.

COMMISSAIRES Ordinaires des Guerres, ordinary commissaries of the wars, or deputy-multer-masters. Officers subordinate to the immediately preceding, who ought to assist at reviews, who are charged with the conduct, police, and discipline of troops, and with making the men observe the military decrees. With the army, they have the detail of the hospitals, bread, victuals, &c. &c. They make inventories of provisions, and are charged with the management of convoys. Their creation is very ancient: for there is mention made of them under the reign of king Jean I. in 1355. They were called at first *conducateurs des gens de guerre*, (conductors of the people of war, or of military people) a title or appellation which they enjoyed for a long time under Louis XIII., and they are still called so in their commissions. Those who were not gentlemen, had the right of taking the rank of squire, or equire; of enjoying all the privileges of the noblesse, and of acquiring noble siefs.

COMMISSAIRE Provincial des Guerres, provincial commissary of the wars. There were no *commissaires provinciaux des guerres* before the year 1635. They were afterwards suppressed, and were re-established in 1704, under Louis XIV., with the same privileges, rights, attributions, and authorities for the service of cities of war, that the ordinary commissaries of the wars enjoyed for the service of marches, and of the armies.

COMMISSAIRE General des Vivres, commissary general of provisions. This officer has under him several other commissaries, who ought to know the number of men, which each of them will have to subsist, in order to make choice of a proper place for causing the provisions to be brought to, as also to form magazines for the

duration of the campaign, and of course to procure a sufficient number of bakers and workmen.

COMMISSAIRE d'Artilerie, commissary of artillery. There is one such officer in each department of the ordnance, who keeps one of the three keys that belong to the artillery-magazine. It is at his requisition that the governor or commandant of a place sends soldiers to remove, when necessary, the pieces of artillery and stores of war. He has the superintendance and direction of every thing connected with the cleanliness and general management of the magazines.

COMMISSAIRES provinciaux d'Artilerie, provincial commissaries of artillery. These were of two sorts or descriptions. The one had the names or titles of the provinces; the other had merely the title of provincial. But on service, they both received the same pay.

COMMISSAIRES ordinaires d'Artilerie, ordinary commissaries of artillery. These were subordinate to the provincial commissaries, and were distributed among the forts, garrisoned towns, navy, and dockyards.

COMMISSAIRES extraordinaires d'Artilerie, extraordinary commissaries of artillery. Under the monarchy of France, these formed the third of ordnance-commissaries, and they were in like manner distributed on duty in garrisoned places, and on board ships of war.

COMMISSAIRE provincial en l'Arsenal de Paris, ou departement de l'Isle de France, provincial commissary in the arsenal of Paris, in the department of the isle of France. This officer received his commission from the grand master, in whose gift it was, and possessed the exclusive privilege of being made privy to every alteration or movement that took place in the arsenal.

COMMISSAIRE General des Poudres et Salpêtres, commissary general of gun-powder and saltpetre. This appointment was created in 1634, with that of superintendent general of gun-powder and saltpetre. It was at last suppressed, and the grand master of the ordnance appointed a person to exercise its functions.

COMMISSAIRE General des Fontes, commissary general of the founderies. This appointment was the gift of the master of the ordnance, and was invariably bestowed on those who had given convincing proofs of their abilities and skill in the casting of cannon, &c.

COMMISSAIRES des Guerres entretenus dans l'Hotel des Invalides, commissaries of war kept in the hotel des invalides. It was a principal part of their duty to keep a regular roll or list of all the names of the different officers, non-commissioned officers, and soldiers, that might be detached on garrison duty, &c. from which they made a monthly return to the secretary at war. Each commissary, at every review or inspection of the corps of invalids, had particular directions to mark and point out those men who appeared to be capable of serving, of whom a regular return was made to the secretary at war.

COMMISSAIRE General des Fortifications, commissary general of fortifications. This was an office of great importance, as it was his duty to give the plans for places and new works; to approve or condemn those that had been ordered by others; to visit the fortified places of the kingdom; to order the reparation of works that had been damaged; to regulate the conduct of the engineers, and to give them orders for the good of the service.

At a siege, he directed the tracing out of the lines of circumvallation and countervallation, and the securing of the posts; he decided on attacks which were made according to his plan; he directed the making of lodgments, saps, mines, the traverse of the ditch, the attack of the breach, and

and after the place was taken, caused it to be repaired. In defending a place, he had the same or equal power. His appointments amounted to about 30,000 livres per annum.

COMMISSARY, in *Military Language* of Britain, has various denominations, though he is generally a civil officer appointed to inspect the musters, stores, and provisions for the army. The number of such officers is not limited in time of war.

Commissaries *general*, and commissaries *of accounts*, in our service, are appointed by warrant under the king's sign manual, directing them to obey all instructions given to them for the execution of their duty by the lords commissioners of the treasury. These instructions are generally prepared by the comptrollers of the army-accounts, under the orders of the treasury, and subject to its subsequent inspection.

COMMISSARY General of the Musters, or *Master-muster general*. This officer takes an account of the strength of every regiment as often as he pleases; reviews them; sees that the horse are well mounted, and that all the men are well armed and clothed. He receives and inspects the muster-rolls, and thereby knows exactly the strength of the army. A new officer has been appointed under the appellation of *Inspector-general of Cavalry*, who performs the duties in that respect, which used to be performed by the muster-master general.

COMMISSARY General of Stores. A civil officer who has charge of ordnance stores, for which he is accountable to the office of ordnance. He has other commissaries under him, as well as clerks and conductors, particularly in time of war.

COMMISSARY of the Train-horses. A civil officer of the ordnance, who has the inspection of all horses belonging to the train of artillery, the hospital, and the bakery. He has a number of conductors, drivers, &c. under him.

COMMISSARY of Accounts. A person of responsibility, who, with a proper establishment, attends each army, sufficiently large and numerous to render it necessary for the purpose of taking, examining, and controlling accounts on the spot. All such commissaries make returns of their examinations, on which, as documents, the comptrollers of the army-accounts ground their inquiries into that branch of the public expenditure.

COMMISSARY General of Provisions. An officer who is charged with furnishing the army in the field and on service, with all sorts of provisions; forage, &c. generally by contract, and sometimes otherwise. He has a variety of commissaries, store-keepers, clerks, &c. under him.

COMMISSARY, in the *Ecclesiastical Law*, an officer of the bishop, who exercises ecclesiastical jurisdiction in those parts of the diocese, which are so remote from the see, that the chancellor cannot call the subjects thereof to the bishop's principal consistory, without their too great molestation.

This officer, called by the canonists *commissarius*, or *officialis foraneus*, is appointed to supply the bishop's office in the out-parts of the diocese, and in such parts as are peculiar to the bishop, and exempted from the jurisdiction of the archdeacon: for where the archdeacons have jurisdiction, as in most places they have, either by prescription or composition, the commissary is superfluous, and frequently vexatious, and ought not to be: yet in such cases, a commissary is sometimes appointed by the bishop, and takes prebendation of the archdeacon yearly *pro exteriori jurisdictione*, as it is ordinarily called. But this is held to be a wrong to archdeacons and the poorer sort of people. Cowel's *Interp.* 4 Inst. 378.

COMMISSARY Court, in *Scots Jurisprudence*. At the reformation, all episcopal jurisdiction exercised under the au-

thority of the bishop of Rome was abolished; and the course of justice in consistorial causes was thus stopped. Hence queen Mary, besides naming a commissary for every diocese, did, by a special grant, establish a new *commissary court* at Edinburgh, consisting of four judges or commissaries. This court is vested with a double jurisdiction; one diocesan, which is exercised in the special territory contained in the grant, *viz.* the counties of Edinburgh, Haddington, Linlithgow, Peebles, and a great part of Stirlingshire; and another universal, by which the judges confirm the testaments of all who die in foreign parts, and may reduce the decrees of all inferior commissaries, provided the reduction be pursued within a year after the decree. Bishops, upon their re-establishment in the reign of James VI., were restored to the right of naming their several commissaries. The commissaries retain to this day an exclusive power of judging in declarations of marriage, and of the nullity of marriage; in actions of divorce and of non-adherence, of adultery, bastardy, and confirmation of testaments; because all these matters are still considered to be properly consistorial. Inferior commissaries are not competent to questions of divorce, under which are comprehended questions of bastardy and adherence, when they have a connection with the lawfulness of marriage, or with adultery. Commissaries have now no power to pronounce decrees in absence for any sum above 40*l.* Scots, except in causes purely consistorial; but they may authenticate tutorial and curatorial inventories; and all bonds, contracts, &c. which contain a clause for registration in the books of any judge competent, and protests on bills, may be registered in their books.

COMMISSION in *Common Law*, is the same with *delegatio* among the civilians; and is taken for the warrant, or letters-patent, which all persons exercising jurisdiction, either ordinary or extraordinary, have to authorize them to hear or determine any cause or action: such as the commission of judges, &c.

The term, however, is sometimes extended farther than to matters of judgment; as in the commission of purveyors, which seems to be null by the statute for taking away purveyance, 12 Car. II. and the high commission court, which was founded by the statute 1 Eliz. and is also abolished by act of parliament 16 Car. I. The persons charged with a commission are hence called *commissioyers*; sometimes *commisses*.

Commissions of inquiry shall be made to the justices of one bench or the other, &c., and to do lawful things are grantable in many cases. Most of the great officers, judicial and ministerial, of the realm, are made by commission. And by such commissions, treasons, felonies, and other offences, may be heard and determined: by this method, likewise, oaths, cognizances of fines, and answers, are taken, witnesses examined, offices found, &c. Bro Ab. 12. R.p. 39. See stat. 42 E. III. c. 4. Most of these commissions are appointed by the king under the great seal of England; but a commission under the grand seal may be determined by a privy seal; and by granting another new commission to do the same thing, the former commission determines; and on the death or demise of the king, the commissions of judges and officers generally cease. Bro. *Commiss.* 2 Dver 289.

COMMISSION of Anticipation, was anciently a commission given under the great seal, to collect a tax or subsidy before the day. 15 Hen. VIII.

COMMISSION of Array. See *MILITIA*.

COMMISSION of Association, is a commission under the great seal to associate two, or more learned persons, with the several justices, in the several circuits and counties in Wales.

COMMISSION of Bankruptcy, a commission under the great seal,

feal, directed to five or more commissioners, to enquire into the particulars of a man's circumstances, who hath failed, or broke; and to act according to certain statutes made in that behalf. See *BANKRUPT*, and *PETITION of Bankruptcy*.

COMMISSIONS of Charitable Uses go out of the chancery to the bishop and others, where any lands given to charitable uses are misemploy'd, or there are any fraud or disputes concerning them, to enquire of and redress the abuse, &c. 43 Eliz. cap. 4.

COMMISSION of Delegates, a commission under the great seal to certain persons, usually two or three temporal lords, as many bishops, and two judges of the law, to sit upon an appeal to the king in the court of chancery, where any sentence is given in any ecclesiastical cause by the archbishop. Stat. 25 Hen. VIII. c. 19. Now generally three of the common law judges and two civilians sit as judges. See *COURT and DELEGATES*.

COMMISSION to enquire of faults against the law, an ancient commission set forth on extraordinary occasions and corruptions.

COMMISSION of Lunacy, a commission out of chancery to enquire whether a person represented to be lunatic, be so or not; that, if lunatic, the king may have the care of his estate, &c. 17 Edw. II. c. 10.

COMMISSION of Peace See *JUSTICE of Peace*.

COMMISSION of Rebellion, or *Writ of Rebellion*, is issued out when a man, after proclamation made by the sheriff upon a process out of the chancery, to present himself, under pain of his allegiance, to the court by a certain day, does not appear. See *REBELLION*.

This commission is directed by way of command to certain persons; three, two, or one of them; to apprehend, or cause to be apprehended, the party as a rebel; and to bring him to the court on a day assigned.

This writ or commission goes forth after an attachment returned, *non est inventus*, &c.

COMMISSION of Sewers, is directed to certain persons to see drains and ditches well kept, and maintained, in the marshy and fenny parts of England, for the better conveyance of water into the sea, and preserving the grass upon the land. Stat. 23 Hen. VIII. c. 5. 13 Eliz. c. 9. The stat. 3 Jac. I. c. 14. ordains, that all ditches, water-courses, &c. within two miles of London, falling into the Thames, shall be subject to the commission of sewers; and the lord-mayor, &c. is to appoint persons who have this power. 7 Ann. c. 10.

COMMISSION to examine witnesses, is sometimes appointed by the court of equity in cases that require it, as when the cause arises in a foreign country, and the witnesses are at home, or when the witnesses are abroad, or soon to leave the kingdom; or again, when they are aged and infirm. This commission is empowered to exercise the same jurisdiction as would have been exercised if the witnesses had attended. See *SUIT*.

COMMISSION of Treaty with Foreign Princes, is where leagues and treaties are made and transacted, between states and kingdoms, by their ambassadors and ministers, for the mutual advantage of the kingdoms in alliance.

COMMISSION to take up Men for War, was a commission to press or force men into the king's service. This power of impressing has been heretofore doubted; but the legality of it is now fully established. Folt. Rep. 154. Blackf. Com. v. 419. Comp. 517. See *IMPRESSING*.

COMMISSION, Militaire. A brevet, or power, granted in writing by the minister of war in the name of the sove-

reign, and sealed with the great seal, by which he, to whom it is given, exercises the military charge entrusted to him, and takes his rank from the day of the date thereof. Commission in a military sense, in our forces, denotes any situation or place, which an individual may hold in the regular army, militia, or volunteers. All commissions in the line, guards, or volunteer-corps, must have the royal sign manual. Commissions however in the militia do not bear the royal sign manual, except that of the adjutant, who is commonly called a king's officer. The lieutenants or deputy-lieutenants of counties affix their seals and signatures to militia-commissions after they have been laid before the king for his approbation. Fourteen days constitute the time allotted for the royal approbation or disapprobation. And if his majesty does not within that time *disapprove* of the person so recommended, a notification of his pleasure and acquiescence is sent by one of the principal secretaries of state to the ord. lieutenant or to those acting by commission in his absence.

COMMISSION Militaire is also a momentary or temporary tribunal appointed or ordered to sit for the trial of military crimes and offences. When judgment is pronounced and the duty is performed, for which it was appointed, its authority, as well as its existence, ceases.

COMMISSIONS of Array. Commissions issued to experienced officers to draw out and array the fittest men in each county for service, and to march them to the sea coasts, or to such other parts of the county as were thought to be most in danger. There were hundreds of such commissions between the 5th of Henry III., and the reign of Edward IV. The form of one is to be seen in "Rushworth's Historical Collection," published in 1640. Such commissions were attempted to be revived by Charles I.; but they were voted illegal and unconstitutional by the parliament.

Non commissioned is a term commonly employed to denote a class of men, who stand between the rank and file of a battalion, and the commissioned and warrant officers, as serjeants-major, serjeants for instance.

COMMISSION-OFFICERS. See *OFFICER*.

COMMISSIONS, Book of. See *BOOK*.

COMMISSION, in Commerce. See *FACTORAGE*.

COMMISSIONER, he who has a commission, *c. pr.* a patent, or other legal warrant, to execute any public office. See *WARRANT*, &c.

Such are, *commissioners of hawkers and pedlars, commissioners of alienation, commissioners of the stamps*, &c.

COMMISSIONERS of Public Accounts. See *ACCOUNTS*.

COMMISSIONERS of the Customs. See *CUSTOM-house*.

COMMISSIONERS of the Dock-yards. See *DOCK-yARDS*.

COMMISSIONERS of Excise. See *EXCISE*.

COMMISSIONERS of the Navy. See *NAVY*.

COMMISSIONERS, Lords, of the Treasury. See *TREASURY*, and *EXCHEQUER*.

COMMISSIONERS of Trade, &c. See *BOARD*.

COMMISSUM Fidei. See *FIDEI*.

COMMISSURE, *COMMISSURA*, a term used by some authors for the junctures, or for the small interstices of bodies; or the little clefts between the particles; especially when those particles are broadish or flat, and lie contiguous to one another, like thin plates, or lamellæ.

The word literally signifies a *joining*, or connecting of one thing to another.

COMMISSURE, in *Architecture*, &c. denotes the joint of two stones; or the application of the surface of the one to that of the other.

COMMISSURÆ *Cerebri*, in *Anatomy*, are parts of the brain, which join together the right and left sides of the viscus.

There are three of these commissures: an anterior one which is directly under the anterior crura of the fornix; a posterior, which is behind the optic thalami, and in front of the tubercula quadrigemina; and a middle one, which joins together the opposed convexities of the thalami nervorum optico-rum. For a further description of these parts, see **BRAIN**.

COMMITMENT, in *Law*, the sending of a person to prison by warrant or order, who hath been guilty of any offence not bailable, or for which bail is refused. It may be by the king and privy council, or secretary of state, by the judges of the law, justices of peace, and other magistrates, who have authority by the laws and statutes of the realm to do it, which must be exactly pursued.

As to the manner of commitment, it is enacted by 2 & 3 P. & M. c. 10., that justices of peace shall examine persons brought before them for felony, &c. or suspicion thereof, before they commit them to prison, and shall bind their accusers to give evidence against them. A justice of the peace may detain a prisoner for examination, and it is said that three days are a reasonable time for this purpose. 2 Hawk. P. C. c. 16. § 11, 12. Dalt. c. 125. 2 Inst. 52, 591.

Every commitment must be in writing, under the hand and seal, and shew the authority, of him that made it, and the time and place, and must be directed to the keeper of the prison. It may be either in the king's name, and only tested by the justice, or in the name of the justice. It may command the gaoler to keep the party in safe and close custody, which he is bound by law to do. 2 Hawk. P. C. c. 16. § 13, 14, 15. It ought to set forth the crime with convenient certainty, whether the commitment be by the privy council, or by any other authority; otherwise the officer is not punishable by reason of such mittimus, for suffering the party to escape; and the court before which he is removed by Habeas-corpus, ought to discharge or bail him; and this holds not only where no cause at all is expressed in the commitment, but also where it is so loosely set forth, that the court cannot judge whether it were a reasonable ground for commitment or not. 2 Hawk. P. C. c. 16. § 17. See **ARREST** and **BAIL**. A commitment for high treason or felony in general, without expressing the particular species, has been held good. (2 Hawk. P. C. c. 16. § 16.) But now, since the Habeas-corpus act, it seems that such general commitment is not good. Moreover, it is safe to set forth that the party is charged upon oath; but this is not necessary, for it hath been resolved, that a commitment for treason, or for suspicion of it, without setting forth any particular accusation or ground of the suspicion, is good. 2 Hawk. P. C. c. 16. § 17. Every such mittimus ought to have a lawful conclusion, *viz.* that the party be kept till he be delivered by law, or by order of law, or by due course of law; or that he be kept till further order (which shall be intended of the order of law) or to the like effect; and if the party be committed only for want of bail, it seems to be a good conclusion of the commitment, that he be kept till he can find bail; but a commitment till the person who makes it shall take further order, seems not to be good; and it seems that the party committed by such or any other irregular mittimus, may be bailed. 2 Hawk. P. C. c. 16. § 18.

A commitment grounded on an act of parliament ought to be conformable to the method prescribed by such

statute. Where a man is committed as a criminal, the conclusion must be, "until he be delivered by due course of law;" if he be committed for contumacy, it should be "until he comply."

All commitments must be to some prison within the realm of England; for by the Habeas-corpus act (stat. 31 Car. II. cap. 2.) it is enacted "that no subject of this realm, being an inhabitant or resident of this kingdom of England, dominion of Wales, or town of Berwick-upon-Tweed, shall or may be sent prisoner into Scotland, Ireland, Jersey, Guernsey, Tangier, or into any ports, garrisons, islands or paces, beyond the seas, which then were, or at any time after should be, within or without the dominions of his majesty." By stat. 14 Ed. III. c. 10, sheriffs shall have the custody of the gaol as before that time they were wont to have, and they shall put in such under keepers for whom they will answer. This is confirmed by stat. 19 Hen. VII. c. 10. It hath also been held, that regularly no one can justify the delivering of a prisoner in custody out of the common gaol, unless there be some particular reason for so doing, as sickness endangering life, or evident danger of a recess from rebels, &c.: nevertheless constant practice seems to authorize a commitment to a messenger; and it is said, that it shall be intended to have been made in order to the carrying of the party to gaol. 2 Hawk. P. C. c. 16. § 8, 9. And it is said, that if a constable bring a felon to gaol, and the gaoler refuse to receive him, the town where he is constable ought to keep him till the next gaol delivery. H. P. C. 114. 2 Hawk. P. C. c. 16. § 9. A prisoner in the custody of the king's messenger, on a warrant from the secretary of state, who is brought into K. B. by Habeas-corpus to be bailed, but has not his bail ready, cannot be committed to the same custody, under which he came; but must be committed to the custody of the marshal, which will prevent the necessity of suing out a new Habeas corpus; as he may be brought up from the prison of the court, by a rule of court, whenever he shall be prepared to give bail. 1 Burr. 466. If a person arrested in one county for a crime done in it, fly into another county, and be retaken there, he may be committed by a justice of the first county to the gaol of such county. (H. P. C. 92.) But by the better opinion, if he had, before any arrest, fled into such county, he must be committed to the gaol thereof by a justice of such county. 2 Hawk. P. C. c. 16. § 8. Dalt. c. 118. It seems also to be laid down as a rule by some books, that any offender may be committed to the gaol next to the place where he was taken, whether it be in the same county or not. 2 Hawk. P. C. c. 16. § 8. By stat. 6 Geo. I. c. 19, vagrants and other criminals, and persons charged with small offences, may, for such offences, or for want of surties, be committed either to the common gaol or house of correction, as the justices shall think proper. By stat. 24 Geo. II. c. 55, if a person is apprehended, upon a warrant indorsed, in another county, for an offence not bailable, or if he shall not there find bail, he shall be carried back into the first county, and be committed, or if bailable, bail'd by the justices in such first county.

With respect to the charges of commitment, it is enacted by stat. 3 Jac. I. c. 10, that offenders committed are to bear their own charges, and the charges of those who are appointed to guard them; and if they refuse to pay, the charges may be levied by sale of their goods. And by stat. 27 Geo. II. c. 3, if they have no goods, &c. within the county where they are apprehended, the justices are to grant a warrant on the treasurer of the county for payment of their charges. But in Mid-

differs the same shall be paid by the overseers of the poor of the parish where the person was apprehended. By stat. 3 Hen. VII. c. 3. the sheriff shall certify the names of all prisoners in his custody to the justices of gaol delivery.

Prisoners, committed at night to the proper prison, ought not to be removed thence, except in some special cases; and in peculiar circumstances, specified by 31 Car. II. c. 2. A person, legally committed for a crime, which certainly appears to have been done by some one or other, cannot be lawfully discharged by any other but the king, till he be acquitted on his trial, or have an *ignoramus* found by the grand jury, or none to prosecute him on a proclamation for that purpose, by the justices of gaol-delivery. But if a person be committed on a bare suspicion, without any appeal or indictment, for a supposed crime, when afterwards it appears there was none; as for the murder of a person thought to be dead, but afterwards found to be alive, it hath been held that he may be safely dismissed without any farther proceeding. 2 Hawk. P. C. c. 16. § 22. But the safest way for the gaoler is to have the authority of some court, or magistrate, for discharging the prisoner. If the words of a statute are not pursued in a commitment, the party shall be discharged by Habeas-corpus. Jacob's Law Dict. by Tomlin. See ARREST, BAIL, IMPRISONMENT, MITTITUS, &c.

COMMITTEE, in *Law*, one or more persons, to whom the consideration of any matter is referred, either by a court, or by consent of the parties concerned.

COMMITTEE of *Parliament*, is a board consisting of a certain number of members, appointed by the whole house for the examining of a bill, or making report of an inquiry, or process of the house, &c.

Sometimes the whole house is resolved into a *committee*; on which occasion each person has a right to speak, and reply as much, and as often as he pleases; and an expedient they usually have recourse to in extraordinary cases, and where any thing is to be thoroughly canvassed. When the house is not in a *committee*, each gives his opinion regularly, and is only allowed to speak once, unless to explain himself.

The standing *committees*, appointed by every new parliament, are those of *privileges and elections*, of *religion*, of *grievances*; of *courts of justice*, and of *trade*, though only the former act. See PARLIAMENT.

COMMITTEE of *the king*, is used for a widow of one of the king's tenants; thus called, as being by the ancient law of the realm committed to the king's care and protection. See WIDOW.

COMMITTEE of a *Lunatic*, *Idiot*, &c. denotes the person to whom the care and custody of such lunatic, &c. is committed by the court of chancery. See LUNATIC.

COMMITTEES of *Corporations*, &c. are select members who perform the general routine of business. See CORPORATIONS.

COMMEDIATE, COMMODATUM, in the *Civil Jurisprudence*, the loan or free concession of any thing moveable or immovable, for a certain time on condition of restoring again the same individual after a certain term.

The commode is a kind of loan; there is this difference, however, between a loan and a commode, that the latter is gratis, and does not transfer the property: the thing must be returned in essence, and without impairment: so that things which consume by use, or time, cannot be objects of a commode, but of a loan; in regard they may be returned in kind, though not in identity.

COMMODAVIENSIS, an appellation given by some authors to a species of *lapis calaminaris* found in Bohemia.

But as it yields no zinc, Mr. Margraff denies it to be true calamine.

COMMODITIES, *Staple*. See STAPLE.

COMMODORE, in the *British Marine*, a general officer invested with the command of a detachment of ships of war designed on any particular enterprise; during which time he bears the rank of a brigadier-general in the army, and his ship is distinguished by a broad red pendant tapering towards the outer end, and sometimes focked.

COMMODORE is also a name given to a select ship in a fleet of merchantmen, which leads the van in time of war, bearing a light in her top to conduct the rest.

COMMODUS, LUCIUS AURELIUS ANTONINUS, in *Biography*, was the only son of the emperor Marcus Antoninus and Faustina, and born A. D. 161. He was educated with the utmost attention, and he enjoyed every superior advantage from the precepts and instructions of tutors appointed to prelude over his infantile studies and pursuits; but from the first openings of his mind, he displayed an untoward disposition, and a strong propensity for low and unworthy gratifications. He discovered an aversion from whatever was rational and liberal, and a fond attachment to the sports of the circus, amphitheatre, the combats of gladiators, and the hunting and destroying of wild beasts. To wean him from these pursuits, and with a view of engaging his mind in useful and manly occupations, his father made him a partaker of the sovereign power in his fifteenth year. This instance of parental affection did not produce the desired effect; it only furnished him with better opportunities of indulging every sensual gratification. Upon the death of Marcus, in the year 180; he succeeded to the quiet and undisputed possession of the throne; he saw about him neither competitor to remove nor enemies to punish, and during the first three years of his reign, the influence of his father's virtuous counsellors restrained him from any acts of tyranny towards his subjects. During this period, however, he indulged in every species of licentiousness, and revelled in all the licence of sovereign and unrestrained power, but his hands were unstained with blood, and occasionally he displayed a generosity of sentiment worthy of a great mind; he had in one instance refused to see the proofs of a conspiracy formed against him, and it was hoped he might have followed the track of his illustrious father. A fatal incident decided his fluctuating character. An assassin was employed to destroy him; in making the attempt he exclaimed "the senate sends you this." The deed was prevented, and Commodus from that hour encouraged a deep-rooted hatred for the whole body of senators. Spies and informers increased his suspicions and excited his jealousy of power in any other hands than his own. Accusation was regarded as proof, and the mockery of a pretended trial led only to certain condemnation. The execution of any considerable senator was ever attended with the death of all those who should attempt to revenge, or publicly dare to lament his fate, and when Commodus had tasted of human blood, he became incapable of pity or remorse. His ministers were one after another the victims of his fears or of his cruelty. Perennis was condemned to die for a charge of aspiring to the empire, and after his death the conduct of Commodus assumed the appearance of virtue. He repealed the most odious of his minister's acts, loaded his memory with public execrations, and ascribed to his pernicious counsels, all the errors of inexperienced youth. But his seeming repentance lasted only a short month, and then every sentiment of humanity appeared to be obliterated from his breast. He abandoned the reins of government to the most unworthy, and he valued nothing in sovereign power,

except the unbounded licence of indulging his sensual appetites. His hours were spent in a seraglio of beautiful women and boys, selected from all ranks of the people, and from every province of the empire. The intervals of lust were filled up with the basest amusements. The ferule crowd, whose fortune depended on their monarch's vices, applauded these vile pursuits. Having by long practice attained great skill in the use of the bow, he exhibited his talents before the people, and animals of the rarest species were collected from the remotest part of his dominions in order to serve as marks for the leoparded archer. The peridious voice of flattery reminded him that by exploits of the same nature, the Grecian Hercules had acquired a place among the gods, and an immortal memory among men. He accordingly assumed the title and insignia of Hercules; in this character he assembled all the helpless and distressed of the city, and causing them to be wrapped up in fantastical habits, like dragons and monsters, and armed with sponges instead of stones, he rushed upon them with his club and laid them all dead at his feet. He exhibited himself more than 700 times in the character of a gladiator, and in all his combats he was victorious, but his amusements in this way were frequently fatal to his antagonists. It would take more of our work than can be allotted to this article to describe all the cruelties and acts of savage barbarity which disgraced the reign of Commodus. At length his detestable career came to its merited end. Opposition to his bloody designs was given by some of his bosom counsellors, among whom was Marcia, his favourite concubine. He resolved to put them to death, and entered their names in a long list destined to the same fate. Marcia discovered his intentions, and apprized her friends of their common danger. They resolved to anticipate the blow, and Marcia mixing some poison in wine, presented it to him as he came from the bath. He soon fell asleep, but the dose not being sufficiently strong, he awoke; while, however, he was labouring under the effects of the poison, a robust youth, by profession a wrestler, entered his chamber, and strangled him without resistance. The body was secretly conveyed out of the palace, before a suspicion was entertained either in the city or the court of the emperor's death. Such was the fate of Commodus, and "so easy," says the historian, "was it to destroy a tyrant, who, by the artificial powers of government, had oppressed, during thirteen years, to many millions of subjects, each of whom was equal to their master in personal strength and personal abilities." Gibbon.

COMMOUNGNE, in *Law*, a word signifying a fellow-mosk, that lives in the same convent. 3 Inst. 15.

COMMON, in *Agriculture*, an open piece of ground, made use of equally by different persons who occupy lands in the parish to which it belongs or in which it lies.

It is remarked by Mr. Marshall in his "Treatise on Landed Property," in regard to the origin of commonable lands, "that, a very few centuries ago, nearly the whole of the lands of England lay in an open, and more or less in a commonable state. Each parish, or township, (at least in the more central and northern districts) comprised different descriptions of lands; having been subjected, during successive ages, to specified modes of occupancy, under ancient and strict regulations, which time has converted into law. These parochial arrangements, however, varied somewhat in different districts; but, in the more central and greater part of the kingdom, not widely. Under this ingenious mode of organization, each parish or township was, he says, considered as one common farm, though the tenantry were numerous. Round the village in which the tenants resided lay a

few small inclosures or *grass yards* for rearing calves, and as baiting and usury grounds for other farm-stock. This was the common farmlet or *homestead*, which was generally placed as near the centre of the more culturable lands of the parish or township as water and shelter would permit." And that "round the homestead lay a suit of *arable fields*, including the deepest and fondest of the lower grounds, situated out of waters' way, for raising corn and pulse: as well as to produce fodder and litter for cattle and horses in the winter season." While in the lowest situation, as in the water-formed base of a rivered valley, or in swampy dips, shooting up among the arable lands, lay an extent of *meadow grounds* or *ings*, to afford a supply of hay for cows and working flock, in the winter and spring months.

That on the out-skirts of the arable lands, where the soil is adapted to the pasturage of cattle, or on the springy slope of hills, less adapted to cultivation, or in the fenny leases of valleys, which were tunnel or gravelly water-formed lands, which were too dry to produce an annual supply of hay with sufficient certainty, one or more *stinted pastures*, or hams, were laid out, for milking cows, working cattle, or other stock which requires superior pasturage, in summer.

While the best and worst-soiled, and most distant lands of the township were left in their native wild state, for *timber and fuel*, and for a *common pasture*, or suit of pastures, for the more ordinary flock of the township, whether horses, rearing cattle, sheep or swine, without any other stint, or restriction, than what the arable and meadow lands indirectly gave; every joint tenant, or occupier of the township, having the nominal privilege of keeping as much live stock on these commons, in summer, as the appropriated lands he occupied would maintain, in winter.

Further, that the appropriated lands of each township were laid out with equal good sense and propriety. That each occupier might have his proportionate share of lands of different qualities, and lying in different situations, the arable lands more particularly were divided into numerous parcels, of sizes, doubtless, according to the size of the given township, and the number and rank of the occupiers.

And that the whole might be subjected to the same plan of management, and be conducted as one common farm, the arable lands were moreover divided into compartments, or "fields," of nearly equal size, and generally three in number, to receive, in constant rotation, the triennial succession of fallow, wheat (or rye), and spring crops, (as barley, oats, beans, and peas), thus adopting and promoting a system of husbandry, which, howsoever improper it is become in these more enlightened days, was well adapted to the state of ignorance and vassalage of feudal times, when each parish or township had its sole proprietor; the occupiers being at once his tenants and his soldiers, or meane vassals. The lands were in course liable to be more or less deserted by their occupiers, and left to the feebleness of the young, the aged, and the weaker sex. But the whole township being, in this manner, thrown into one system, the care and management of the live stock at least would be easier and better than they would have been under any other arrangement. And at all times, the manager of the estate was better enabled to detect bad husbandry, and enforce that which was profitable to the tenants and the estate, by having the whole spread under the eye at once, than he would have been had the lands been distributed in detached inclosed farmlets, besides avoiding the expence of inclosure. And another advantage, he thinks, arose from this more social arrangement: in barbarous times the tenants, by being concentrated in villages, were not only best situated to defend each other from predatory at-

tacks,

tacks, but were called out by their lord with greater readiness in cases of emergency.

But it is remarkable, that beside the organized townships which were inhabited and cultivated in the manner described, there were, and are to the present day, in different parts of England, extensive tracts of lands, some of them of a valuable quality, which lie nearly in a state of wild nature!—These uninhabited tracts are styled *forstles*, and heretofore many or most of them have been attached to the crown; and some of them are still under royal patronage. Whether they were originally set out for amusement merely, or whether the timber which stood on them was of peculiar value, or whether, at the time of laying out townships, those tracts were impenetrable woods inhabited by wild beasts, and when these were destroyed, or sufficiently overcome to render them objects of diversion, were taken under the protection of the crown, is not perhaps well ascertained. But let the original intention have been either of these, it no longer exists. The timber in most cases has fallen a sacrifice to age and neglect, and the game is no longer an object of regal pastime. But whether or not the forests (now so called) originated in wild woodlands, occupied by ferocious animals at the time of laying out townships, there were doubtless tracts of that description in different parts of the kingdom, and which now bear no marks of the common field system; but which appear evidently to have been inclosed from a state of woodland or common pasture; though it is possible they may have been nominally attached to neighbouring parishes. Of this description principally are the woods of Kent and Sussex, and many other old inclosed lands in different parts of the kingdom, whose fields or inclosures are of irregular shapes, and their fences crooked. And it is observable, that these woodland districts, as the forest lands, are divided into manors, which have not an intimate connection, or correspondence with parishes or townships; a further evidence that they were in a wild state, when the feudal organization took place.

It is stated by the author of "Modern Agriculture," that "on all the open field parishes, where the same arrangement continues as was at first established, there is a considerable extent of common field allotted for the pasturage of the live stock belonging to the inhabitants. These generally consist of such lands as are left fit for the plough, or more distant from the town or village. The parish commons are for the most part divided into three fields; one for the pasturage of the horses, another for the neat cattle, and the third for the sheep. These horses are generally tended by one of the farmer's servants. The whole of the sheep belonging to the parish are put under the charge of a common shepherd, who is hired at the general expence; and the cows and young cattle are taken care of nearly in a similar manner. Where the inhabitants of several adjoining parishes possess rights of common pasturage on an extensive common, as is frequently the case, particularly in the counties of Middlesex, Surry, Northampton, and other districts in the middle and southern parts of the kingdom, all the horses, cattle, sheep, hogs, &c. which are sent to the commons, are committed to the care of one or more persons appointed for the purpose. In some cases the right is limited; or, as it is called, *flinted*. When that is the case, such a number of cattle only, as the straw and hay growing on the farms will maintain in winter, is permitted to pasture these commons in summer. And therefore each farmer is, by particular laws, prevented from sending above a certain number, which is regulated, partly by the extent of his farm, and in some cases by the title on which he claims a right of commonage in the particular instance.

But where the common is unlimited; or in other words, where the farmers possess right of pasturing any number and species of live stock which they choose to send, and without restraint of any kind, the value of such right is considered by many farmers to be inconsiderable as not to be worthy of their attention. Such farms as possess improved breeds of horses, cattle, and sheep, seldom, indeed, if ever, send any of them to be pastured on the commons, whether flinted or unlimited. They generally dispense of their right, for a trifle, to some neighbouring farmers or dealers, who have no objection, in the view of profit, of running the risk of their cattle meeting with accidents, or being infected with disease, as most naturally be expected to happen on these extensive commons, where so many cattle are promiscuously collected together.

It has been remarked by a late able writer, that "the commons in Middlesex, as in most other places, are three fourths of them covered with heath and furze, from which a little of the worst sort of firing is obtained by the poor. The trifling quantity of food which cattle consume from these shrubs, does not, and indeed cannot, improve them, as it is barely sufficient to keep them from starving. Much of the remainder is occupied by roads, gravel pits, and ponds, yielding nothing. After the most mature consideration, I am inclined to think, that about 5,500 acres of the commons in the above county are employed in the production of grass for the feeding of cattle, affording indeed but a miserable pasture, as the greater part is under water during winter; and, from being poached and trodden down by cattle while wet, is rendered hard, lumpy, full of holes, and partakes of the sterility of moor during summer. The grasses are mostly of the dwarf kind, and of scanty produce, with a large proportion of the carnation and other grasses which are known to be rather more dangerous than nourishing; so much so, as to induce some of the most observing farmers in various parts of the kingdom, possessing extensive common rights, after a fair trial to refrain altogether from turning their cattle on such commons.

On such authority it may well, he says, be questioned, whether commons are of any more use to the community than they would be were they confined to the bottom of the deep. But without attempting the solution of such a question at present, he may be allowed to observe, that the value of commons, considered solely as to their power of increasing animal food, and as totally unconnected with the adjoining inclosures, is extremely small indeed. But when considered as affording an opportunity to the neighbouring farmer to turn his stock out, at certain seasons of the year, they become an object of some importance. For in the spring quarter of the year, by receiving the stock during these months, the growth of hay is encouraged, they answer the purpose of pasture, and the farmer is thereby enabled to mow all his grass land; which must sensibly increase the quantity of hay to be sent to market; as at Finchley and Harrowweald in this county; or being applied during the winter months to the support of a greater quantity of live stock in places more distant from a good hay-market; and in others, for the purpose of folding on the arable land."

It is further stated, that "on estimating the value of the commons in the same county, including every advantage that can be derived from them in pasturage, locality of situation, and the barbarous custom of turbarry, it appears, he says, that they do not produce to the community, in their present state, more than four shillings per acre! On the other hand, they are, in many instances, of real injury to the public, by holding out a lure to the poor man for procuring the means of materials

wherewith to build his cottage, and ground to erect it upon; together with fising, and the run of his poultry and pigs for nothing. This is of course temptation sufficient to induce a great number of poor persons to settle upon the borders of such commons. But the mischief does not, he says, end here: for having gained these trifling advantages, through the neglect or connivance of the lord of the manor, it unfortunately gives their minds an improper bias, and inculcates a desire to live from that time forward without labour, or at least with as little as possible. The animals kept by this description of persons, it is soon discovered by their owners, are not likely to afford them much revenue, without better feed than the scanty herbage of a common. Hence they are tempted to pilfer corn, &c. towards their support: and, as they are still dependent on such a deceptive supply, to answer the demands of their consumption, they are in some measure constrained to resort to various dishonest means, so as to make up the deficiency.

And there is another very serious evil which the public suffers from these commons, the same writer observes, which is, "that they are the constant rendezvous of gipsies, strollers, and other loose persons, living under tents, which they carry with them from place to place according to their convenience. Most of these persons have asses, many of them horses, nay, some of them have even covered carts, which answer the double purpose of a caravan for concealing and carrying off the property they have stolen, and also of a house for sleeping in at night. They usually stay a week or two at a place; and the cattle which they keep serve to transport their few articles of furniture from one common to another. These, during the stay of their owners, are turned adrift to procure what food they can find in the neighbourhood of their tents, and the deficiency is made up from the adjacent hay-stacks, barns, and granaries. They are known, he says, never to buy any hay or corn, and yet their cattle are supplied with these articles of good quality. The women and children beg and pilfer, and the men commit greater acts of dishonesty. In short, says he, the commons of this county are well known to be the constant resort of footpads and highwaymen, and are literally and proverbially a public nuisance. And that they are so in the more distant counties is evident, from the Gloucester and Hereford reports of the state of agriculture. There are also many additional injuries which commons render to society, of other kinds to those which have been noticed above. But that the commons of Middlesex, says he, are capable of being improved, so as to produce large crops of all the vegetables usually cultivated, and to rear and support a very highly improved breed of cattle, there can be no sort of doubt. Indeed it is truly lamentable to see, in every part of these kingdoms, such extensive tracts of land lying waste or uncultivated; producing no revenue to the owners of such property, and extremely doubtful if of any, the smallest benefit to the community. But it is particularly disgraceful to this, the first and principal county, which, so far from raising a sufficient supply of bread for its inhabitants, is under the necessity of importing corn from every quarter of the world (Europe, Asia, Africa, and America) while, at the same time, it has so many acres of good land lying waste, and locked up from the operation of the plough. By the single means of inclosure an abundant quantity of corn might be produced, and 150,000*l.* a year added to the wealth of the county, which is now absolutely lost to society, with as careless an indifference as if the proprietors of the soil were afraid of becoming too rich; or, as if like the dog in the manger they would not permit the community to share in a blessing of which they themselves are not inclined to partake.

The benefits and advantages that would be derived from a general inclosure of commons, are, he thinks, so numerous, as far to exceed his powers of description or computation. The opportunity it would afford of separating dry ground from wet, of well draining the latter, and liming the rotten parts, is of infinite consequence: as such an arrangement would, with the aid of intelligent breeders, be the means of raising a breed of sheep and neat cattle far superior to the present race of wretched half-starved animals now seen in such situations. It would have the effect of supporting a more numerous flock upon the same quantity of food by restraining the cattle and sheep within due bounds. Their restlessness and rambling disposition not only treads the grass off the ground, but also takes the flesh off their bones. This renders the attendance of a shepherd necessary, and requires likewise that they may be driven to and from the fold. Further, the live-stock would by this means be rendered many hundreds per cent. more valuable to individuals and the community than it has hitherto been, or can possibly be, without inclosure; and, what is of the last, the greatest importance, it would tend to preserve such improved breeds from that destructive maul, (the rot) which makes such terrible havoc among our flocks. Add to this, that the markets would be more plentifully supplied with beef and mutton, and the price of these articles considerably reduced.

It does not, he says, appear necessary to state with precision (nor indeed is it capable of being so stated) what would be the increase or value of the commons of this country on their being inclosed and well and properly cultivated. It may, however, with safety be stated at upwards of 15 times their present value to the proprietors, and 40 times their present value to the public. But increasing the rental of such land to 15, or perhaps 20 times, its present amount, is by no means the greatest advantage that may be expected to result from an inclosure of commons. The general salubrity and healthiness of the country would necessarily be improved, while industry would be largely increased among the most useful classes of society, beggary and robbery much lessened, and the general stock of corn and cattle almost inconceivably augmented. And wherever inclosures are made with due attention to the interest of the poor (as they ought always to be), they will be found to ameliorate their condition, as much as they increase the property and the comforts of the rich."

It is further observed, that "the commons of this kingdom being, with very few exceptions, without ridges, furrows, or drains, have not the means of discharging that superfluous water from the surface of them, which is well known to be of great detriment to vegetation in general.

Many commons in low situations, and where the soil happens to be of a retentive quality, hold water like a sponge, which being always stagnant, as well as excessive in quality, renders the soil of such commons much too wet for the pasturage of sheep, and is, no doubt, the cause of many of the disorders which that animal is subject to, particularly that fatal malady, the rot. From the same causes, also, the neighbourhood of most commons must be particularly unfriendly to the health and longevity of man. Only let us, says he, reverse the scene, and for a moment suppose these commons to be inclosed, the necessary ditches and drains sunk, and the land brought into tillage, and we shall see all the superabundant moisture got rid of; and the water, being kept in constant motion, by trickling down the sides of the ridges into the furrows, and from thence into the ditches and rivulets, will be found to fertilize the very soil which in its present stagnant state it serves to injure;

injure; while, by leaving the land dry, it will be rendered more healthy both for men and cattle. The effects of such a measure would soon shew themselves in many districts of this island, which, at present, are very unpropitious to the health of man, in the much greater longevity of the inhabitants. It may also be further noticed, he says, that commons are entirely defective in the great article of labour; but no sooner does an inclosure take place, than the scene is agreeably changed from a dreary waste, to the more pleasing one of the same spot, appearing all animation, activity, and bustle. Every man, capable of performing such operations, is furnished with plenty of employment, in sinking ditches and drains, in making banks and hedges, and in planting quicks and trees. Nor are the wheelwright, carpenter, smith, and other rural artificers, under the necessity of being idle spectators of the scene, since abundance of work will be found for them, in the creation of farm houses, and the necessary appendages thereto; and in the forming and making of roads, bridges, gates, stiles, implements of husbandry, &c. Even after a few years, when this kind of temporary exertion is over, by the whole being brought into a regular system of husbandry, it will still continue to provide both food and employment for a very increased population.

“It is highly probable, he thinks, that if the legislature should pass an act for the general inclosure of waste land, it would increase the quantity of rural labour so much as to advance its price considerably, and thereby have the good effect of drawing a vast number of hands out of the unwholesome confinement of manufactories; where, in addition to the life-shortening effects of such confinement, the morals of the people are exposed to certain contamination.”

With respect to the effect produced by inclosures on the population of the country, it may be observed, that the inclosing of 1000 acres in any one parish would probably require 100 different labourers, many of whom would undoubtedly be drawn from such of the adjoining parishes as had less work than workmen. Thus it must follow, that the neighbouring towns and villages would diminish, just as much as the parish in which the inclosure is going forward, would increase its numbers; yet the amount of the community will evidently be the same. But although the inclosing of waste land certainly does not immediately either increase or lessen population, as some writers seem to have supposed, yet, that inclosures ultimately affect population, (and that as to its increase,) inasmuch as the district is thereby made more conducive to health, is, he says, sufficiently evident. Every thing that has a tendency to make a nation more healthy and productive, must, of necessity, operate as a stimulus to population. The certainty of a man's being able, with ease and comfort, to provide for himself and family, by the increase of rural labour, is at once an inducement to marriage, and a consequent increase of population.

The inhabitants wholly supported by agriculture in England and Wales, appear, the same writer says, to be nearly, or perhaps quite, six millions, (while it supplies provisions for near two millions more,) or one to every six acres and a half of cultivated soil. The estimation is made in this manner.

ESTIMATE.

Cultivators of farms, six persons to every	
100 acres, is	2,340,000
Ditto of gardens, hop-grounds, nurseries, &c.	300,000

Smiths, wheel-wrights, bricklayers, masons,	Brought over
carpenters, painters, plumbers, glaziers,	2,640,000
various manufacturers of furniture, woollen	
cloth, and making it up, linen, and making	
it up, leather, and making it into shoes,	
boots, &c. horse, harness, and saddlery; as	
many of each of this description of persons,	
as are wholly employed by the cultivators	
of the soil; men, women, and children,	
about seven persons to each farm, of 100	
acres, is	2,800,000
The like of millers, bakers, maltsters, brewers,	
distillers, starch-makers, dealers in corn, and	
persons employed in the commerce of corn	500,000
The landlords of farms	40,000
Persons supported by taxes on the produce of	
land	120,000
	<hr/>
	6,100,000

Not but that the extremes vary much, as there are some few grazing farms, with only one soul to fifty, and arable farms that are peopled in the proportion of one person to three acres of land. In point of produce, the commons, in their present state, apparently, though, he thinks, not really afford entire support to human beings, in the proportion of one to an hundred acres. But by being inclosed, and brought into the present ordinary cultivation of the country, every six acres and a half might do the same.

Should agriculture experience a rapid advance towards perfection, as there is reason to imagine it will, both from the exertions of the board, and of intelligent individuals, every three or four acres, would, in a few years, be capable of supporting its inhabitant; and, as from its nature, it might certainly be carried on from one degree of perfection to another; it may even arrive at such a pitch of excellence, as that every acre of land shall support its man.”

It has long since been well observed by Dr. Anderson, that while land is in the condition of common, man is debarred from ever being able to ameliorate the soil, and thus to augment its product to the state; but that he is not prevented so effectually from deteriorating it. While, in the state of a common, the surface of the ground may be broken by him in such a way, as not to recover for ages a swart equal to that which was originally upon it. It may be cast up and sunk into pits; it may be converted into wet and rotten marshes, by casual obstructions being thrown in the way of the water, which no one finds it his interest to remove; it may, in short, while a common, be abused in a thousand ways, by reason of the obliquity, indolence, or caprice of individuals, but it never can be benefited by the industry of man; and not only may this be done, but these things actually are done, in innumerable instances; so that to a person who contemplates the loss that the nation must sustain by these deplorable abuses, nothing can afford a more melancholy train of reflections, than that which the frequent recurrence of those disgusting commons suggests to his mind, as he travels over the otherwise delightful country of England. When he stops to inquire more minutely into the effects of this kind of property upon the morals and domestic economy of the individuals who claim a right to these commons, he only finds additional causes, he says, of regret. He frequently discovers that the quiet and industrious cultivator, having a right upon a common, is obliged to aban-

don that right, because of the harrassments to which he is subjected from turbulent and assuming neighbours, who have obtained a small footing there, with a predetermined resolution, to baps, to encroach much farther than their right would authorize; because they know that towards the restraining of these excesses, no obvious and easy means occur. Thus does the peaceable man often find it better to relinquish his right almost entirely, than be subjected to the perpetual contention that would occur in defending it. Such an inquirer frequently finds, that in consequence of this, the small flocks of the poor cottager, who cannot afford to look after them continually himself, are so tormented by being chased from place to place by these marauders, that instead of a relief to the poor cottager, these flocks prove only a torment to him; his family becomes, in consequence of this, a burthen on the parish, which is obliged to support them; he finds, that among those who are bred up in these situations, there are many young men who delight more in active plunder, than in sober industry; and who, tempted by the high prices that luxurious inhabitants of towns offer for game, become poachers, and from such powerful confederations of determined profligates for their mutual protection, that no one, less determined than themselves, will dare to interfere with them; which enables them to carry on their depredations with impunity. He further observes, that the money these young men thus acquire, is usually squandered in drinking and riotous excesses; the young women are contaminated by their conversation, corrupted by their excesses, and debauched; the last evil attending which courses, is a great number of illegitimate children, and an extravagant poor rate. But who, says he, can estimate the detriment that a nation sustains, when the morals of the country inhabitants of it become corrupted? It is like, says he, tainting the springs of water with poison, which, instead of promoting health and vigour, as they naturally ought to have done, produce one universal cause of infectious disease. It is common, he adds, to read in the History of Britain, that the rot became at times so prevalent in England, as to carry off many millions of sheep at once; and these diseases were regarded, like the pestilence among the human species, as a terrible visitation of heaven for the sins of a guilty land. There is great reason to believe that these frequent mortalities among the flocks were entirely occasioned by the numerous commons, which were in those times much more extensive than at present; for it is still known, that in neglected spots, where water is allowed to stagnate and congregate marshes, as is often the case with commons when the season proves wet, the sheep pastured upon them are, to this day, so much subjected to the rot, as to induce many persons, as has been observed, rather to give up their right, than to allow their flocks to enter upon these unhealthy pastures. Considered under every possible point of view, then, says he, it appears to be undeniable, that the prevalence of commons is a great national grievance, which ought, if possible, to be removed; and that the Board of Agriculture cannot be more beneficially employed, than by granting all the aid that their wisdom can devise, for removing these bars that at present tend to prevent the equitable division of this kind of property.

It is evident from every one of the agricultural surveys which have been yet made, he says, that in every county in England and Wales, there are extensive tracts of land of this description (for commons and wastes may be considered as nearly synonymous terms, although it be a truth that many of these commons consist of land naturally as good as any in the kingdom). Of the extent of these lands, were it necessary, a tolerably accurate knowledge, he thinks,

might be obtained; but as to the amount of improvement, it is impossible for any person to form at present an idea of it, should the prosperity of this country be permitted to go forward for a considerable length of time in that accelerating ratio into which it would naturally fall, if the general tranquillity of the nation were preserved, and the obstructions which have hitherto repressed exertions in agriculture removed. It is enough here to say, he thinks, that it would be an object of immense magnitude. He has had occasion to observe, that in some favourable situations, it is well known that land, in the course of a very few years, has been made a thousand times at least more productive than in its original state. Many commons are at present lying waste in situations equally favourable as these; and many other situations may become equally favourable by an extension of those modes of facilitating intercourse, which are now in contemplation, and are only prevented from being carried into effect by barriers that judicious laws may easily remove. See WASTE LAND.

In regard to the appropriation of commonable lands, it has been observed by Mr. Marshall, that the species of unappropriated lands in this country are, at present,

1st. "Forest lands, and other extensive wastes, on which several manors, or adjacent townships, have a right of common pasturage.

2d. "Commonable lands of distinct townships, or manors, whose appropriated lands are wholly inclosed, and in a state of mixed cultivation.

3d. "Commonable lands of townships, whose arable fields, &c. are partially inclosed;" and

4th. "Commonable lands of townships, whose arable fields remain wholly open."

And in respect to the principles on which the appropriation of such lands requires to be conducted, it may be observed, that as, by an established principle of the general law or constitution of the country, immemorial custom establishes right, neither the original rights and regulations, respecting such lands, nor the changes which may have taken place during a succession of centuries, from the origin of forests and townships, to the latest periods of time, are objects of investigation or inquiry; but many acquired rights which exist in any certain case at the time of appropriation, and which would continue to exist were it not to take place. "The possessor of a cottage," says the same writer, "which has enjoyed, time immemorial and without interruption, the liberty of pasturage, though such cottage were originally an encroachment of a *freedbooter* or an *outlaw*, has indisputably as legal a claim to a proportionate share of the commonable lands, as the possessor of the demesne lands of the manor has (merely as such), although they may have descended from father to son from the time of their feofforality. For it is evidently on the estimated values of the respective rights which exist, and which can be rightfully exercised in time to come, and on these alone, that a just and equitable distribution can be effected."

It is, however, stated, that before the distribution of commonable lands among the owners of common pasturage can take place, the more *abstract rights* which belong to commons require to be estimated, and the just claims of their possessors to be satisfied. These are, he says, principally manorial rights, and the rights of tithes.

The manorial claims are to be regulated by the particular advantages which the lord of a given manor enjoys, and which he will continue to enjoy, while the commons remain open and unappropriated; whether they arise from mines, quarries, water, timber, alien tenants, fuel, estover, pannage, or game? And that "his claim, as guardian of the soil, as productive

productive of *pasturage only*, is in most cases only honorary; he cannot as such (unless through ancient custom) profit by the *herbage* or the *browse* that the soil produces." But that "the claim of the lord of the manor, in right of the soil on which *thriving timber* is standing, is substantial. For out of this, he has, in effect, a real yearly income, equal to the annually increasing value of the timber: a species of advantage which, if the commons remain open and unappropriated, he will in course continue to enjoy, so long as the timber continues to increase in its value. His claim, therefore, in this respect, depends on the quantity of timber, and its rate of growth taken jointly. Young thriving timber *in situ* only affords an annual increase of value at present, but will continue its benefits for many years to come, if it be suffered to remain undisturbed on the soil which supports it, during the estimated period of its future increase; whereas, dotards, and stunted trees which afford no increase of value, do not entitle their owner to any share of the soil they stand upon. The trees themselves, or their intrinsic value, are all the lord of the manor can have a right to claim."

And further, in like manner, the claims of the crown, or of hereditary rangers (if any), on the forest lands, ought, he conceives, to be satisfied.

But the claims of *tithe owners*, aggregately considered, are more complex and obscure. In a case where the great and small tithes are united, where the tithe of wool and lamb, and that of grain, roots, and herbage, belong to the same owner, and where no modus exists, it may seem to be reasonable that he should have the option of receiving land of equal value to the existing value of the whole of the tithes, or of taking the chance of their value, in the state of cultivation. But seeing the evil tendency of corn tithes, and the impropriety of laying on so harmful a burthen, as they are now become, upon lands that have never borne it, there can be little risk in saying that it would be at least politic in parliament to prevent it. Beside, it stands part of the statute law, he believes, that the lands which have never been under tillage, shall not pay tithes during the first seven years of their cultivation; during which time, the incumbent's income might, by leaving the tithe to take its course, be materially abridged, and his circumstances thereby be rendered distressing.

It is therefore concluded, that, on the whole, it appears to be proper in this case, that the law should instruct commissioners to set out lands equal to the existing value of the tithes at the time of appropriation; and, where much corn land (land fit for corn) shall be appropriated, to set out a farther quantity, equal to the reversion of the extra value of the tithes to arise from such corn lands, seven years after the appropriation shall have taken place, above the value of the tithes that exist, provided any such extra value shall appear by the estimates.

And further "in cases in which the tithe of lamb and wool, and the tithe of corn, &c. belong to separate owners, the line of rectitude and strict justice to all parties, appears, he says, to be still more difficult to draw. The former is clearly entitled to land, or a money payment equal to his loss of tithe; but the right of the other is less obvious. To cut him off entirely from any share of the lands, and likewise from any share of tithes to arise from them after they shall be appropriated, may seem unjust; he may be a lay rector, and may have lately purchased the tithes, or a clerical rector who has recently bought the advowson under the expectation of an *inclosure*. On the other hand, it appears to be hard that the proprietors of the parish should first give up land for the tithe of wool and lamb which will no longer exist, and then be liable to a corn tithe on the

same lands, after they shall have bestowed on them great expense in clearing and cultivation. Indeed the injustice of such a measure is evident. A middle way, therefore, he thinks, requires to be sought; and it will be difficult, perhaps, to find one which has more justice in it than that which is proposed for the first case."

It may, however, says he, be urged that, admitting the foregoing regulation to be the true ground on which a remuneration in lieu of tithes of commonable lands ought to be eliminated, the difficulties of cultivation would in some cases be great, and might be the cause of dispute and delay in the general work of appropriation; and a more practical method, though less reconcileable to theory, presents itself. Thus, let a certain proportion in value, of the lands to be appropriated as one, be assigned in lieu of the whole of the tithes of the township or manor, supposing the whole be payable in kind; and if there are more than one tithe owner in the manor or township, let the commissioners divide, such aggregate allotment among the several owners and claimants, as the rector, the vicar, &c.; and the owners of land, &c. who pay tithes by ancient modus not in kind: such owners being entitled to a share of the same as the tithe owners, in proportion to the advantage they receive, by such ancient privilege.

And if any other abstract claim on the lands to be appropriated be fairly made out, or any alien right, as that of a non-parishioner, or extra manorial occupier who has acquired by ancient grant, or by prescription, the privilege of depasturing them, be fully proved, its value requires to be accurately estimated, and land to be assigned in lieu of it."

When this has been done, the remainder of the *unlimited commons* of a given township or manor belongs to the owners of its common right lands and houses; but in what proportion may be difficult to determine with mathematical precision. Nevertheless, by adhering strictly to the general principle, on which alone he conceives an equitable appropriation can be conducted, *viz.* that of determining each man's share by the benefit which he has a right to receive at the time of appropriation, and which he might continue to receive, were it not to take place, truth and justice may be sufficiently near approached.

He considers that one of the first steps towards an equitable distribution of unlimited commons, is to ascertain the common right houses, and to distinguish them from those which have no right of commonage, and which therefore can have no claim to any share of the lands of the unlimited commons, further than the right of the lands they stand upon.

By ancient, and, he believes, pretty generally received, though somewhat vague idea, respecting the rights of commonage, the occupier of every common right house has the privilege of depasturing as many cattle, sheep, or other live stock, on the common in summer (provided, it must be understood, that it is large enough to permit every occupier to exercise this right), as the grounds he occupies within the township or manor can properly maintain in winter; and no one can exceed that proportion, for the surplus of the pasturage (if any) belongs to the lord of the soil, according to Fitzherbert and Blackstone.

Under this regulation, the appropriated lands of a common field township, which are not occupied jointly with a common right house, may be said to be deprived, during the time they are so occupied, of their right of commonage. And in some of the private bills of inclosure, which have been suffered to pass through parliament, the lands which happened to be in this state of occupancy at the time of passing

passing the bills, were deprived of their interest in the common lands, for ever: Notwithstanding, perhaps, they had a few years preceding this accidental circumstance, an undoubted right to their portion of them; a right which, a few weeks or a few days afterward, might have reverted to them, without the smallest hint, by the temporary alienation. If any of the appropriated lands of a township or manor have been estranged from its commons, during time immemorial, have never been occupied jointly with a common right house, or in any way enjoyed of right the common pasturage, within memory, they may, with some reason, be said to have lost their right, and be excluded from a participation.

It is stated, that by this ancient, and in a degree essential, usage, common right houses have a clear right to the land of the commons, superior to the ground they stand upon; especially if they rightfully enjoy a privilege of partaking of the fuel and pannage they afford; for these properly belong to the houses, not to the lands; and still especially if they are not conveniently situated for enjoying the several benefits which the commons afford in their wild state. And whatever a common right house is worth, merely as such, that is to say, whatever it will let or sell for, over and above a non-common right house of the same intrinsic value, it certainly ought to participate, in the distribution, according to such extra value.

“The true proportionate shares of the common right lands are to be ascertained on the same principle. For although the ancient regulation respecting common right may continue in force while the commons remain open and unappropriated, it would be found troublesome, or unmanageable, as a rule to their just appropriation. There are few, if any, commons (of common-field townships at least) that now afford pasturage in summer for all the stock which the appropriated lands are capable of maintaining in winter; so that their several proportions only could be used: and these proportions may be calculated with much greater certainty and dispatch, on the respective rental values of the lands, than on the more vague and troublesome estimation of the quantities of stock they would winter, which indeed would be best calculated by the rental value of the land. Consequently, in adopting this as the basis of calculation, the ancient rule is in effect complied with.

But still there is another circumstance, he says, of some importance, which requires attention, before an equitable distribution can be made. For although each common right occupier may have a right to stock in proportion to the productiveness or rental value of his appropriated lands, every one could not do this with equal profit, and of course could not receive equal benefit. Lands situated on the side of a common, are much more beneficial in this respect, than lands which lie a mile or two from it, with bad roads between them. And it is the real advantage which an occupier can freely receive that is the true guide in the partition; which consequent y ought to be conducted, not on the rental value of the land, abstractly considered, but on this and its situation with respect to the commonable lands, jointly. In other words, it is the rental values of the common right lands while the commons remain open, not what they will become after the commons are inclosed, which he conceives to be the proper ground-work of appropriation. And that in cases where commonable lands are wholly attached to manors, and not common to the parish or township in which they are situated, as in forests and woodland districts, the self-same principle of distribution is applicable. The remainder of the commons (after the owners of abstract rights have been satisfied) belong to the common right lands and

houses, no matter whether such lands and houses belong to copyhold tenants exclusively, or to copyholders and freeholders jointly, provided the immemorial custom of the manor make no distinction in their respective rights; the well established customs of manors being in all cases rules of conduct and unerring guides to commissioners.”

With these, he supposes, end the great difficulties as to the principles of appropriation; the rest he considers as merely technical; the works of admeasurement, estimation, and calculation; operations that are familiar to professional men in every district, and which require nothing but application and integrity to render them sufficiently accurate. It is however a matter of vast importance to have persons fully conversant with the subject as commissioners in all such cases.

Through the uncertainty and expence attending private acts, a great portion of these uninclosed common lands remain nearly as nature left them;—appearing in the present state of civilization and science, as blotches on the face of the country, especially when seen under the threatening clouds of famine, which have now repeatedly overspread it.

COMMON-FIELD Land, signifies a description of land of a somewhat similar kind to that of commons, only lying in extensive fields. There is a large portion of this sort of land in almost every county of the kingdom. It has been observed by Mr. Malleson, that the common arable fields in the county of Middlesex are about 20,000 acres; and in that, as well as in most other counties, are divided into too small properties to be advantageously cultivated. He says he has known thirty landlords on a field of 200 acres; and the property of each so divided as to lie in ten or twenty places, containing from an acre or two downwards to fifteen perches; and in a field of 300 acres he has met with patches of arable land, containing eight perches each. In this instance the average size of all the pieces in the field was under an acre. In all cases, he observes, they lie in long, narrow, winding, or worm-like slips. Land so distributed occasions great loss of time to the farmer, in removing his teams and labourers; and what is of equal importance, he can neither cross-plough nor harrow and clean such land in a workmanlike manner. And another great inconvenience attending common-field land is, the farmer cannot crop with that which best suits his soil, but is confined to sow such grain as must be cut with his neighbour's. An act to inclose common-field land would be advantageous to the farmer, and make the estates compact, and of more value to the owners. Neither can he sow any green or meliorating crops, vary the usual improving succession, or even destroy the vermin. In short, the cultivator of these lands finds his expences double, and his crops only half of what they might be, if the land were laid together and well fenced.”

By inclosing the common-fields, says he, which consist of a turnip and barley soil, both the landlord and the farmer are freed from the shackles of an exhausting and obsolete rotation of crops, and placed at liberty to distribute for cultivation the soil in the most improved manner, keeping it clean, in better heart, raising such roots and green crops as are in the greatest demand at market, and only growing a crop of corn for the sake of renewing the course of green and root crops. In this manner intelligent men, after inclosure, can double the produce of their land.

It is added that the invariable rotation of crops in all the common-fields is, first year a fallow, second year wheat, third year pease or oats, then begin again with a fallow. This, he says, is the destructive system of arable management that mostly prevails in this kind of land, and by which

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some of the best land in the kingdom is condemned to be unemployed every third year; and the farmer who occupies it is compelled to pay three years rent in taxes, for two years use of it, and of course to maintain his family, servants, cattle, and implements of husbandry, every third year, without having any return from the land. It is, therefore, impossible that lands of this sort can ever be cultivated to the greatest advantage, while they remain in their present state. See INCLOSING.

It is observed by Mr. Marshall that "absurd as the common field system is, in almost every particular, at this day, it was admirably suited to the circumstances of the times in which it originated, the plan having been conceived in wisdom and executed with accuracy as appears in numberless instances, even at this distance of time."

It is remarked that in the western extreme of the island the common field system has never, perhaps, been adopted; has certainly never been prevalent, as in the more central parts of England. There, a very different usage would seem to have been early established, and to have continued to the present time; when lords of manors have the privilege of letting off the lands of common pastures, to be broken up for corn, the tenant being restricted to two crops; after which the land is thrown open again to pasturage. And it is at least probable, that the lands of that country have been cleared from wood and brought into a state of cultivation through similar means. At present they are judiciously laid out, in farms of different sizes, with square straight-lined inclosures, and with detached farmsteads situated within their areas; the villages being generally small and mean; and the more residence of labourers. These are circumstances which strongly evince that the common field system never took place in this part of the island, as it did in the more central parts.

But during the two last centuries, more particularly within the last, the feudal organization, having lost its original basis, has itself been mouldering away. A great majority of the appropriated common field lands and commons have been partially or wholly inclosed, either by piecemeal, each proprietor inclosing his own slip (a very inconvenient mode of inclosure); or by *general consent*: the whole of the proprietors agreeing to commit their lands to the care and judgment of arbiters or commissioners; who, restoring the fields to their original intirety, reparcelled them out, in a manner more convenient to the several proprietors, and laid each man's portion, which had consisted of numberless narrow slips, in one or more well-shaped grounds, or by *acts of parliament*, whereby not only common fields, common meadows, and stinted pastures, but unstinted commons also, have been appropriated, by commissioners named in, or chosen in pursuance of, each respective act, who, throwing back the entire township to its original state, laid it out afresh, according to the directions of the act and their own judgment.

COMMON Field Husbandry, that sort of cultivation which is practised in common fields. See HUSBANDRY. It has been observed in the "Agricultural Report of Wiltshire," that the introduction of the common field husbandry seems to have been very slow and progressive; and that the dispersed situation and smallness of the pieces, of the common field lands now in cultivation, evidently shew that the occupiers began with tilling a single acre, as one day's work for a plough, or perhaps only half an acre each; and that, as a want of corn increased, this cultivation was augmented until they had cultivated all that was most proper for that purpose, still leaving those parts which were less fit for the plough, or more distant from home, in a constant state of

commonage, but by mutual agreement keeping the cattle out of the cultivated parts till after harvest. This was, probably, the origin of common fields. It does not seem probable, that any improved methods of cultivation can be adopted on common field lands, until the system of common field husbandry is abolished. See COMMON and COMMON Field Lands.

COMMON Meadows and Pastures, are such meadows and pastures as are held in a state of commonage. It is remarked, by the author of the "Agricultural Survey of Wiltshire," that, by the same kind of mutual agreement, as is stated in speaking of common field lands, those who have rights shut up, and in some cases inclosed, such parts of their common pastures as were most proper to mow for hay, dividing them into certain specific quantities, either by land-marks, or by lot, for mowing, and suffering the common herd of cattle to feed there again as soon as the hay was carried off, till it was time to lay them up for a new crop; and that this was the origin of common meadows. And that the mutual agreements, originally founded in necessity, became, when approved by the lords, and observed for a length of time by the tenants, what are called "custom of manors," constituting the very essence of the court baron, or manorial court, by which both lord and tenants were and are still bound; and of which, though the lord or his steward is the judge, the tenants are the jury, the custom of the manor equally binding both.

COMMON, Communis, in a general sense, something that belongs to all alike; is owned or allowed by all; and is not confined to this more than that.

In which sense, *common* stands opposed to *proper, peculiar, &c.* Thus, the earth is said to be our *common* mother; in the first, or golden age, all things were in *common*, as well as the sun and elements; the name animal is common to man and beast; that of substance to body and spirit. Philosophers dispute whether there be any such thing as *common* notions, innate, or impressed on the mind by nature herself; or whether our ideas are all adventitious. See IDEA.

COMMON, Communia; (i. e. *quod ad omnes pertinet*) in *Law*, signifies that soil, the use whereof is *common* to a particular town or lordship; or it is a profit that a man hath in the land of another person, usually in common with others; or a right or privilege, which one or more persons claim to take or use, in some part or portion of that which another man's lands, waters, woods, &c. do naturally produce; without having an absolute property in such land, waters, wood, &c. It is called an "incorporeal right," which lies in "grant," as if originally commencing on some agreement between lords and tenants, for some valuable purposes; which by age being formed into a prescription, continues, although there be no deed or instrument in writing which proves the original contract or agreement. 4 Co. 37. 2 Inlt. 65. 1 Vent. 387. And there is not only common of PASTURE, which the word "common," in its most usual acceptation, signifies; but also common of PISCARY, common of ESTOVERS, common of TURBARY, &c. And in all cases of *common*, the law doth much respect the custom of the place: for there the rule is, *consuetudo loci est observanda.* 7 Rep. 5.

COMMON of pasture, is a right of feeding one's beasts on another's land; for in those waste grounds, usually called commons, the property of the soil is generally in the lord of the manor; as in "common fields," it is in the particular tenants. This kind of common is divided into *commons in gross, common appendant, common appurtenant, and common per cause de vicinage.*

COMMON in gross, is a liberty to have *common* alone, that

is without any land or tenement in another man's land, granted either to a person for life or to him and his heirs. This is commonly passed by deed, or specialty, and claimed by prescriptive right.

COMMON appendant, and *COMMON appurtenant*, are usually confounded; both being defined to be a liberty of *common* appertaining to, or depending on, such or such a freehold; which *common* must be taken with beasts *commouable*: as horses, oxen, &c. being accounted fittell for the plowman; and not with goats, geese, and hogs. Others distinguish between the two, thus; *common appurtenant* may be severed from the land whereto it appertains; and is where the owner of land has a right to put in other beasts not *commouable*; as hogs, goats, &c. which neither plough nor manure the land. Whereas *common appendant*, according to lord Coke, had its original in the following manner:

"When a lord enfeoffed another in arable lands to hold of him in socage; the feeſee, to maintain the service of his plough, had at first, by courtesy of his landlord, *common* in his wailes, for necessary beasts to eat and compost his lands; and that for two causes; 1^o. Because it was tacitly implied in the feoffment; by reason the feeſee could not till, or compost his pasture: by consequence, therefore, the feeſee had, as a thing necessary, or incident, *common* in the wailes, or lands of the lord. 2^o. For the maintenance and advancement of tillage."

Common appendant belongs only to ancient arable land, and not to a house, meadow, pasture, &c.; and it is of common right. But it is not common appendant, unless it hath been appendant time out of mind. 1 Danv. 746. It may be upon condition; for all the year, or for a certain time, or for a certain number of beasts, &c. by usage; though it ought to be for such cattle as plough and compost the land to which it is appendant. 1 Danv. 797. *Common appendant* may be to common in a field after the corn is severed, till the ground is sown, and it may be to have common in a meadow after the hay is carried off, till Candlemas, &c. Yelv. 185. This common, which in its nature is not restricted by number, may be limited by custom as to the beasts; whereas *common appurtenant* ought always to be for those levant and couchant, and may be *sans* number. Plowd. 161. A man may prescribe to have common appurtenant for all manner of cattle, at every season in the year. 25 Aff. 8. He who hath common appendant or appurtenant can keep but a number of cattle proportionable to his land; for he can common with no more than the lands to which his common belongs is able to maintain. 3 Saik. 93.

COMMON pur cause de vicinage, i. e. by reason of neighbourhood, is the liberty that the tenants of one lord in one town, have to *common* with the tenants of another lord in another town.

But it is to be observed, that those who claim this kind of *common*, (which is usually called *intercommoning*) may not put their cattle into the *common* of the other lord, for then they are distrainable; but, turning them into their own fields, if they stray into their neighbour's *common*, they must be suffered.

The inhabitants of one town or lordship may not put in as many beasts as they will, but with regard to the freehold of the inhabitants of the other; for otherwise it were no good neighbourhood, upon which all this depends. Terms de Ley. If one lord encloses the common, the other town cannot then common; but though the common of vicinage is gone, common appendant remains. 4 Rep. 38. 7 Rep. 5. Every common *pur cause de vicinage* is a common appendant. 1 Danv. Abr. 799. This is indeed only a permissive right,

intended to excuse what in strictness is a trespass in both, and to prevent a multiplicity of suits. And therefore either township may enclose and bar out the other, though they have intercommoned time out of mind. Blackst. Com. ii. 34.

The property of the soil in the "*common*" is entirely in the lord; and the use of it jointly in him and the commoners. Lords of manors may depasture in commons where their tenants put in cattle: and a prescription to exclude the lord is against law. 1 Inst. 122. The lord may agut the cattle of a stranger in the common by prescription; and he may license a stranger to put in his cattle, if he leaves sufficient room for the commoners. 1 Danv. 755. 2 Mod. 6. The lord may also furcharge, &c. an overplus of the common; and if, where there is not an overplus, the lord furcharge the common, the commoners are not to distrust his beasts; but must commence an action against the lord. F. N. B. 125. The lord may distrust when the common is furcharged, and bring action of trespass for any trespass done in the common. 9 Rep. 113. A lord may make a pond on the common, though he cannot dig pits for gravel or coal; the statutes of improvement extending only to inclosure. 3 Inst. 204. 9 Rep. 112. 1 Sid. 106. If the lord makes a warren on the common, the commoners may not kill the conies; but are to bring their action, for they may not be their own judges. 1 Rol. 90. 495. By statute of Merton (20 H. III. c. 4.) lords may "approve" against their tenants, *viz.* inclose part of the waste, &c. and thereby discharge it from being common, leaving common sufficient; and neighbours as well as tenants, claiming common of pasture, shall be bound by it. If the lord incloses on the common, and leaves not common sufficient, the commoners may not only break down the inclosures, but may put in their cattle, although the lord ploughs and sows the land. 2 Inst. 88. 1 Rol. Abr. 406. By stat. 29 Geo. II. c. 36. Owners of commons, with the consent of the majority, in number and value, of the commoners; the majority of the commoners, with consent of the owners, or any persons, with the consent of both, may inclose any part of a common for the growth of wood. If the wood be destroyed, the offender may be punished according to stat. 1 Geo. I. c. 48.; if not convicted in six months, the owner shall have satisfaction from the adjoining parishes, &c. as for fences overthrown by stat. Weilm. 2. Persons cutting wood on commons shall incur the same penalty. And by stat. 31 Geo. 2. c. 41, the recompence is to be paid to persons interested, in proportion to their interest. A commoner hath only a special and limited interest in the soil, but yet he shall have such remedies as are commensurate to his right; and therefore he may distrust beasts damage-fasant, bring an action on the case, &c.; but not being absolute owner of the soil, he cannot bring a general action of trespass for a trespass done upon the common. A commoner cannot do any thing on the soil which tends to the melioration or improvement of the common, as cutting down of bushes, fern, &c. 1 Sid. 251. 2 Hen. VIII. 2. 13 Hen. VIII. 15. Therefore, if a common every year in a flood is surrounded with water, the commoner cannot make a trench in the soil to avoid the water, because he has nothing to do with the soil, but only to take the grass with the mouth of the cattle. 1 Rol. Abr. 405. 2 Bull. 116. Every commoner may break the common if it be inclosed; and although he does not put his cattle in at the time, yet his right of commonage shall excuse him from being a trespasser. Lit. Rep. 38. 1 Rol. Abr. 406. If a tenant of the freehold ploughs it, and sows it with corn, the commoner may put in his cattle, and with them, eat the corn growing upon the land: so if he lets his corn

corn lie in the field, beyond the usual time, the other commoners may, notwithstanding, put in their beasts. 2 Leon. 202, 203. The commoner cannot use common except with his own proper cattle; but if he hath not cattle to manure the land, he may common other cattle to manure it, and use the common with them; for, by the loan, they are in a manner made his own cattle. 1 Danv. 798. A commoner may diltrain beasts put into the common by a stranger, or every commoner may bring action of the case, where damage is received. 9 Rep. 11. But one commoner cannot diltrain the cattle of another commoner, though he may those of a stranger, who hath no right to the common. 2 Lutw. 1238. See SURCHARGE of Common, and DISTURBANCE of Common.

Upon agreement between two commoners to inclose a common, a party having interest, not privy to the agreement, will not be bound; but one or two wilful persons shall not hinder the public good. Chan. Rep. 48. Commons must be driven yearly at Michaelmas, or within 15 days after; infected heifers and stone-horses under five, &c. are not to be put into commons. Under forfeiture, by Stat. 32 Hen. VIII. c. 13. New erected cottages, though they have four acres of ground laid to them, ought not to have common in the waste. 2 Inst. 740. In law-proceedings, where there are two distinct commons, the two titles must be shewn: cattle are to be alleged commonable; and common ought to be in lands commonable; and the place is to be set forth where the messuage and lands lie, &c. to which the common belongs. 1 Nels. 462, 463. By Stat. 13 Geo. III. c. 81. in every parish where there are "common field-lands," all the arable lands lying in such fields shall be cultivated by the occupiers, under such rules as three-fourths of them in number and value (with the consent of the land and tithe-owners) shall appoint, by writing under their hands; the expense to be borne proportionably, under the management of a field-master, or field-reeve, to be appointed annually in

May. For other particulars, see Jacob's Law Dict. by Tomlins.

COMMON, in *Geometry*, is applied to an angle, line or the like, which belongs equally to two figures, or makes a necessary part of both.

COMMON, in *Grammar*, denotes the gender of nouns which is equally applicable to both sexes, male and female.

Such is that of *patrens*, parent; which is either masculine, or feminine, as it is used to signify either father, or mother.

The Latin grammarians, besides this, which they call the common of two, also make a common of three; which extends to masculine, feminine, and neuter.

COMMON, *Communis*, in *Ancient Music*, was an appellation given to the seventh species of the diapason. See DIAPASON.

COMMON Bail. See BAIL.

COMMON Barretor. See BARATRY.

COMMON Bench. The court of Common Pleas was anciently called *Common Bench*, because the pleas of controversies between common persons were there tried and determined.

In law books and references, the court of Common Pleas is written C. B. from *communi banco*, or C. P.: and the justices of that court are styled *justiciarii de banco*. See COURT and Common PLEAS.

COMMON Centre of Gravity, in *Mechanics*. See CENTRE of Gravity.

COMMON Chord, in *Music*, is sometimes used to denote the third, fifth, and octave of any note, considered as a bass. It will afford some light into the composition of chords, to exhibit all the possible variations in the order or arrangement of the concord, major *third* (111), minor *third* (3d), and minor *fourth* (4th), constituting the common chord in the following manner, *viz.*

1		the common chord.
2		the common chord minor.
3		the chord of sixth, or 3 rd .
4		the chord of b ⁶ _b or b ⁶ _{b3} .
5		the chord of 6 th .
6		the chord of 4 th . b ₆

By a comparison of the several chords in the first arrangement above, it will appear, that when the four notes, C, E, G, and C, constituting the common chord, are sounded together, all of the seven concords, *viz.* 3^d, III, 4th, V,

V, 6th, VI and VIII are in reality heard between the different notes, except the VI: and this circumstance, combined with the III being above the bass or lowest note, seem essential to a full or common chord. In the second arrangement, or C, b E, G and C, it will be perceived, that all the concords are heard except the 6th; and this, combined with the third above the bass note, constitutes the common chord of the minor mode. In the third arrangement, it will be seen, that there is no V produced, while a III occupies the place immediately above the bass note, being the chord of sixth. The fourth arrangement will also be found without a V, but with the 3d next the bass, constituting the chord $b\overset{6}{b}$. The fifth arrangement will be found without a 6th, and with no third (but a 4th), next to the bass, and this constitutes the chord $\overset{6}{4}$. And lastly, the sixth arrangement will be found without a VI, or a third above the bass, which constitutes the chord $b\overset{6}{4}$.

In performances by voices and perfect instruments, as violins, violincellos, &c. these several chords will be all heard *perfectly*; and in each of the six cases, a union or blending of the six concords, almost similar to a single sound, will be perceived, but much more delightful to the ear; the characteristic differences of which constitute the character of the common chord and its five inversions, as above. But upon the common keyed instruments, such as organs, pianofortes, harpsichords, &c. which contain but twelve sounds within the octave, it is impossible that these single or compound chords can all be heard perfect, but the greater part of the whole of them must be tempered or slightly altered from the true chord (see TEMPERAMENT). If, for instance, the III C E above, were sharpened seven semisimas, or 7σ , which is very nearly the case in *Equal Temperament* (which see), the 3d E G flattened 5σ , and the 4th G C sharpened 2σ ; the common chord, or first arrangement upon such an instrument, would produce the following tempered concords, viz. 3d— 8σ , III+ 7σ , 4+ 2σ , V— 5σ , and 6th— 7σ . combined with VIII; which chords, combined and blended, impress upon the ear the peculiar sensation of the common chord in this temperament. In the second arrangement, or common chord minor, the effect produced will depend upon the union of the following tempered chords, viz. 3d— 8σ , III+ 7σ , 4th+ 2σ , V— 5σ , VI+ 8σ and VIII. A common chord C E G C, upon an instrument tuned according to earl Stanhope's temperament, (see Phil.osophical Magazine, vol. xxviii. p.141) will be found to consist of the following perfect chords, viz. 3d, III, 4th, V, 6th, and VIII; whence his lordship denominates his key of C major to be perfect (see STANHOPE TEMPERAMENT); but if we consider the second arrangement, or common chord of C minor, upon one of his lordship's instruments, we shall find 3d— $10\frac{1}{2}\sigma$, III+ $10\frac{1}{2}\sigma$, 4th, V, VI+ $10\frac{1}{2}\sigma$, and VIII to constitute this chord, nearly, the very small interval *minute* (*m*) only, being in any case omitted. Thus it will be easy to compare the effect of any inversions of the common chord, in this, or any other temperament of the scale which may be proposed.

COMMON Clerk. See TOWN Clerk.

COMMON Crier. See CRIER.

COMMON Council. See Mayor's COURTS.

COMMON Day. i. plea of land, signifies an ordinary day in court, as *actibus Hilarii, quindena Pasche*, &c. It is mentioned in 13 Rich. II. stat. 1. cap. 17. and in the statute

51 Hen III. concerning general days in bank. *Blount and Coxe*.

COMMON, *Disturbance of*. See DISTURBANCE of Common.

COMMON Duct, in Anatomy. See DUCTUS Communis.

COMMON, *Estate in*. See ESTATE.

COMMON of Flowers. See BEETWEERS.

COMMON Field-land. See COMMON *supra*.

COMMON Fine, in Law, a certain sum of money, which the tenants within the liberty of some leets pay to the lord thereof; called in some places, *head-silver*; in others, *certmoney*, or *certum leze*, and *head-pence*.

It was first granted to the lord towards the charge of his purchase of the court-leet; whereby the tenants have now the convenience of doing their suit within their own manors, without being compelled to go to the sheriff's turn.

COMMON in Grofs. See COMMON *supra*.

COMMON Hunt, the chief huntsman belonging to the lord mayor and aldermen of London.

COMMON Informer. See INFORMER.

COMMON Intendment, in Law, the common understanding, meaning, or construction of any thing: without straining it to any foreign, remote, or particular sense: and *Bar to Common Intendment*, is an ordinary, or general bar, which is commonly an answer to the declaration of the plaintiff. See BAR and INTENDMENT.

COMMON Jury. See JURY.

COMMON Law, that body of rules generally received, and held as law in this nation, in contradistinction to the statute, or written law, and including not only general customs, or the common law properly so called; but also the particular customs of certain parts of the kingdom, and likewise those particular laws, that are by custom observed only in certain courts and jurisdictions.

The common law is grounded upon the general customs of the realm, and comprehends the law of nature, the law of God, and the principles and maxims of the law: it is founded upon reason, and it is said to be the perfection of reason, acquired by long study, observation, and experience, and refined by learned men in all ages. It is justly regarded as the common birth-right, which the subject has for the self-guard and defence, not only of his goods, lands, and revenues, but of his wife and children, body, fame, and even life. Co. Litt. 97. 142. *Treatise of Laws*, p. 2. According to Hale, the common law of England is the common rule for administering justice within this kingdom, and asserts the king's royal prerogatives, and likewise the rights and liberties of the subject. It is, in general, that law by which the determinations in the king's "Ordinary courts" are guided; and this directs the course of descents of lands; the nature, extent, and qualifications of estates, together with the manner and ceremonies of conveying them from one to another; the forms, solemnities, and obligations of contracts; the rules and directions for the exposition of deeds, and acts of parliament; the process, proceedings, judgments, and executions of our courts of justice; also the limits and bounds of courts, and jurisdictions; the several kinds of temporal offices and punishments, and their application, &c. *Hale's Hist. of the Common Law*, p. 24—44, 45.

As to the origin of the common law, which, adopting the expression of lord chief-justice Hale, is as undiscoverable as the head of the Nile; our ancient lawyers, and particularly Fortescue, warmly insist, that the customs, which constitute our common law, are as old as the primitive Britons, and that they have been continued down, through

the several mutations of government and inhabitants, to the present time, unchanged and unadulterated. This, says judge Blackstone, may be the case as to some; but, in general, as Mr. Selden observes, this assertion must be understood with many grains of allowance; and ought only to signify, as the truth seems to be, that there never was any formal exchange of one system of laws for another; though, doubtless, by the intermixture of adventitious nations, the Romans, the Picts, the Saxons, the Danes, and the Normans, they must have insensibly introduced and incorporated many of their own customs with those that were before established; thereby in all probability improving the texture and wisdom of the whole, by the accumulated wisdom of divers particular countries. Accordingly, lord Bacon observes, that our laws are as mixed as our language; and, as our language is so much the richer, the laws are the more complete. And, indeed, our antiquaries and early historians do all positively assure us, that our body of laws is of this compounded nature.

After the decay of the Roman empire, it has been said, Britain became invaded by three kinds of German people, *viz.* the Saxons, Angles, and Jutes. From the Jutes descended the men of Kent, and those of the Isle of Wight; from the Saxons came the people called the East, South, and West Saxons; and from the Angles came the East Angles, Mercians, and Northumbrians.

Now, as each people had its peculiar customs, so each inclined to different laws; whereof, those of the West Saxons and Mercians, who inhabited the midland counties, were, upon the dissolution of the heptarchy, and establishment of a monarchy, preferred to the rest, and acquired the common appellation of *Jus Anglorum*. Their particular names were *West Saxon-lage*, and *Mercen-lage*.

The first Saxon laws published in England were those of king Ethelbert, in the sixth century. Three hundred years after, king Alfred, whom our historians call *magnus juris Anglicani conditor*, having united the heptarchy, and rendered himself master of the whole nation, made a collection from among the numerous laws and customs of the several provinces of his domains, which were grown so various; and commanded them to be observed throughout his kingdom. This collection was denominated *folk-right*, and soon after the *common law*; as being *common* to the whole nation.

This was written in Alfred's *dome-book*, or *liber judicialis*, which was designed for the general use of the whole kingdom.

This book is said to have been extant in the reign of king Edward IV.; but has since been unfortunately lost. It contained, as we may reasonably imagine, the principal maxims of the common law, the penalties for misdemeanors, and the forms of judicial proceedings.

By these laws the nation was governed for a considerable time, till, being at length subdued by the Danes, the customs of those people were introduced, and incorporated with the rest. Hence the code of Alfred in many provinces fell into disuse, or, at least, was mixed and debased with other laws of a coarser alloy: and thus a new form of *common law* arose, called *Dane-lage*.

The three systems of law above recited, *viz.* the *Dane-lage*, principally maintained in several of the midland counties and also on the eastern coast; the *West Saxon-lage*, which was much the same with the code compiled by Alfred, and which obtained in the counties to the south and west of the island, from Kent to Devonshire, being the municipal law

of the far most considerable part of Alfred's dominions, and particularly of Berkshire, the seat of his peculiar residence; and the *Mercen-lage*, observed in many of the midland counties, and those bordering on the principality of Wales, the retreat of the ancient Britons, and therefore probably intermixed with the British or Druidical customs; were in use about the beginning of the eleventh century. The northern provinces were at this time under a distinct government. In process of time king Edgar began what his grandson Edward the Confessor, on this account called *legum Anglicanarum restitutor*, completed; *viz.* to form one digest or body of laws to be observed throughout the whole kingdom. This seems to have been only a new edition, or fresh promulgation of Alfred's *dome-book*, with such additions and improvements as the experience of a century and a half had suggested.

The Danes being afterwards, in their turn, overcome by the Normans; the Conqueror, on a review of the several laws and customs that then obtained, abrogated some, and abolished others; adding some of his own country laws.

His son, William Rufus, broke through the ancient laws and customs which his father had established; but his next son, Henry I. excluded the civil customs which his brother had introduced, and restored the laws of Edward the Confessor, with those amendments made by his father, under the advice of his barons. These were afterwards confirmed in succeeding reigns.

Hence is derived that system of maxims and unwritten customs, now known by the name of the *common law*, which is of Saxon parentage; though the customs and maxims themselves are of higher antiquity than memory or history reach; many of them being as old as the primitive Britons. The name of common law was given to it, either in contradistinction to other laws, as the *statute-law*, the *civil law*, the *law merchant*, and the like; or, more probably, as a law common to all the realm, the *jus commune* or *folk-right* mentioned by king Edward the Elder, after the abolition of several provincial customs and particular laws.

The *common law* of England is, properly, the common customs of this kingdom; which, by length of time, have obtained the force of laws.

The goodness of a custom depends upon its having been used time out of mind; or, in the solemnity of our legal phrase, time whereof the memory of man runneth not to the contrary. This gives it its weight and authority; and of this nature are the maxims and customs which compose the common law, or *lex non scripta*, of this kingdom. This unwritten, or common law, is properly distinguished into three kinds; 1. General customs, which are the universal rule of the whole kingdom, and form the common law, in its stricter and more usual signification. 2. Particular customs, which for the most part affect only the inhabitants of particular districts. 3. Certain particular laws; which by custom are adopted and used, by some particular courts, of pretty general and extensive jurisdiction. See *CUSTOM*.

Some have divided the common law into two principal grounds or foundations; *viz.* 1. Established customs; such as that, where there are three brothers, the eldest brother shall be heir to the second, in exclusion of the youngest; and, 2. Established rules and maxims; as, that the king can do no wrong; that no man shall be bound to accuse himself; and the like. But judge Blackstone observes, that these are one and the same thing. For the authority of these maxims rests entirely upon general reception and usage; and the only method of proving,

proving, that this or that maxim is a rule of the common law, is by shewing that it hath been always the custom to observe it. See CUSTOM.

It is called *lex non scripta*, the *unwritten law*: not but that we have most of it written in the old Norman dialect, and the monuments and evidences of our legal customs are contained in the records of the several courts of justice, in books of reports and judicial decisions, and in the treatises of learned sages of the profession, preserved and transmitted from times of the highest antiquity; but because it does not appear to be made by charter, or parliament; for those are always matters of record. Its original institution and authority are not set down in writing, but it receives its binding power and the force of law, by long and immemorial usage, and by universal reception through the kingdom. See AUTHORITIES and REPORTS.

Beside the *common law* of England in general, there are in divers parts of the nation particular customs, and common usages, which have the force of *common law* among those people, who have retained them: such as the Borough-English, Gavel-kind, &c.—Where the *common law* is silent, there the STATUTE-law speaks. See STATUTE.

All trials at *common law* are by a jury of twelve men.

Among the ancient and most eminent writers on common law we may select and enumerate the following. Britton wrote his learned book of the common law of this realm by the king's command, and it runs in his name, corresponding to the institutions of the civil law, which Justinian assumes to himself, though composed by others under his direction. This Britton is mentioned by Gwin to have been bishop of Hereford. Bracton, a great lawyer in the time of Henry III., wrote a very learned treatise of the common law of England, held in great estimation; and he was said to be lord chief-justice of the kingdom. The famous and learned Glanvil, lord chief-justice in the reign of Henry II., wrote a book of the common law, which is said to be the most ancient composition extant on that subject. Besides these, in the time of Edward IV. the renowned lawyer Littleton wrote his excellent book of "English Tenures." In the reign of king James I., the great oracle of the law, sir Edward Coke published his learned and laborious "Institutes" of our law, and commentary on Littleton. About the same time likewise Dr. Cowell, a civilian, wrote a short institute of our laws. In the reign of king George I., Dr. The Wood, a civilian and common lawyer, and at last a divine, wrote an institute of the laws of England, somewhat after the manner of the Institutes of the civil law. And to mention no others, the late learned judge Blackstone, in the reign of George III., published his "Commentaries" on the laws of England, the best analytic and most methodical system of our laws, which was ever published; and equally adapted for the use of students, and of those gentlemen who wish to acquire that knowledge of our laws, which is, in fact, essentially necessary for every one. See biographical articles BRITTON. BRACTON, &c. &c.

Common measure divisor, in *Arithmetic*, a number that exactly measures two other numbers, without a remainder. And the greatest number that can measure any two other numbers, is called their greatest common measure; thus 4 is the greatest common measure of 8 and 12.

To find the greatest common measure of two numbers; divide the greater by the less, and if there be no remainder, the less number is the measure required. If there be a remainder, divide the last divisor by it, and thus proceed, till there be no remainder left, and the last divisor is the greatest common measure.

E. G. To find the greatest common measure of 816 and 1488.

$$\begin{array}{r}
 816)1488(1 \\
 \underline{816} \\
 672)816(1 \\
 \underline{672} \\
 144)672(4 \\
 \underline{576} \\
 96)144(1 \\
 \underline{96} \\
 \text{Common measure} = 96
 \end{array}$$

For algebraic quantities, the remainders are to be divided by their simple divisors, and the quotients will be the quantities required.

E. G. Let the quantities be $a^2 + 2ab + b^2$ and $a^2 + 2a^2b + 2b^3$.

Divide the latter of these by the former in the following manner:

$$\frac{a^2 + 2a^2b + 2b^3}{a^2 + 2ab + b^2}$$

The remainder is $-ab^2 + b^3$, which being divided by b^2 , its greatest simple divisor, given $a + b$; and by this divide $a^2 + 2ab + b^2$, and the quotient will be $a + b$, exactly, which is the common measure required. And if fractions are divided by their greatest common measure, they will thus be reduced to their lowest terms.

E. G. Let the fraction be $\frac{816}{1488}$: then divide the numerator and denominator by 48, the greatest common measure, and the fraction will be reduced to $\frac{17}{31}$, its lowest terms.

Let the algebraic fraction be $\frac{a^2 + 2a^2b + 2b^3}{a^2 + 2ab + b^2}$; then, dividing the numerator and denominator by $a + b$ the greatest common measure; and it will be reduced to $\frac{a + b}{a^2 + ab + b^2}$, its lowest terms.

These operations are founded on this principle, *viz.* that whatever quantity measures the whole and one part of another, must also measure the remaining part. For that quantity (whatever it is) which measures both the divisor and dividend, must evidently measure $a^2 + 2ab + b^2$, being a multiple of the former; whence, by the above-cited principle, the same quantity, as it increases the whole dividend, must also measure the remaining part of it, $a^2b + b^3$: but the divisor, which we are seeking, being a compound one, we may call off the simple divisor b^2 , as not answering our purpose; whence $a + b$ appears to be the only compound divisor which the case admits of; and this must be the common measure required, if the proposed example admits of any such.

COMMON, *Mouth, Motion, Nuisance, and Object.* See the SUBSTANTIVES.

COMMON OF PASTURE. See PASTURE and COMMON.

COMMON OF PISCARY. See PISCARY.

COMMON PLACE BOOK, *Adversaria*, among the learned, denotes a register, or orderly collection of things which occur worthy to be noted, and retained in the course of a man's

man's reading, or study; so disposed, as that among a multiplicity of subjects, any one may be easily found.

Common place-books are of great service: they are a kind of promptuaries or storehouses, wherein to reposit the most valuable parts of authors, to be ready at hand when wanted. Several persons have their several methods of ordering them: but that which comes best recommended, is the method of that great master of order Mr. Locke. He has thought fit to publish it in a letter to M. Toifnard; determined thereto, by the great conveniency and advantage he had found from it in twenty years experience; as well as by the recommendations and intreaties of many of his friends, who had likewise proved it.

The substance of this method we shall here give the reader; whereby he will be easily enabled to execute it himself.

The first page of the book you intend to take down the common places in, is to serve as a kind of index to the whole; and to contain references to every place, or matter there-

in: in the commodious contrivance of which index, so that it may admit of a sufficient copia, or variety of materials, without any confusion, the whole secret of the method consists.

In order to this the first page, as already mentioned, or for more room, the two first pages that front each other, are to be divided by parallel lines, into twenty-five equal parts; whereof every fifth line is to be distinguished, by its colour, or some other circumstance. These lines are to be cut perpendicularly by others, drawn from top to bottom; and in the several spaces thereof the several letters of the alphabet, both capital and minuscule, are to be duly written. The form of the lines and divisions, both horizontal and perpendicular, with the manner of writing the letters therein, will be conceived from the following specimen; wherein what is to be done in the book for all the letters of the alphabet, is here shewn in the first four, A, B, C, and D.

A	a	C	c
	e		e
	i		i
	o		o
	u		u
B	b	D	d
	e		e
	i		i
	o		o
	u		u

The index of the common-place book being thus formed, matters are ready for the insertion of any thing in it. In order to this, consider to what head, the thing you would enter is most naturally referred; in this head, or word, regard is had to the initial letter, and the first vowel that follows it; which are the characteristic letters on which the whole use of the index depends.

Suppose, *e. gr.* I would enter down a passage that refers to the head *beauty*; B, I consider, is the initial letter, and *e* the first vowel; then looking upon the index for the partition B, and therein the line *e* (which is the place for all words whose first letter is B, and first vowel *e*; as *Beauty, Beneficence, Bread, Bleeding, Blemishes, &c.*), and finding no numbers down already direct me to any page of the book where words of this characteristic have been entered, I turn forward to the first blank page I find, which in a fresh book, as this is supposed to be, will be page 2, and here I now write what I have occasion for on the head *beauty*; beginning the head in the margin, and indenting all the other subservient lines, that the head may stand out, and shew itself; this done, I enter the page where it is written. *viz.* 2, in the index, in the space B *e*, from which time, the class B *e* becomes wholly in the possession of the 2d and 3d pages, which are consigned to letters of this characteristic.

Had I found any page or number already entered in the space B *e*, I must have turned to the page, and have written my matter in what room was left therein: so, if after entering the passage on beauty, I should have occasion for *benevolence*, or the like, finding the number 2 already possessed of the space of this characteristic, I begin the passage on benevolence in the remainder of the page; which not containing the whole, I carry it on to page 3, which is also for B *e*, and add the number 3 in the index. When

the two pages destined for one class are full, look forward for the next backside that is blank; if it be that which immediately follows, write at the bottom of the margin of the page filed, the letter *v* for *verte*, turn over; and the same at the top of the next page: and continue from this new page as before. If the pages immediately following be already filled with other classes, then write at the bottom of the page last filled, the letter *v*, with the number of the next blank page; and at the top of that page, the number of the page last filled; then entering that head in this new page, proceed as before. By these two numbers of reference, the one at the top, and the other at the bottom of the page, the discontinued matters are again connected. It may not be amiss, every time you put a number at the bottom of a page, to put it likewise in the index. Now, if the head be a monosyllable beginning with a vowel, the vowel is at the same time both the initial letter, and the characteristic vowel: thus the word *art* is to be wrote in A *a*. Mr. Locke omits three letters of the alphabet in his index, *viz.* K, Y, and W; which are supplied by C, I, U, equivalent to them: and as for Q, since it is always followed by an *u*, he puts it in the fifth place of Z; and so has no Z *u*, which is a characteristic that very rarely occurs. By thus making Q the last in the index, its regularity is preserved, without diminishing its extent. Others choose to retain the class Z *u*, and assign a place for Q *u* below the index.

If any imagine, that those hundred classes are not sufficient to comprehend all kinds of subjects without confusion, he may follow the same method, and yet augment the number to five hundred, by taking in one more characteristic to them.

But the inventor assures us, that in all his collections, for a long series of years, he never found any deficiency in the index

index as above laid down. Other contrivances for commonplace books have been proposed; but they are such as will naturally occur to persons conversant with the subject, and accustomed to orderly arrangement: and it is, therefore, needless to extend this article.

COMMON PLEAS, in Rhetoric. See ARGUMENTS and TOPICS.

COMMON PLEAS. See COURT of Common Pleas.

COMMON PRAYER, is the liturgy of the church of England. Clergymen are obliged to use this liturgy in the service of the church; and refusing to do so, or using any other public prayers, is punishable by 1 Eliz. cap. 2. and every incumbent residing on his living and keeping a curate, is obliged, once every month at least, to read the common prayer in his parish church, in his own person, under a forfeiture of 5*l.* for every failure, by the act of uniformity, 13 and 14 Car. II. cap. 4.; and by the same stat. every church is to be provided with a book of common prayer, under the penalty of 3*l.* a month, and the common prayer is to be read before every lecture. Every minister who speaks any thing in derogation of this book shall, if not beneficed, be imprisoned one year for the first offence, and for life for the second; and, if he be beneficed, he is liable to six months imprisonment, and the forfeiture of a year's value of his benefice; for the second offence to deprivation and one year's imprisonment; and for the third offence to deprivation and imprisonment for life: and any person convicted of reviling it in plays, songs, or other open words, or of forcibly preventing its being read, or of causing any other service to be read in its stead, shall forfeit for the first offence an hundred marks; four hundred for the second; and for the third offence all his goods and chattels, and suffer imprisonment for life. Stat. 1 Eliz. cap. 2. See LITURGY.

COMMON RECEPTACLE. See RECEPTACULUM.

COMMON RECOVERY. See RECOVERY.

COMMON, Right of. See COMMON.

COMMON SCOLD. See SCOLD.

COMMON SEAL. See SEAL.

COMMON SENSE. See SENSE.

COMMON SENSORY. See SENSORY.

COMMON SERJEANT. See SERJEANT.

COMMON, Surcharge of. See SURCHARGE.

COMMON, Tenants in. See TENANT.

COMMON TIME. See TIME.

COMMON VOUCHER. See VOUCHER.

COMMON Ways. See Way.

COMMON Weal denotes "bonum publicum," or the public good, and is much favoured in our laws; and therefore many things are legally tolerated, with a view to the public good, which otherwise might not be done. Hence it is that monopolies are void in law, and that bonds and covenants to restrain free trade, tillage, and the like, are adjudged void. 11 Co. Rep. 50. Plowd. 25. Shep. Epit. 270.

COMMON Year. See YEAR.

COMMONABLE LANDS, in Agriculture, are such lands as are generally in some measure arable, and which belong, in property, to individuals who are known, and the limits of whose property are ascertained: but which, in regard to their culture and mode of cropping, are subject to certain regulations, which custom, for time immemorial, has established, so as gradually to have acquired the force of law, to which rules every individual occupying such property must adhere, until these old customs shall be abrogated, either by the unanimous consent of all the individuals having a right to such commonable lands, or by an express statute, obtained with their consent, for the purpose of annulling them.

In some countries, Dr. Anderson says, it appears that not much less than one half of the whole arable lands are in this state; although it is evident, by the concurring testimony of all the agricultural reports, that taking all these lands at an average, they do not afford half the produce the same lands would do, if they were put under the ordinary management that appropriated farmers are subjected to in their respective districts: and not perhaps one tenth part of what they might easily be made to afford, within a very short period of time, should all other obstructions to improvement be removed. It would be tiresome, he says, to enumerate all the facts that occur in the different agricultural surveys, tending to point out the pernicious tendency of this mode of tenure: but a few of them may be mentioned. In one place it is stated, that a few inclosures had been made, seemingly with the concurrence of all the parties concerned; but when the hedges had advanced nearly to become a fence, one of the commonable tenants went deliberately and pulled them up by the roots, and eradicated them entirely. In another case the parishioners having come to an agreement to sow clover, after that practice had been universally acquiesced in for the space of eighteen years, one of the farmers, occupying sixteen acres of land, bought a large flock of lean sheep in the month of May, and turned them on the clover crops, which were nearly in bloom, and no one could hinder him. In another case, where custom had established the practice of having one corn crop, and one fallow, alternately, the occupiers of the district came to an agreement to have two crops and a fallow alternately; but before the expiration of ten years, one of the farmers broke through the agreement, and turned his cattle upon the crops of beans, oats, and barley: in which plan he was followed by the rest of his neighbours; and the crops were, in consequence, totally destroyed on that part of the field, which, agreeable to the ancient custom, should have been that year in fallow. These notices, while they tend to illustrate the nature of this particular kind of tenure, at the same time, he says, clearly demonstrate its pernicious tendency to the public. No one, who has considered the subject for a moment, but will readily admit, that it were much for the interest of Britain that no such practice existed in it: and that, of course, no time should be lost in endeavouring to eradicate it; for, were this effectually done, it must appear evident from the facts stated, that the total produce of the kingdom would be greatly augmented and improved. See COMMON.

COMMONALTY, comprehends one distinction of the civil state; the nobility being the other; and like the nobility, includes several degrees of rank and condition. In Art. super Chartas, 28 Ed. 1. c. 1, the words "Tout le commune de l'Engleterre," signify all the people of England. 2 Inst. 539. But the term is generally used for the middle rank of the king's subjects, such of the commons as are raised above the ordinary sort, and having the management of offices, are by that means one degree below burgesses, who are superior to them in order and authority:—and companies incorporated are said to consist of masters, wardens, and commonalty, the first two being the chief, and the others such as are usually called the livery. The ordinary people, and freeholders, or at best knights and gentlemen, under the degree of baron, have been, of late years, called "communitas regni;" or "tota terræ communitas;" yet anciently, if we credit Brady, the barons and tenants in capite, or military men, were the community of the kingdom, and those only were reputed as such in our most ancient histories and records. Brady's Gloss. to his Introd. to Eng. Hist.

COMMONE, in Ancient Geography, the name of an island

in the Mediterranean, placed by Pliny on the coast of Ionia.

COMMONER, is used for a student in some universities, entered in a particular rank.

The word is also applied to a member of the house of commons, in contradistinction to a peer.

COMMONI, in *Ancient Geography*, a denomination given by Ptolemy to a people of Galia Narbonensis, who inhabited the country, including the town of Taurocentium, the promontory of Citharistes, the town of Olbia, that of Forum Julii, &c.

COMMONS, in a general sense, consist of all such men of property in the kingdom, as have not seats in the house of lords; every one of whom has a voice in parliament, either personally, or by his representatives. In a free state, says judge Blackstone, every man, who is supposed a free agent, ought to be in some measure his own governor; and, therefore, a branch at least of the legislative power should reside in the whole body of the people. And this power, when the territories of the state are small, and its citizens easily known, should be exercised by the people in their aggregate or collective capacity; as was wisely ordained in the petty republics of Greece, and the first rudiments of the Roman state. But this will be highly inconvenient, when the public territory is extended to any considerable degree, and the number of citizens is increased. Thus when, after the Social war, all the burghers of Italy were admitted free citizens of Rome, and each had a vote in the public assemblies, it became impossible to distinguish the spurious from the real voter, and from that time all elections and popular deliberations grew tumultuous and disorderly; which paved the way for Marius and Sylla, Pompey and Cæsar, to trample on the liberties of their country, and at last to dissolve the commonwealth. In so large a state as ours, it is therefore wisely contrived, that the people should do that by their representatives, which it is impracticable to perform in person; representatives chosen by a number of minute and separate districts, wherein all the voters are, or easily may be, distinguished.

COMMONS, in parliament, are the lower house, consisting of knights elected by the counties, and of citizens and burghesses by the cities and borough-towns. See BOROUGH, BURGESS, and KNIGHT.

In these elections, anciently, all the people had votes; but in the 8th and 10th of king Henry VI. for avoiding tumults, laws were enacted, that none should vote for knights but such as were freeholders, did reside in the county, and had forty shillings yearly revenue; equivalent to near 20*l.* a year of our present money: the persons elected for counties to be *militæ notabiles*, at least esquires, or gentlemen fit for knighthood; native Englishmen, at least naturalized; and twenty-one years of age: no judge, sheriff, or ecclesiastical person, to sit in the house for county, city, or borough.

The *house of commons*, in Fortescue's time, who wrote during the reign of Henry VI. consisted of upwards of 300 members: in Sir Edward Coke's time their number amounted to 493. At the time of the union with Scotland, in 1707, there were 513 members for England and Wales, to which 45 representatives for Scotland were added; so that the whole number of members amounted to 558.

In consequence of the union with Ireland, in 1801, 100 members were added for that country; and the whole house of commons now consists of 658 members; viz. 80 knights for 40 counties in England; 50 citizens for 25 cities (Ely sending none, and London four); 334 burghesses for 167 boroughs, and 5 burghesses for 5 boroughs, viz. Abingdon, Banbury, Bewdley, Higham Ferrers, and Monmouth; 4

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burghesses for the two universities of Oxford and Cambridge; 16 barons for the 8 cinque-ports, viz. Hastings, Dover, Sandwich, Romney, Hythe, and their three branches, Rye, Winchelsea, and Seaford; 12 knights for 12 counties in Wales; 12 burghesses for 12 boroughs in that country; 30 knights for the shires of Scotland, and 15 burghesses for its boroughs; 64 knights and 36 burghesses for Ireland. For an account of the privileges of members of the house of commons, and other particulars, see PARLIAMENT.

COMMONS is also used in opposition to *nobles* or *peers*, viz. for all sorts of persons under the degree of a baron; including the orders of knights, esquires, gentlemen, the sons of the nobility, and yeomen. See each under its proper article, ESQUIRE, GENTLEMAN, YEOMAN, &c.

COMMONS, *Doctors*. See COLLEGE of *Civilians*.

COMMONS, *Proctor of the*. See PROCTOR.

COMMONS is also used for the stated and ordinary diet or eating, of a college, inn of court, or other society. See INN, &c.

COMMONWEALTH. See REPUBLIC.

COMMONWEALTH of *England*, in *History*, a form of government introduced after the dissolution of the monarchy by the death of Charles I., in 1649. The change of government seems to have been suggested in the preceding year by a council of officers, who took into consideration a scheme called "The Agreement of the People;" being the plan of a republic to be substituted in the place of that government which they were demolishing; but the commonwealth was not established till after the tragical event of the king's death. Soon after this event, the house of commons published an act to forbid the proclamation of Charles Stewart, eldest son of the late king, or any other person, on pain of high treason. On the same day the lords desired a conference with the commons about settling the government and the administration of justice, the commissions of the judges having been determined by the king's death. The commons, without answering the message, voted the house of lords to be useless and dangerous, and therefore to be abolished. They only left the lords the privilege of being elected members of parliament, in common with other subjects. Thus, the parliament, which at first was composed of the king, 120 lords, and 513 commons, was reduced to a house of commons, consisting of about 80 members, few of whom at the beginning had 500*l.* yearly income. Nevertheless, these few and inconsiderable members assumed the name of a parliament, and acted as if their body had been invested with the authority, which had before resided in the king, lords, and commons. But they were previously disposed and prepared for the business which they undertook to execute, and they were aided and supported by an army of near 50,000 men, formidable from its discipline and courage, as well as its number, and actuated by a spirit that rendered it dangerous to the assembly, which had assumed the command over it. It must be confessed, however, that in this parliament there were some men of distinguished capacity and integrity, and that if they adopted erroneous principles, or pursued those that were just and reasonable to an unwarrantable extent, they were destitute neither of talents nor of influence to defend and support them. The sovereign authority, as they maintained, resided originally in the people, by whom a part of it was committed to the kings, chosen to govern them according to law; and they alleged, that the king's abuse of this trust had broken the original contract between king and people, and that, in consequence of this violation, the contract subsisted no longer, but the sovereign power reverted to the people, as to its original source. Considering themselves as the representatives of the people, they conceived that they

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had a right to change the form of the government, without any regard to the original contract annulled by the king in his violation of the laws. Upon these principles, the commons, assuming the name of parliament, voted, and afterwards enacted, that the kingly office should be abolished as unnecessary, burdensome, and dangerous, and that the state should be governed by the representatives of the people in a house of commons without king or lords, and under the form of a commonwealth. The former oaths of allegiance and supremacy were abolished, and a new oath was prepared, called "The Engagement," by which every man swore, that he would be true and faithful to the government established, without king or peers. Justice was no longer to be administered in the king's name, but the name, style, and title of the writs were to be, "custodes libertatis Angliæ, autoritate parliamenti;" a new great seal was to be made; new money to be coined; and, in a word, every thing was to be let aside and abolished, that bore any marks of royalty. A great seal was therefore made, on one side of which was seen the parliament sitting, with this inscription: "the great seal of the parliament of the commonwealth of England;" and on the other side, the arms of England and Ireland, with these words, "the first year of freedom by God's blessing restored." This seal was committed to a certain number of persons, who were styled "keepers of the liberties of England." And it was ordained, that, for the future, all public orders should be dispatched in the name of these keepers, under the direction of the parliament. The parliament also made choice of 39 persons to form a council of state for the administration of public affairs under the parliament; to this council all addresses were made; they gave orders to all generals and admirals, executed the laws, and digested all business before it was brought into parliament. They professed to employ themselves entirely in adjusting the laws, forms, and plan of a new representation; and as soon as they should have settled the nation, they avowed their intention of restoring the power to the people, from whom, they acknowledged, they had wholly derived it. The parliament also erected a high court of justice, consisting of 60 members, to try some persons of distinction, who were in their power. The commonwealth, thus formed and established, found England composed into a seeming tranquillity by the terror of its arms. Foreign powers, occupied in wars among themselves, had no leisure nor inclination to interpose in the domestic dissensions of this island. The young king, poor and neglected, living sometimes in Holland, sometimes in France, sometimes in Jersey, indulged the hope, among his present distresses, of better fortune at some future period. The situation alone of Scotland and Ireland occasioned any immediate inquietude to the new republic. As to the Scots, they were allowed for the present to take their own measures in settling their government; but Ireland demanded more immediately their efforts for subduing it. Cromwell, having obtained the appointment of lieutenant in that country by his interest in the council of state, lost no time in passing thither; and he proceeded with such uninterrupted success, that in the space of nine months he had almost entirely subdued it. Afterwards, leaving the command of Ireland to Ireton, who governed that kingdom in the character of deputy, he hastened home, and was declared captain-general of all the forces in England. Having received this honourable appointment, he immediately marched his forces and entered Scotland; where Charles, who had been invited thither, was making considerable progress, with an army of 16,000 men. Cromwell having gained a decisive victory over the Scots in the battle of Dunbar, and having taken possession of Edin-

burgh and Leith, followed the young prince in his march into England, and falling in with an army of about 30,000 men in the city of Worcester, he either killed or took prisoners the whole Scottish army, and obliged the king to fly; and at length to make his escape from Shoreham in Sussex, to Fescamp in Normandy. The ruling members of the commonwealth were destitute of those comprehensive views which might qualify them for acting the part of legislators. They made slow progress in the work to which they professed themselves devoted, that of settling a new model of representation and fixing a plan of government. The nation therefore began to apprehend, that they intended to establish themselves as a perpetual legislature, and to confine the whole power to 60 or 70 persons, who called themselves the parliament of the commonwealth of England. However, the republicans, by the turn of their disposition, and by the nature of the instruments which they employed, shewed themselves better qualified for acts of force and vigour than for the slow and deliberate work of legislation. Notwithstanding the distressed state of the kingdom, occasioned by contending factions and by the devastation of civil wars, the power of England had never, in any period, appeared so formidable to the neighbouring kingdoms as it did at this time, in the hands of the commonwealth. A numerous army served equally to retain every one in implicit subjection to established authority, and to strike a terror into foreign nations. The power of peace and war was lodged in the same hands with that of imposing taxes. The military genius of the people had, by the civil contest, been roused from its former lethargy, and excellent officers were formed in every branch of service. The confusion into which all things had been thrown, had given opportunity to men of low stations to work through their obscurity, and to raise themselves by their courage to commands which they were well qualified to exercise, but to which their birth could never have entitled them. And while so great a power was lodged in such active hands, it is no wonder that the republic was successful in all its enterprizes.

Notwithstanding all the successes that attended the military operations of the commonwealth, both by sea and land, some circumstances occurred which widened the breach that had subsisted for a considerable time between the parliament and the army. Cromwell also saw that the zealous republicans in the government entertained a jealousy of his power and ambition, and were resolved to bring him to a subordination under their authority. He, therefore, without scruple or delay, determined to prevent them. Accordingly he called a council of officers, under the pretence of expediting the establishment of that free and equal government which parliament had so long promised to the people. In this council Cromwell had many friends, and also some opponents. The measure which he proposed was debated by the officers; and during the debate, Cromwell received information, that the parliament was still sitting, and had come to a resolution not to dissolve themselves, but to fill up the house by new elections; and that at this very time it was engaged in deliberations with regard to this expedient. Cromwell in a rage, hastened to the house, taking with him a body of 300 soldiers, whom he arranged about the house. After waiting for some time in seeming suspense, and professing his reluctance in adopting the measure which he had previously determined to execute, that of dissolving the parliament, he carried it into effect in the most rude and violent manner; and, without the least opposition or murmur, though he loaded the parliament with the vilest reproaches, for their tyranny, ambition, oppression, and robbery of the public, he annihilated that famous assembly,

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which had filled all Europe with the renown of its actions, and with astonishment at its crimes, and the commencement of which was not more ardently desired by the people than its final dissolution. Parliament having been thus dissolved, Cromwell might have assumed the administration of the government by an authority similar to that with which he had dissolved the parliament. But he chose to proceed in his assumption of the sovereign power by more cautious steps, and with some appearance of respect for the popular opinion. Accordingly, by the advice of his council of officers, he sent summonses to 128 persons of different towns and counties of England, to five of Scotland, and six of Ireland; and he pretended by his sole act and deed to devolve upon these the whole authority of the state. This legislative power they were to exercise during 15 months; and they were afterwards to choose the same number of persons, who might succeed them in that high and important office. They immediately voted themselves a parliament, called by way of derision from Barebone, a leather-seller, one of their number, "Barebone's parliament;" and having their own consent, as well as that of Oliver Cromwell, for their legislative authority, they now proceeded very gravely to the exercise of it. The members of this legislative assembly, of which Cromwell himself was ashamed, though he had introduced into it several members entirely devoted to his own interest, found themselves unequal to the burden imposed upon them; and having met, by consent, at an early hour, they agreed to dissolve themselves and to resign the sovereign authority into the hands from which they had received it. They hastened, therefore, to Cromwell, along with Rouse, their speaker; and by a formal deed of assignment restored to him the supreme authority. The council of officers now proposed to adopt another scheme of government, and to temper the liberty of a commonwealth by the authority of a single person, who should be known by the appellation of protector. Without delay, Lambert, who made this proposition, prepared what was called "the instrument of government," containing the plan of this new legislature; and as it was supposed to be agreeable to the general, it was immediately voted by the council of officers. Cromwell was declared "Protector," and with great solemnity installed in that high office. The chief articles of the forementioned instrument are these: a council was appointed, the number of which was not to exceed 21, nor to be less than 13 persons. These were to enjoy their office during life or good behaviour; and in case of a vacancy, the remaining members named three, of whom the protector chose one. The protector was appointed supreme magistrate of the commonwealth; in his name all justice was to be administered; from him were all magistracy and honours derived; he had the power of pardoning all crimes, excepting murder and treason; to him the benefit of all forfeitures devolved. The right of peace, war, and alliance rested in him, with the advice and assistance of his council. The power of the sword was vested in the protector jointly with the parliament, while it was sitting, or with the council of state in the intervals. He was obliged to summon a parliament every three years, and allow them to sit five months without adjournment, prorogation, or dissolution. The bills which they passed, were to be presented to the protector for his assent; but if it were not obtained within twenty days, they were to become laws by the sole authority of parliament. A standing army for Great Britain and Ireland was established, of 20,000 foot and 10,000 horse; and funds were assigned for their support. These were not to be diminished without the consent of the protector; and in this article alone he assumed a negative.

During the intervals of parliament, the protector and council had the power of enacting laws, which were to be valid till the next meeting of parliament. The chancellor, treasurer, admiral, chief governors of Ireland and Scotland, and the chief justices of both the benches, must be chosen with the approbation of parliament; and in the intervals, with the approbation of the council, to be afterwards ratified by parliament. The protector was to enjoy his office during life; and on his death, the place was to be immediately supplied by the council. Such was the instrument of government enacted by the council of officers, and solemnly sworn to by Oliver Cromwell. The council of state, named by the instrument, consisted of 15 persons; men entirely devoted to the protector, and by reason of the opposition among themselves in party and principles, not likely ever to combine against him. The military force of the country was exerted under this government with vigour, conduct, and unanimity; and never did the kingdom appear more formidable to all foreign nations. In September, 1654, a new parliament was summoned. Of 400 members, which represented England, 270 were chosen by the counties; the rest were elected by London, and the more considerable corporations; all the small boroughs having been deprived of their right of election, because they were the most exposed to influence and corruption. The lower populace, so easily guided or deceived, were also excluded from the elections; an estate of 200*l.* value was necessary to entitle any one to a vote. The elections of this parliament, says Mr. Hume, were conducted with perfect freedom; and excepting, that part of the royalists which had borne arms against the parliament and all their sons were excluded, a more fair representation of the people could not be desired or expected. Thirty members were returned from Scotland, and as many from Ireland. This parliament, having heard the protector's speech of three hours length, and having chosen Lenthall for their speaker, immediately entered into a discussion of the instrument of government, and of that authority, which Cromwell, by the title of protector, had assumed over the nation. The greatest liberty was used in arraigning this new dignity; and even the personal character and conduct of Cromwell escaped not without censure. The protector, surprised and enraged at the refractory spirit of the parliament, sent for them to the painted chamber, and authoritatively inveighed against their conduct. He obliged the members to sign a recognition of his authority, and an engagement not to propose or consent to any alteration in the government, as it was settled in a single person and a parliament; and he placed guards at the door of the house, who allowed none but subscribers to enter. Most of the members, after some hesitation, submitted to this condition; but retained the same refractory spirit which they had manifested in their first debate. Cromwell hastened to the dissolution of this dangerous assembly, and having ordered their attendance, he delivered to them a tedious, confused, angry harangue, and dismissed them.

In 1656, Cromwell, having gained by his administration so much lustre and success abroad, and so much order and tranquillity at home, ventured to summon a parliament, having taken previous measures for filling the house with his own creatures and partisans. The fear, however, that the majority would not be favourable to him. He, therefore, set guards on the door, who permitted none to enter but such as produced a warrant from his council; and the council rejected about a hundred, who either refused a recognition of the protector's government, or were on other accounts obnoxious to him. These protested against a violence which was subversive of all liberty; but every applica-

tion for redress was neglected both by the council and parliament. In this parliament a motion was made to bestow the crown on Cromwell; and no surprize or reluctance was discovered on the occasion. A formal motion was afterwards made to the same purpose; but it produced great disorder, and divided the house into parties. The bill was however voted by a considerable majority; and a committee was appointed to reason with the protector, and to overcome those scruples which he pretended against accepting so liberal an offer. Cromwell's chief difficulty arose from the opposition of the soldiers; and he justly dreaded a mutiny in the army. At length he determined to decline the acceptance of that crown, which the representatives of the nation, in the most solemn manner, had tendered to him. The parliament, when Cromwell had rejected the royal dignity, found themselves obliged to retain the name of a commonwealth and protector; and as the government had hitherto been a manifest usurpation, it was thought proper to sanction it by a seeming choice of the people and their representatives. Accordingly, instead of "the instrument of government," which was the work of the general officers alone, an "humble petition and advice" was framed, and offered to the protector by the parliament. This was represented as the great basis of the republican establishment, regulating and limiting the powers of each member of the constitution, and securing the liberty of the people to the most remote posterity. By this deed, the authority of protector was in some particulars enlarged; in others, it was considerably diminished. He had the power of nominating his successor; he had a perpetual revenue assigned him, of a million a year for the pay of the fleet and army, and 300,000*l.* for the support of civil government; and he had authority to name another house, the members of which should enjoy their seats during life, and exercise some functions of the former house of peers. But he abandoned the power assumed in the intervals of parliament, of framing laws with the consent of his council; and he agreed, that no members of either house should be excluded but by consent of that house, of which they were members. The other articles were much the same with those contained in the instrument of government. This model of government, the humble petition and advice, was accepted for the voluntary deed of the whole people in the three united nations; and Cromwell, as if his power had just commenced from this popular consent, was anew inaugurated in Westminster Hall, after the most solemn and pompous manner.

In 1658 the parliament was again assembled; consisting, as in the times of monarchy, of two houses, the commons and the other house: Cromwell, during the interval having sent writs to his house of peers, which consisted of 60 members. Upon the death of Cromwell in 1658 (see CROMWELL) the council recognized the succession of his son Richard. A parliament was called; and in hopes of obtaining greater influence in elections, the ancient right was restored to all the small boroughs; and the counties were allowed no more than their usual members. The house of peers, or the other house, consisted of the same persons that had been appointed by Oliver. All the commons, at first, signed an engagement, without hesitation, not to alter the present government; they next proceeded to examine "the humble petition and advice," and after much debate it was confirmed. But though parliament acquiesced, cabals were formed against the new protector by the army. Richard, who possessed neither penetration nor resolution, was prevailed on to give an unguarded consent for calling a general council of officers; but as soon as they were assembled, they voted a remonstrance; and they proposed that the

whole military power should be entrusted to some person, in whom they might all confide. The protector, who was in his disposition gentle, humane, and generous, was justly alarmed at the movements of the officers; nor was the parliament less alarmed at the military cabals. They voted that there should be no meeting or general council of officers, except with the protector's consent, or by his orders. This enraged the officers, who bateden and demanded of him a dissolution of the parliament. The parliament was dissolved; and by the same act, the protector was, by every one, considered as dethroned. Soon after he signed his dissolution in form; and withdrawing into retirement, extended his peaceful life to an extreme old age. The council of officers, now possessed of supreme authority, deliberated what form of government they should establish. It was agreed at last to revive the long parliament, which had been expelled by Cromwell. The members of this parliament did not exceed 70; but they resolved, since they enjoyed the title of the supreme authority, and observed that some appearance of a parliament was requisite for the purposes of the army; not to act a subordinate part to those who acknowledged themselves as their servants. They chose a council consisting of 7 persons, who should nominate to such commands as became vacant; and they voted, that all commissions should be received from the speaker, and be assigned by him in the name of the house. The general officers were disgusted by those precautions; but the state of the country prevented their manifesting their disgust. As soon as an interval occurred, they renewed their hostility, and expelled the parliament. The officers, again possessed of supreme authority, elected a committee of 23 persons, of whom 7 were officers, whom they pretended to invest with sovereign authority; and they called them "the committee of safety." On the approach of danger, Lenthall the speaker was invited by the officers to summon the parliament, which had twice before been expelled, with so much reproach and ignominy. But general Monk was advancing with his army, and having sent a message to the parliament from St. Alban's, desiring them to remove from London those regiments, which had so lately offered violence to their assembly; he marched towards London and took quarters at Westminster. He afterwards required parliament, in the name of the citizens, soldiers, and whole commonwealth, to issue writs for the filling of their house, and to fix the time for their own dissolution, and the assembling of a new parliament. The parliament attempted to conciliate the general, and dispatched a committee to him for this purpose; but he refused to hear them, except in the presence of some of the secluded members. These members, upon the general's invitation, were restored; and the long parliament, after having passed some resolutions for the composition of the kingdom, dissolved itself, and issued writs for the immediate assembling of a new parliament. When the parliament met, measures were taken for the restoration of Charles II.; he was proclaimed in the presence of the two houses, on the 8th of May, and on the 29th, which was his birth-day, the king entered London. Rapin's Hist. vol. xi. Hume's Hist. vol. vii.

COMMORANCY, in *Law*, an abiding or dwelling in any place; as an inhabitant of an house in a vill, &c. Commorancy for a certain time may make a settlement in a parish. Commorancy consists in usually lying in a certain place. Dalt. Blacklt. Com. iv. 273.

COMMORTH, from the Brit. *Cymmerth*, q. d. subfidium, a contribution which was gathered at marriages, and when young priests said or sung the first masses, &c. See stat. 4 Hen. IV. c. 27. But stat. 26 Hen. VIII. c. 6. prohibits levying any such in Wales, or the marches, &c. *Cowel*.

COMMOTAU, or **CHOMSTON**, in *Geography*, a town of Bohemia, in the circle of Saatz. Large quantities of alum are prepared here. It is distant 10 miles N. W. of Saatz. 38 S. of Dresden, and 42 N. W. of Prague.

COMMOTE, an ancient term in Wales, denoting half a cantred, or hundred; containing fifty villages. Stat. Wallie, 12 Ed. I.

Wales was anciently divided into three provinces; each of these subdivided into cantreds; and every cantred into two *commotes*, or half hundreds.

Silvester Girald, however, tells us, in his Itinerary, that a *commote* is but a quarter of a hundred. *Commote* also signifies a great signory or lordship, and may include one, or divers manors. Co. Litt. 5.

COMMOTION, an intestine motion, or luctation in the parts of any thing.

In medicine, the term is chiefly used for a blow, or shake of the brain. A convulsion is a commotion of the fine medullary fibres of the brain. A fall occasions a commotion, whence frequently arises a counterstroke on the opposite part; which occasions sometimes a contraction, and at other times a rupture of the vessels, and an imposthume, by shaking the whole mass of the brain.

COMMUNAM, *Appropriare*. See **APPROPRIARE**, &c. **COMMUNANCE**, a name formerly given to the commoners, or tenants and inhabitants, who had the right of common or commoning in an open field, &c. Cowley.

COMMUNE, in the present organization of France, denotes the subdivision of a canton, including sometimes a single town, and sometimes an union of several villages, possessing a mayor, and a communal municipality. All the considerable cities are divided into several communes.

COMMUNE Concilium Regni Angliæ, denotes the common council of the king and people assembled in parliament.

COMMUNE Rectum. See **RECTUM**.

COMMUNEM Legem, *Writ of Entry ad*. See **LEGEM**.

COMMUNIA Placita non tenenda in scaccario, an ancient writ directed to the treasurer and barons of the Exchequer, forbidding them to hold plea between "common persons," (*i. e.* not debtors, to the king, who alone originally sued and were sued there) in that court, where neither of the parties belong to the same. Reg. Orig. 187. But little obedience would be now paid to such a writ, if any officers were to dare to issue it; for the court of Exchequer seems, by prescription, to have attained a concurrent jurisdiction in civil suits with the other courts in Westminster-hall.

COMMUNIBUS Locis, a Latin term, in frequent use among philosophical, &c. writers; implying some medium, or mean relation between several places.

Dr. Keil supposes the ocean to be one quarter of a mile deep, *communibus locis*, *q. d.* at a medium, or taking one place with another.

COMMUNIBUS Annis, has the same import with regard to years, that *communibus locis* has with regard to places.

Mr. Derham observes, that the depth of rain, *communibus annis*, *i. e.* one year with another, were it to stagnate on the earth, would amount to, at Townly in Lancashire, 42½ inches; at Upminster, in Essex, 19½; at Zurich, 32½; at Pisa, 43½; and at Paris, to 19 inches.

COMMUNICANS Arteria Cerebri, in *Anatomy*, is a branch of the internal carotid artery, which joins with a branch of the profunda cerebri, to form the circle of Willis. See **ARTERIES**.

COMMUNICATING, in *Theology*, the act of receiving the sacrament of the EUCCHARIST.

Those of the reformed, and of the Greek church commu-

nicate under both kinds; those of the Romish only under one.

The oriental communicants receive the species of wine by a spoon; and anciently they sucked it through a pipe, as has been observed by Beat. Rlicanus on Tertullian.

COMMUNICATION, the act of imparting a thing to another, or making him a sharer with us therein.

The use of speech is for the communicating of our ideas and sentiments to each other.

COMMUNICATION is also used for the connection of one thing with another; or the passage from one place to another. Anciently, it was frequent to have subterraneous communications between one place and another.

COMMUNICATION, *Bridge of*. See **BRIDGE**.

COMMUNICATION, in *Military Language*. Communications are all sorts of ways or passages, above or below ground, which lead from different parts of the works to mines, or from one work to another. Those are best, which cannot be annoyed by the enemy, but are secure against his fire. A place cannot be long or obliquately defended without good communications; whereas, on the other hand, if these be good, it may hold out, if well garrisoned, and sufficiently furnished with every thing necessary for defensive operations, for a length of time. When its ditches are filled with water, or a river runs through it, floating bridges, boats, &c. serve as communications.

COMMUNICATIONS in and with a Camp. In every camp there should be communications between the different parts; and each of the principal, or more necessary ones, ought to be wide enough for forty or fifty men to walk abreast. As to communications with a camp, see the article **CAMP**.

COMMUNICATIONS in the Attack of a Place. Besiegers ought to, and generally do, take care to join their works with one or several communications. All those which they construct in the parallels, on the glacis, and on the counter-scarp, communicate one with another. And as it generally happens, that the besiegers' quarters in their camp are separated by rivers, great or small, or by marshes, it is not only necessary, but of the first importance, to make causeways across the marshes and bridges of communication, across the rivers, either on wooden frames, or on batteaux. It is better, however, to make them on frames or piles, if possible, as they are generally safer and stronger when so constructed, especially if the place be in a situation to open a large sluice of water capable of breaking those placed on batteaux, as actually happened at the siege of Valenciennes, which the besiegers were obliged to raise with loss. That place was besieged in 1656 by the French, under the command of the marshals de Turenne and de la Ferté-Senneterre. But the Spaniards, commanded by Don Juan of Austria, and the prince of Condé, made them raise the siege. And their quarters being separated by the breaking of their bridges of communication, one half of their army was entirely routed, and the marshal de la Ferté was made prisoner. In like manner, when the French were besieging Turin with 72,000 men, prince Eugene, observing that one of their quarters was separated from the rest by rivers, and that their bridges were bad and neglected, attacked them in that place with 24,000 only, defeated them, and raised the siege.

The bridges should be made very strong and secure; and on every communication of difficulty or importance, there should be at the least four, at the distance of forty or fifty fathoms from one another. The avenues to them ought to be rendered as easy and practicable as possible. Guards should be placed near them for their security, and to prevent their receiving any injury. And they should always

always be made within the line of circumvallation, for the safety of those who press and repulse.

COMMUNICATION of *idoms*, in *Theology*, the act of imparting the attributes of one of the natures in Jesus Christ to the other.

The communication of *idoms* is founded on the supposed union of two natures in the person of Christ: by this communication of *idoms* it is, that some divines say, God suffered, died, &c. which is strictly understood of the human nature; and signifies that God suffered in his humanity, that he died as to his human nature, &c.

The Lutherans carry the communication of *idoms* so far, as to say, that Jesus Christ is not only in his divine nature, and by reason of his divine person, but also really and properly in his humanity, immortal, immune, &c.

COMMUNICATION of *motion*, that act of a moving body, whereby another body at rest is put by it in motion, or a body already in motion is accelerated.

F. Malebranche looks on the *communication of motion* as something metaphysical; *i. e.* as not necessarily arising from any physical principles, or any properties of bodies, but flowing from the immediate agency of God: there being, according to him, no more connection, or dependence, between the motion or rest of one body, and that of another, than between the form, colour, magnitude, &c. of one body, and those of another. The motion of one body, therefore, on his principle, is not any physical cause of that of another. See **CAUSE**.

The communication of motion results from, and is an evidence of the impenetrability and inertia of matter as such: unless we admit the hypothesis of penetrable matter, advanced by M. Boscovich and Mr. Michell, and ascribe to the powers of repulsion those effects which have been usually ascribed to its solidity and actual resistance. See **MATTER**.

Action, and re-action, sir Isaac Newton demonstrates, are equal and opposite; so that one body striking against another, and thereby occasioning a change in its motion, does itself undergo the very same change in its own motion, the contrary way. See **MOTION**.

Hence, a moving body striking directly against another at rest, the one loses just as much of its motion as it communicates to the other; and they will proceed with the same velocity as if united into one mass. For the laws and quantity of motion so communicated, either in elastic or non elastic bodies; see **COLLISION**.

COMMUNICATION, *communicatio*, in *Rhetoric*. See **ANACONOSIS**.

COMMUNI CUSTODIA, in *Law*, a writ which anciently lay for the lord, whose tenant holding by knight's service died, and left his eldest son under age, against a stranger that entered the land, and obtained the ward of the body. F. N. B. 89. Reg. Orig. 161. Since the stat. 12. Car. II. c. 24., hath taken away wardships, this writ is of no use.

COMMUNION, in *Theology*, an uniform belief in several persons; whereby they are united under one head, in one church. See **UNITY**, **UNIFORMITY**, &c.

In this sense, the Lutherans, Calvinists, &c. are said to have been cut off from the Romish *communion*.

This is the primitive use of the word *communion*, as appears from the canons of the council of Elvira.

Though the term has been more extensively applied to denote a general agreement in matters of doctrine, discipline, and worship. And unless the term be understood in this large sense, so various are the opinions of men, there could be no *communion* among the members of any one church on earth.

COMMUNION is also used for the act of *communicating* in, or participating of, the sacrament of the **EUCCHARIST**. The

fourth council of Lateran decrees, that every believer shall receive the communion, at least, at Easter; which seems to import a tacit desire, that they should do it oftener; as, in effect they did it much oftener in the primitive days. Gratian, and the master of the sentences, prescribe it as rule for the laity to communicate three times a year, at Easter, Whitsuntide, and Christmas. But in the thirteenth century, the practice was got on foot, never to approach the eucharist except at Easter; and the council thought fit to enjoin it then by a law, lest their coldness and remissness should go farther still.

And the council of Trent renewed the same injunction, and recommended frequent communion without enforcing it by an express decree.

In the ninth century, the communion was still received by the laity in both kinds; or, rather the species of bread was dipped in the wine, as is owned by the Romanists themselves. Acta SS. Benedicti Sac. III. M. de Marca observes, that they received it at first in their hands. Hist. de Bern, and believes the communion under one kind alone to have had its rise in the West under pope Urban II. in 1096, at the time of the conquest of the Holy Land. And it was more solemnly enjoined by the council of Constance in 1414. The twenty-eighth canon of the council of Clermont en-joins the communion to be received under both kinds, distinctly; adding, however, two exceptions; the one of necessity, the other of caution, *nisi per necessitatem, & cautelam*; the first in favour of the sick, the second of the abstemious, or those who had an aversion from wine.

It was formerly a kind of canonical punishment, for clerks guilty of any crime, to be reduced to *lay communion*, *i. e.* only to receive as the laity did, *viz.* under one kind.

They had another punishment of the same nature, though under a different name, called *foreign communion*; to which the canons frequently condemned their bishops, and other clerks. This punishment was not any excommunication, or deposition; but a kind of suspension from the function of the order; and a degradation from the rank they held in the church. It had its name because the communion was only granted to the criminal on the foot of a foreign clerk, *i. e.* being reduced to the lowest of his order, he took place after all those of his rank, as all clerks, &c. did in the churches to which they did not belong. The second council of Agda orders every clerk that absents himself from the church, to be reduced to foreign communion.

COMMUNION, *Infant*. Some instances occur in the early ages of the church, of the practice of administering the eucharist to infants; and some few have imitated this practice in more modern times. Mr. Pierce pleads the use of it even to this day among the Greeks, and in the Bohemian churches till near the time of the Reformation; and he refers to the usage of the ancient churches, recorded by Photius, Angustin, and Cyprian. He urges from Scripture the right which children have to all the privileges of which they are capable, as well as the Jewish children under the law, who were allowed to eat of the passover, and other sacrifices. To which it has been answered, that the sacrifices, of which they were allowed to partake, were chiefly peace offerings, which became the common food of the family, and were not considered as acts of devotion in such a degree as our eucharist. He replies to the objection founded on the incapacity of infants to examine themselves and discern the Lord's body, by observing that the precept extends only to those who were capable of understanding and complying with it; on the same ground that faith is required previous to baptism. Bishop Bedell suggests the following inquiry relative to this subject; what necessity of baptizing infants,

infants, if their baptism produces no effect till they come to years of discretion? To which he replies, though the most principal effect be not attained presently, the less principal are not to be refused: so children were circumcised, who could not understand the reason of it, and the same also did eat the passover: and so did children baptized, in the primitive church, communicate in the Lord's supper: which I know not (says he) why it should not be so still; *de quo olim*. It has been alleged, that the foundation of this practice was a mistaken apprehension of the absolute necessity of this ordinance in order to salvation, resulting from an erroneous interpretation of John vi. 53. See Bishop Bedell's Letter to Dr. Ward, in p. 442 of Archbishop Usher's Life by Parr. Pierce's Essay on the Eucharist. Wall's Hist. of Infant Baptism, part ii. chap. 9. § 15 and 16. Waterland's Review of the Doctrine of the Eucharist, and preface to his two volumes of Posthumous Sermons, p. 32, &c. and Inquiry concerning Infant Communion, vol. ii. p. 75, &c.

COMMUNION SERVICE, denotes that part of the liturgy of the church of England which relates to the administration of the sacrament. See LITURGY.

COMMUNION-TABLE. See ALTAR.

COMMUNIS CAPSULA. See CAPSULA.

COMMUNIS ductus choledochus. See DUCTUS.

COMMUNIS digitorum manus extensor. See EXTENSOR.

COMMUNIS labiorum depressor. See DEPRESSOR.

COMMUNIS labiorum elevator. See ELEVATOR.

COMMUNIS misericordia. See MISERICORDIA.

COMMUNITY, a society or body of men united together under certain common laws, agreed on among themselves, or imposed by a superior.

The Romans, who seem to have given the first hint of communities to the several nations into which their empire was divided, doubtless borrowed it from some rules of their neighbours: they call them *colleges*; which term, among them, had nearly the same signification with community among us. For an account of the introduction and establishment of communities in Europe, see *Charters of COMMUNITY and CITY*. See also CORPORATION and CROISSAGE.

Communities now are of two kinds, *ecclesiastic* and *laic*; the first are either *secular*, as chapters of cathedral and collegiate churches; or *regular*, as convents, monasteries, &c.

Lay communities are of various kinds; some contracted by a fixed abode of a year and a day in the same place; others formed by the discharge of the same office, the profession of the same art, or attending the same place of worship, as those of parishes, fraternities, &c.

Accordingly, the word is commonly understood of pious foundations for the support of several persons, either in a secular or regular life; as *colleges*, *abbies*, *convents*, *priories*, *seminaries*, *hospitals*, *inns*, &c.

Community is more particularly used in the French law, for the joint property in goods between the husband and the wife: the result of which is, that during marriage they are equally intitled to all effects, and liable to all debts, contracted either before or under marriage.

Community is a species of succession, and the acceptance of community resembles an *additio hereditatis*.

Community was set on foot in favour of the wives, to enter them as sharers in their husband's effects.

In countries where the civil law obtains, this community has no place, nor even in several customary countries, as being reputed a burden on the man.

Anciently, the woman's share in the community was only one-third; and this appears (till the sense of the law among us, the widow, at the decease of her husband, being only intitled to one-third part of the moveables.

COMMUNITY, continued, in the *French Law*, is that which subsists between the survivor of two persons joined in marriage, and the minor children of that marriage, when the survivor has not made an inventory of the effects in possession during marriage. The widow may either renounce community with her children, or continue it.

COMMUNITY, *tacit*, is a community contracted between a man and woman, by the mere mingling of their effects, provided they have lived together the space of a year and a day: this community, being odious, is now abolished.

COMMUNITY, *Charters of*. See CHARTERS of Community.

COMMUNITY of Goods, as it has been sometimes denominated, signifies a practice which was adopted for a short time in the primitive church, and which consisted principally in a common use, derived from an unbounded liberality, that induced the opulent to share their riches with their indigent brethren. The rich supplied the wants of their necessitous brethren with such liberality and promptitude, that, as St. Luke tells us (Acts ii. 4. iv. 32.) among the primitive disciples of Christ, all things were in common. This expression, however, has been greatly abused, says Mosheim (E. H. v. i. p. 60), and has been made to signify a "community of rights, goods, and possessions," than which interpretation nothing is more groundless, nothing more false. From a multitude of reasons, as well as from the express words of St. Peter (Acts v. iv.) it evidently appears, that the community which is implied in mutual use, and mutual liberality, is the only thing intended in this passage. This is very clearly and satisfactorily proved by Mosheim, in a dissertation concerning the true nature of the community of goods, which is said to have taken place in the church of Jerusalem. This learned discourse is to be found in the second volume of his excellent work entitled, "Dissertationes ad Historiam ecclesiasticam pertinentes." Mr. Gibbon (see Hist. Decl. and Fall of Rom. Emp. vol. ii. p. 341) has given a very uncandid and unjust statement of this ancient Christian practice, and instead of considering it as honourable to the liberality and mutual benevolence of the first disciples, he seems to attach reproach and censure to it; when he suggests that the community of women, and that of temporal goods, may be considered as inseparable parts of the same system. He also observes that it was of the same kind with that which had so agreeably amused the imagination of Plato, and which subsisted in some degree among the austere sect of the Essenians; although it was undoubtedly of a very different nature. This author further adds, that the progress of the Christian religion relaxed, and gradually abolished this generous institution, which, in hands less pure than those of the apostles, would too soon have been corrupted and abused by the returning selfishness of human nature; and the converts who embraced the new religion were permitted to retain the possession of their patrimony, to receive legacies and inheritances, and to increase their separate property by all the lawful means of trade and industry. Bishop Watson (see his "Apology for Christianity,") has justly observed, that the expression "permitted to retain," in ordinary acceptation, implies an antecedent obligation to part with; but, as he adds, we have no account in scripture of any such obligation being imposed upon the converts to Christianity, either by Christ himself, or by his apostles, or by any other authority: nay, in the very place where

where this community of goods is treated of, there is an express proof to the contrary. When Peter was about to inflict an exemplary punishment upon Ananias (not for keeping back a part of the price, as some men are fond of representing it, but) for his lying and hypocrisy, in offering a part of the price of his land as the whole of it; he said to him, "Whilst it remained (unfold) was it not thine own? and after it was sold, was it not in thine own power?" From this account it is evident, that Ananias was under no obligation to part with his patrimony; and after he had parted with it, the price was in his own power; the apostle would have "permitted him to retain" the whole of it, if he had thought fit; though he would not permit his prevarication to go unpunished.

Pythagoras not only taught his disciples to be contented with a little, but even deprived them of all command over their own property, by casting the possessions of each individual into a common stock, to be distributed by proper officers, as occasion should require. From the time of this sequestration of their goods, as long as they continued members of this society, they lived upon the footing of perfect equality, and sat down together daily at a common table. If any one, however, repented of the connection, he was at liberty to depart, and might reclaim, from the general fund, his whole contribution.

COMMUNITY of the kingdom. See COMMONALTY.

COMMUTATION, in Astronomy. Angle of COMMUTATION, is the distance between the sun's true place seen from the earth, and the place of a planet reduced to the ecliptic. See PLACE.

Thus the angle ESR (Plate V. Astronomy, fig. 11.) subtended between the sun's true place, E, viewed from the earth at S, and that of a planet reduced to the ecliptic, R, is the angle of commutation.

The angle of commutation, therefore, is found by subtracting the sun's longitude from the heliocentric longitude of the planet R; or contrarily.

COMMUTATION, in Law, a change of a penalty, or punishment, viz. of a greater for a less, &c. as when death is commuted for, by banishment or perpetual imprisonment, &c. Suits are, and always were, allowable in the spiritual court, for money agreed to be given as a commutation for penance. Art. Cler. 9 Edw. II. c. 4. F. N. B. 53.

Some doubt whether the word be properly applied to any change but that of punishment: others will have it indifferently serve for the exchanging, or trucking of any thing.

COMMUTATION ACT, an act passed during the session of parliament in 1784, as part of a system for the prevention of smuggling; so called because, whilst it gave up the existing duties and excise on teas, it proposed an additional tax on windows, not as a new tax, but as a commutation for the portion of the duties on tea which it surrendered. The plan of the framers of this bill was to take off all the excise duty on tea, and impose a custom duty of 12 l. 10 s. on Bohea tea, which, it was apprehended, would ruin the smuggling trade in that article. On the finer kinds of tea, a higher duty would be laid; 15 l. per cent. on fouchong, &c.; 20 l. on single and hyson; and 30 l. on congo. The total annual importation of teas into Europe amounted to about 19,000,000 lbs., above two-thirds of which quantity were consumed in Great Britain and Ireland, though the legal importation was not quite 6,000,000; consequently the quantity annually smuggled must have been above 7,000,000 lbs. According to this calculation, the people of England were considerably under-rated at the number of 6,000,000. Of these it was said that

2,000,000 would be relieved from the payment of the present duty on tea, without being obliged to contribute a farthing towards the tax which would be proposed as a substitution; the other 4,000,000, it was calculated, would, one with another, consume 3 lbs. of tea each in the year, for each pound of which, they, at this time, paid on an average 2 s. 7 d. duty; this duty, or the principal part of it being taken off, they could, of course, afford to pay a substituted tax, which was proposed to be raised in the following manner:

On every house with seven windows, which house was also rated to the house tax, it was intended to lay an additional tax of 3 s. and so on, charging 8 s. for every house of eight windows; 9 s. for those of nine windows; 10 s. 6 d. for those of ten windows, and so on, adding 2 s. 6 d. for each window up to 24, and still rising up to 180 windows, for which 20 l. per annum should be paid, over and above the duty at present paid on windows and houses. This regulation was calculated to produce above 700,000 l.; so that with the new duty on tea, the produce would be near 900,000 l. It was suggested that, according to this plan, the public revenue would be a considerable gainer, and the people at the same time have no reason to complain of additional burdens. In England, Scotland, and Wales, it was calculated that there were about 699,958 houses, which might be divided into the following classes; 286,293 houses under seven windows; 211,483 houses having from 8 to 10 windows; 38,324 of 11 windows; 24,919 from 12 to 13; 67,652, from 14 to 19; 52,652, of 20 windows and upwards; and 17,732 houses in Scotland. Of these about 200,000 as being exempted from the house-tax would pay nothing to this new tax, and the inhabitants being of the poorer sort, would be wholly delivered from the duty on tea. This regulation, it was supposed, would check, or rather absolutely ruin, the smuggling trade; besides being productive of other benefits to the fair trader, and particularly to the East India Company. Against this bill, which, however, passed into a law, many objections have been urged. To the East India Company, it has been argued, this afforded certain advantage; but those which the public were to derive from it are less obvious and certain. It has been said that those householders who were to be charged with the new rate for windows were precisely the persons who should have received the reciprocal benefit of the commutation; but that the reverse of this is undoubtedly the case; they who do not pay the new window-tax, or indeed any window-tax at all, being the only persons who share among them any little advantages that have accrued from the agreement. The facts are these: Of the five different sorts of teas consumed by the public, there are three which are chiefly used by those who pay the new window tax, viz. congo, fouchong, and hyson. The price of the two former of these (which are the most used of the three) has been so inconsiderably reduced, as to afford nothing like a pecuniary compensation for the additional window-tax, and the price of the third sort, hyson, which is the dearest and the least used, though rather more reduced, is still wholly disproportionate to the promised commutation. The only two sorts of tea, therefore, where the reduction of price is at all considerable, are bohea and single; and those are in general consumed by the lower orders of people only. From these facts it has been inferred, that they who pay the new tax consume those sorts of tea, from which not one-sixth of the proposed saving arises; while they who do not pay any tax at all, or at most a small portion of it, consume those species of tea upon which almost the whole of the saving, or at least upwards of five-sixths of it arises. The act has been deemed, by those

who strenuously opposed it, unjust in its principle, and oppressive in its operation.

COMNENA, ANNA, in *Biography*, daughter of the emperor Alexius Comnenus, flourished about the year 1118, and wrote fifteen books upon the life and actions of her father, which she called the "Alexiad." She has been accused of a too great partiality in favour of her hero, for which, considering her near relationship, she may claim an indulgence. This work was published with a Latin translation in 1661, and again in 1670; to this last edition are added notes historical and philological by the learned Du Fresnoy.

COMNENO, in *Geography*, a town of European Turkey, in the province of Albania; 35 miles S. E. of Albanopolis.

COMO, DA, FRA. EMANUELLO, in *Biography*, so called from the place of his nativity, a considerable town in the state of Milan, was an historical painter, whose taste for the art was first called forth upon his seeing some painters at work in the cathedral of Como. Without the direction of any master, he afterwards attained some degree of eminence. His works, however, are of very unequal merit; he painted in the refectory of a convent at Como a "Last Supper," by which but an indifferent idea of his talents could be formed, were not his character retrieved by an excellent picture in the church representing a Pieta with Saino. He died aged 75, in the year 1701. Orlandi. Lanzi. Storia Pittorica.

Como, in *Geography*, a strong, populous, and commercial town of Italy, and capital of a district in the Milanese, built by the Gauls, under the conduct of Brennus, situated at the fourth end of a lake to which it gives name, in a plain, almost surrounded with mountains. The town is encompassed by a wall, guarded with picturesque towers, and backed by a conical eminence, on which stand the ruins of an ancient wall. The houses are almost wholly built of stone; and the cathedral is a handsome edifice of white marble, hewn from the neighbouring quarries. The inhabitants have established several manufactures of cotton and silk, and carry on some trade with the Grisons. This town being distinguished as the birth-place of Pliny the younger, his statue is placed in a niche on the outside of the church, and has a Latin inscription bearing the date of 1499. It is distant 20 miles N. of Milan, in N. lat. 45° 44'. E. long. 8° 57'.

Como, *Lake of*, a lake of Italy in the Milanese, on the confines of Switzerland, about 32 miles long and 88 in circumference. At first it is scarcely a quarter of a mile broad, but it widens near a neck of land upon which is situated the small village of Turino. Towards the south it is divided into two branches, at the end of one of which stands Como, and at the end of the other Lecco. The river Adda passes through it, and several country houses and villages are situated on its banks, which are adorned with vines, chestnuts, and almond-trees. The neighbourhood of Turino, and the districts bordering the lake of Como, supply, for the most part, these Italian emigrants, who wander through Europe vending barometers and thermometers, of whom numbers annually resort to England.

COMOCLADIA, in *Botany* (from Κομος, comatus sum; and Κλαδός, ramus; so called because the branches have a tuft of leaves at the end, bearing a fancied resemblance to a head of hair.) Linn. Gen. 49. Schreb. 66. Lam. Ill. 65. Willd. 82. Juss. 370. Vent. 3. 444. Class and order, *triandria monogynia*. Nat. Ord. *Terebinthaceae*; Juss. Vent.

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Gen. Ch. *Calyx* one-leaved, three or four cleft, spreading, coloured; segments roundish. *Cor.* Petals three or four, roundish-egg-shaped, acute, flat, widely spreading, a little larger than the calyx. *Stam.* Filaments three or four, awl-shaped, shorter than the corolla; anthers roundish, incumbent. *Pistl.* Germ superior, egg-shaped; style none; stigma obtuse, simple. *Peric.* Drupe oblong, somewhat curved, marked at the top with three dots; nut membranous, the form of the drupe. *Seed* single.

Ess. Ch. *Calyx* three, rarely four-cleft. Petals three or four. Drupe oblong; with one seed.

Sp. 1. *C. integrifolia*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Ill. 423. Willd. 1. Jacq. Amer. 12. Brown. Jam. 124.

Lam. Ill. tab. 27. fig. 1. (*Prunus racemosa*; Sloan. Jam. 2. 137. tab. 222. fig. 1.) "Leaflets entire, smooth on both sides." A tree, seldom more than twenty feet high.

Trunk erect, of a moderate thickness; branches few, leafy at the end in open tufts. *Leaves* unequally winged, two feet long, leaflets not more than seventeen, four inches long, ovate-lanceolate, acuminate, slightly wrinkled by the transverse veins, a little revolute at the edges. *Flowers* very numerous, small, sessile, without scent, of a deep red colour, in panicled racemes; racemes about twenty-four, a foot and a half long, branched, pendulous, always with a few quadrifid tetrandrous flowers intermixed with the others. A native of Jamaica, and St. Domingo. It abounds in a watery, slightly glutinous juice, which grows black when exposed to the air, and stains the hands so as scarcely to be washed off. The wood is hard, of a fine grain, and reddish colour.

2. *C. dentata*. Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Ill. 425. Willd. 2. Jacq. Amer. 13. tab. 173. fig. 4. Pæd. 12. tab. 259. fig. 2. "Leaflets egg-shaped, acute, toothed, somewhat prickly, veined and villous underneath." A tree much like the preceding. *Trunk* upright with few branches.

Leaves a foot and half long, in tufts at the ends of the branches; leaflets from thirteen to twenty-one, oblong, acuminate, shining above, edged with prickly teeth. A native of Cuba. Its juice is milky, glutinous, turning very black in the air, durably staining woollen and linen cloth, corroding the skin and rendering it scaly, smelling like liver of sulphur, or the human excrement. The natives have an idea that to sleep under it is dangerous.

3. *C. ilicifolia*. Swartz Prod. 17. Mart. 13. Lam. Ill. 424. Ill. tab. 27. fig. 2. (*C. tricuspidata*; Nonv. Act. Acad. Paris, 1784, p. 347. *Ilex dodonæa*; Linn. Dodonæa; Plum. Gen. 20. tab. 118. fig. 1.) "Leaves roundish angular-spinous, smooth on both sides." Leaflets sessile, rigid, in crowded pairs terminated by an odd one. *Flowers* comparatively few; panicle very slender; racemes generally simple. A native of the West Indies. La Mark's figure was taken from a dried specimen. Willdenow has both an *ilicifolia* and an *angulosa*, quoting for the latter La Mark's figure in opposition to La Mark himself. His error seems to have been occasioned by mistaking the synonym from Plumier, given by Linnaeus, as a spineless variety of his *illex dodonæa*, which Willdenow read *D. aquifolii folio anguloso et aculeato*, instead of *non aculeato*, as it stands in the species plantarum.

Propagation and Culture.—The first two species have been propagated in England, by seeds obtained from their native climate. They require the same treatment as other tropical plants.

COMODI, ANDREA, in *Biography*, an historical painter, who was born at Florence in 1560. He became at once the disciple and companion of Ludovico Cigoli, and was ranked amongst the best Florentine artists of his time, but the ex-

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treme difficulty which he found in satisfying himself with his own productions, has occasioned their number to be very small, considering the great age to which he lived. After having gone through the regular routine of academic study, he went to Rome, where he spent many years, and painted several frescoes, particularly one in the tribuna of the church of St. Vitale, a composition of many figures, representing Christ bearing his cross, and on each side stories of martyrdoms. One of his most esteemed easel pictures was a "Magdalen in the Desert," for which the cardinal Barbarini presented him with five hundred crowns, a very large price in those times. His pictures of "Madonas" are very highly esteemed for the beauty of their colouring and the delicacy with which they are finished, and above all for an elegance and lightness of form, joined to an expression of virgin modesty peculiarly their own. His numerous copies of the pictures of Coreggio, and other great masters are much esteemed. He died in the year 1638. Baldinucci. Lanza, Storia Pittorica.

COMOMBO, in *Geography*, or *the bill of Ombo*, anciently *Onobos*, a town of Egypt, situated to the south of Thebes and on the same side of the river, where are still seen considerable ruins of an ancient temple. The inhabitants of this place were famous for the worship of the crocodile, which they fed in their ponds (according to Ælian), where they became so tame, as to obey when they were called.

COMONAVA, a town of European Turkey, in the province of Macedonia; 60 miles N.N.E. of Akrida.

COMOPOLIS, in *Ancient Geography*, a town of Asia, in Assyria, according to Ptolemy.—Allo, a town of Asia Minor, furnished *Madrena*.—Allo, a town of Asia Minor, in Phrygia Salutaris, furnished *Meros*, the fame with *Myré*.

COMORA ISLES, in *Geography*, are African islands in the Indian ocean, between the north-end of the island of Madagascar and the coast of Zanguebar, generally reckoned five in number, Johanna, Mayotta, Mohilla, Angazi, Comora, though some enumerate three, others four, and others eight, between the 41st and 46th degree of E. long. and the 10th and 14th of S. lat., at an equal distance from Madagascar and the continent of Africa. The largest is Johanna, which see. As the Comora isles abound in horned cattle, sheep, hogs, a variety of fruits and rice, they serve to refresh the European shipping to and from India. The inhabitants are negroes of the Mahomedan religion; but they entertain the European seamen with great humanity.

COMORA, one of the fore-mentioned islands, which gives name to the whole cluster, about 6 leagues long, and three wide, but little known. S. lat. 11° 50'. E. long. 43°.

COMORIN, CAPE, the southernmost part of the southern Hindoostan, N.W. of the island of Ceylon. Though not above nine miles in extent, this promontory unites the two opposite seasons of the year, owing to a ridge of mountains called the *Chauts*, on the south side of which trees are seen loaded with blossom and fruit, whilst on the north side, the fame sort of trees are stripped of all their leaves. N. lat. 8°. E. long. 77° 32' 30".

COMORN, COMORRA, Lat. a town of Hungary, and capital of a district, to which it gives name. It is so well defended by a fortress that the Turks could never take it. Its chief inhabitants were Hungarians, or Rascians, who belong to the Greek church. In 1783 it was almost wholly destroyed by an earthquake: 36 miles S.E. of Presburg, and 34 S.E. of Vienna.

COMORTH. See COMMORTH.

COMOSE, in *Botany*, the thirty-sixth natural order in the *Philosophia Botanica* of Linnæus, which he afterwards

abolished. It contained only *spiræa*, *filipendula*, and *aruncus*. These are now all united in *spiræa*, and the genus referred to the order pomaceæ.

COMOSANDALOS, in *Antiquity*, a crown of flowers worn in the festival CHTHONIA.

COMOUCKS, in *Geography*, the Tartar inhabitants of Comania or Daghestan in Asia, under the protection of Persia. They are ferocious robbers. Every town has a chief named *Myrfa*; and the head of those chiefs chosen from among themselves is called *Schmkal*.

COMPACH, a river of Carinthia, which runs into the Moil, near Vellach.

COMPACT, in *Physics*, is a relative term, denoting a body to be close, dense, and heavy; having few pores, and those small ones. The heaviest metals, as gold and silver, are the most compact. See GRAVITY.

COMPACT, in a *Legal Sense*, signifies an agreement, or a contract, stipulated between several parties. A compact carries with it an obligation equal in point of conscience to that of a law; but the original of the obligation is different. In compacts, we ourselves determine and promise what shall be done, before we are obliged to do it; whereas in laws, we are obliged to all without ourselves determining or promising at all. See CONTRACT.

COMPACT is also the name of a celebrated bull, confirmed by pope Paul IV. relating to the cardinals.

In virtue of the bull of compacts, cardinals can only confer benefices in their natural state; i.e. regular benefices on regulars.

COMPAGES *circularis montium*, a term devised by Kircher to express what he in other places calls the annularity, or annular disposition of MOUNTAINS, which he says run in continued chains, forming belts or ridges in the manner of spines, all round the globe of the earth, from north to south, and so on from that point to north again, and in the same manner from east to west, and from west to east again.

COMPAGNE, Fr. The cabin of the commander or chief of a galley.

COMPAGNIES *aux Gardes*. These were the companies of infantry that composed the regiment of French guards, making part of the household troops of the king for the exterior guard. And it was usual to say *Capitaine aux Gardes*, *Lieutenant aux Gardes*, &c.

COMPAGNIE *Ecolaise*. See GENDARMERIE or *Gardes du Corps*.

COMPAGNIES *d'Ordonnance*. These were companies that never formed corps or regiments, like the *gendarmes*, the light horse, the musketeers, &c.

COMPAGNIES *des Gardes*. The four companies of horse-guards made part of the troops of the household of the kings of France for the interior guard. Thus, in speaking of that corps, it was usual to say, a captain of the guards, a lieutenant of the guards, &c. It was customary to speak in the same manner of Swiss guards.

COMPAGNIES *Franches*, Fr. These free companies were not regimented, but in time of war were put on a certain establishment. Each of them had a chief, who commanded it. They were generally composed of dragoons, hussars, and foot soldiers. A1 those who served in these corps or companies were called *partisans*. They were employed in making incursions into the enemy's country, and laying it waste as much as they could. An officer, who had served some campaigns as a partisan, could not easily afterwards serve with regular troops. They are a sort of voluntary pirates, who know no kind of subordination but that which is peculiar to themselves. When these troops have chiefs that

that are hardy, brave, and intelligent, they render important services to armies.

COMPAGNIE du Guet a pied. See the article *MARÉ-CHAUSSEE*.

COMPAGNIE du Lieutenant criminel de Robecourte. See also the article *MARÉCHAUSSEE*.

COMPAGNIE d'Ordonnance a cheval. See the same article.

Independent company is one that is not incorporated into a regiment. Two such companies generally belong to each regiment in England, for the purpose of supplying the regiments with recruits.

COMPAGUS, in *Antiquity*, a kind of summer-shoe worn by the Roman senators, consisting only of a sole at the bottom; it was fastened with leathern straps, crossing one another many times about the leg.

Rubenius makes the *compagi* to have been a sort of caligæ worn by the roman generals as well as senators. Under the later emperors, in the middle age, we read of the same worn by popes, bishops, and abbots.

COMPANION of the Garter, an appellation distinguishing one of the knights of that most noble order, at the head of which is the king, as sovereign. Stat. 24 Hen. VIII. c. 13. See *GARTER*.

COMPANY, a collective term, understood of several persons assembled together in the same place, or with the same design. See *SOCIETY*.

The word is formed of the French *compagnie*, and that of *compaino* or *companies*, which, Chifflet observes, are found in the Saliæ law, tit. 66. and are properly military words, understood of soldiers, who, according to the modern phrase, are comrades, or mess-mates, i. e. lodge together, eat together, &c. of the Latin *cum, with, and panis, bread*. It may be added, that in some Greek authors under the Western empire, the word *κρηταιων* occurs in the sense of *society*.

COMPANY, in *Commerce*, is an association of several merchants, or others, who unite in one common interest, and contribute by their stock, their counsel, and study, to the setting on foot, or supporting, of some lucrative establishment.

Though *company* and *society*, or *fellowship*, be in effect, the same thing, yet custom has made a difference between them; *society*, or *partnership*, being understood of two, or three dealers, or not many more; and *company* usually of a greater number. See *SOCIETY*.

A second difference between *companies* and *societies* is, that the first, especially when they have exclusive privileges, cannot be established without the concession of the prince; and need letters patent, charters, &c. Whereas, for the latter, the consent of the members, fixed and certified by acts and contracts, and authorized by bye-laws, is sufficient.

The several professions and trades exercised in the city of London, being incorporated into distinct fraternities, governed by their particular laws, a tabular view of them may not be unacceptable.

The abstract of their incorporations, and particular privileges, is taken from the records of the Tower, &c. and from the *Firma-Burgi* of Madox, the king's historiographer; the account of their charities from those eminent historians Stow and Strype; and the lines of the liverymen on admission, are taken from the returns to the clerk of the parliament, and the scrutiny-books made after the several polls for the magistrates and representatives of the city.

The companies are here placed according to their precedence, beginning with the twelve principal ones, of one or other of which the lord mayors have generally made themselves free at their election, if they were not so before; for they are not only the oldest, but the richest, many of them having had the honour of kings and princes to be their members, and the apartments of their halls being fit to entertain a monarch.

Companies.	Halls.	Incorporated A. D.	Livery by	Livery lines l. s. d.	Charitable Gifts paid yearly, and Pri- vileges, &c.
1 Mercers	Cheapside	Richard II.	1393	2 13 4	3000 Exclusive of 20 per cent. paid yearly to the widows of subscribing clergymen during life, pursuant to a proposal accepted in 1698, when they settled a fund of 14,000 <i>l.</i> a year for that purpose.
2 Grocers	Poultry, Groc. alley	Edward III.	1345	20 0 0	700
3 Drapers	Throgmorton street	Henry VI.	1439	25 0 0	4000
4 Fishmongers	Thames-street	Henry VIII.	1536	13 6 8	800
5 Goldsmiths	Foller-lane	Richard II.	1399	20 0 0	1000 They had a privilege from Ed. IV. to inspect, try, and regulate all gold and silver wares throughout the kingdom, and to punish all workers in either that was adulterated.
6 Skinners	Dowgate-hill	Edward III.	1327	15 0 0	700
7 Merchant Taylors	Threadneedle-street	Edward IV.	1466	20 0 0	2000 They were once styled taylor's and linen armourers.
8 Haberdashers	Maiden-lane	Henry VI.	1407	25 0 0	3500 Were anciently styled Milaners, because they dealt in most that came from Milan.
9 Salters	Swithin's-lane	Q. Elizabeth	1558	20 0 0	500
10 Ironmongers	Fenchurch-street	Edward IV.	1464	31 10 0	1800 In 1724, Mr Betton, a Turkey merchant, left 26,000 <i>l.</i> in trust; one moiety of the profits of it to be always applied to the ransom of British captives from Moorish slavery; the other for the poor of the company, and to the charity-schools in its city and its liberty.
11 Vintners	Thames-street	Henry VI.	1437	31 13 4	600
12 Clothworkers	Mincing-lane	Edward IV.	1482	31 10 0	1400

C O M P A N Y.

Companies	Halls.	Incorporated A. D. by	Livery fines	Charitable Gifts, paid yearly, and Pri- vileges, &c.
			<i>l. s. d. l.</i>	
13 Dyers	Elbow-lane	Edward IV.	1472 15 0 0	
14 Brewers	Addle street	Henry VI.	1438 6 13 4	
15 Leatherfellers †	Little St. Helens	Henry VI.	1443 20 0 0 * Her. VII. made their wardens in- spectors of sheep, lamb, and calves leather throughout the kingdom.	
16 Pewterers †	Lime-street	Edward IV.	1474 20 0 0 † By act of Parl. 25 Hen. VIII. their wardens had the inspection of pewter through- out England.	
17 Barber-furgeons †	Monkwell-street	Edward IV.	1461 10 0 0 † In the reign of Hen. VIII. the furgeons of this company, then but 19, were created by parliament from ward and parish offices, and from military service. They were incorporated separately by 18 Geo. II. cap. 15. and the company of furgeons had an elegant hall in the Old Bailey, with a theatre for the dissection of human bodies. They now form a royal college, and their house is in Lincoln's Inn fields.	
18 Cutlers	Cloak-lane	Henry V.	1417 10 0 0	
19 Bakers	Harp-lane	Edward II.	1327 10 0 0	
20 Wax-chandlers	Maiden-lane	Richard III.	1483 5 0 0	
21 Tallow-chandlers	Dowgate-hill	Edward IV.	1463 15 0 0	
22 Armourers §	Coleman-street	Henry VI.	1423 15 0 0 § The brasiers are united to this com- pany.	
23 Girdlers	Basinghall-street	Henry VI.	1449 5 0 0 Q. Elizabeth incorporated the pin- ners and wire-drawers with them.	
24 Butchers †	Pudding-lane	James I.	1615 11 11 0 † This is an ancient fraternity; of which we have an account in the reign of Henry II. A. D. 1180.	
25 Saddlers	Cheapside	Edward I.	10 0 0	
26 Carpenters	London-wall	Edward III.	1344 8 0 0	
27 Cordwainers	Ditstaff-lane	Henry IV.	1410 10 0 0	
28 Painter-flainers	Little Trinity-lane	Q. Elizabeth	1582 14 0 0	
29 Curriers	Near Cripple-gate	James I.	1605 9 13 4	
30 Masons	Basinghall-street	Charles II.	1677 5 0 0	
31 Plumbers	Near Dowgate-hill	James I.	1611 10 0 0	
32 Innholders	Elbow-lane	Henry VIII.	1515 10 0 0	
33 Founders **	Lothbury	James I.	1614 8 0 0 ** All bras weights made in London, or three miles from it, must be fix- ed with the company's standard, and have their mark; the averdu- pois to be sealed at Guildhall, and the Troy at goldsmith's hall. And the company are empowered by charter, to view and search all bras weights, and bras and copper wares made within the said district.	
34 Poulters	No hall	Henry VII.	1504 10 0 0	
35 Cooks	Hail burnt	Edward IV.	1480 10 0 0	
36 Coopers	Basinghall-street	Henry VII.	1501 15 0 0	
37 Tylers and bricklayers	Ladenhall-street	Q. Elizabeth	1568 12 0 0	
38 Bowyers	No hall	James I.	1620 8 0 0	
39 Fletchers ¶	St. Mary Axe	No charter	10 0 0 ¶ It is only a company by prescription.	
40 Blacksmiths	Lambeth-hill	Q. Elizabeth	1577 8 0 0	
41 Joyners and ciefers	Thames-street	Q. Elizabeth	1569 8 0 0	
42 Weavers	Basinghall-street	Henry II.	6 0 0	
43 Woolmen	No hall	No charter	No livery; but they have a master, 2 wardens, and 11 assistants. They are only a company by prescription, yet supposed to have com- menced with the wool-trade.	
44 Scriveners	No hall	James I.	1616 5 0 0	
45 Fruiterers	No hall	James I.	1605 5 0 0	
46 Plasterers	Addle street	Henry VII.	1501 8 0 0	
47 Stationers ††	Ludgate-street	Philip & Mary	1557 20 0 0 †† This company, which also includes bookfellers, letter-founders, printers, and book binders, have a stock which is employed in printing almanacks, primers, psalters, school-books, &c. of which they have the sole privilege, by virtue of a grant from the crown. This stock consists of shares, which are distributed in different proportions among those who have fined for, or served the office of renter-wardens: whose shares, if they die married, devolve to their widows. They pay above 200 <i>l.</i> a year in pensions and other charities. They are likewise trustees for the disposal of the considerable legacies of Mr. William Bowyer, a learned printer, (who died Nov. 18, 1778) consisting of 30 <i>l.</i> a year to the next learned journeyman that can be met with; and 180 <i>l.</i> a year in annuities of 20 <i>l.</i> each to nine necessitous printers of sixty- three years of age or upwards; besides other charities.	
48 Broderers	Cutter-lane	Q. Elizabeth	1591 5 0 0	
49 Upholders	No hall	Charles I.	1627 4 10 0	
50 Musicians	No hall	James I.	1604 10 0 0	

C O M P A N Y.

Companies.	Halls.	Incorporated by	A. D.	Livery fines.	Charitable Gifts, paid yearly, and Privileges, &c.
51 Turners	College-hill	James I.	1604	l. s. d. 8 0 0	
52 Basket-makers	No hall	No charter			No livery; yet a company by prescription, governed by 2 wardens and 48 assistants, with this motto to its arms, <i>Let us love one another.</i>
53 Glaziers	No hall	Charles I.	1637	3 0 0	The glass painters are incorporated with them.
54 Horners	No hall	Charles I.	1638		No livery; yet they have a master, 2 wardens, and 9 assistants, with a warehouse in Spitalfields; where they divide in lots, among themselves, such horns as are brought up by their members in Leadenhall and other markets: And in 1465, they obtained an act of parliament that none should be exported, but such as they refused.
55 Farriers	No hall	Charles II.	1673	5 0 0	
56 Pavours	No hall	No charter			No livery; yet it is a fellowship by prescription, with 3 wardens, and 25 assistants.
57 Loriners	London-wall	Q. Anne	1712	10 0 0	
58 Apothecaries	Blackfryars	James I.	1617	16 0 0	They are exempt from ward and parish-offices, and have a spacious physic-garden at Chelsea; which in 1721 was granted to the company for ever by Sir Hans Sloane, bart. the lord of the manor, on condition of their paying a quit-rent of 5 <i>l.</i> and continuing it always as a physic-garden, and of presenting every year to the Royal Society fifty samples of different sorts of plants, there grown, till they amount to two thousand.—The latter of these conditions hath been long since more than completed. This is what may be called a trading company.
59 Shipwrights	No hall	James I.	1605		No livery; yet they have a master, 2 wardens, and 16 assistants.
60 Spectacle-makers	No hall	Charles I.			No livery; yet have a master, 2 wardens, and 15 assistants.
61 Clock-makers	No hall	Charles I.	1632	10 0 0	
62 Glovers	No hall	Charles I.	1638	5 17 4	
63 Comb-makers	No hall	Charles I.	1636		No livery; yet they have a master, 2 wardens, and 13 assistants.
64 Felt-makers	No hall	James I.	1604	5 0 0	
65 Framework-knitters	Red cross-street	Charles II.	1663	10 0 0	
66 Silk-throwers	No hall	Charles I.	1630		No livery; yet have a master, 2 wardens, and 20 assistants.
67 Silkmen	No hall	Charles I.	1631		No livery; yet have a governor, and 20 assistants.
68 Carmen, have no hall, nor charter, nor livery; but are a fellowship by act of common council, with the title of Free Carmen of the city of London, and have a master, 2 wardens, and 41 assistants, under the direction of the lord mayor and aldermen. The carts that belong to this fellowship, which are betwixt 4 and 500, are, by an act of common council, subjected to the rule of the president and governors of Christ's Hospital; to whom the owner of every cart pays 17 <i>s. 4 d.</i> a year for a licence to work it, and every cart is brought to the hospital to have a number in bras put upon it.					
69 Pin-makers	No hall	Charles I.	1636		No livery; yet have a master, 2 wardens, and 18 assistants.
70 Needle-makers	No hall	O. Cromwell	1656	5 5 0	
71 Gardeners	No hall	James I.	1616		No livery; yet have a master, 2 wardens, and 18 assistants.
72 Soap makers	No hall	Charles I.	1630		No livery; yet have a master, 2 wardens, and 18 assistants.
73 Tin-plate-workers	No hall	Charles II.	1670	10 0 0	
74 Wheelwrights	No hall	Charles II.	1670	15 15 0	
75 D fillers	No hall	Charles I.	1638	13 6 8	
76 Hatband-makers	No hall	Charles I.	1638		Incorporated with the company of needle-makers.
77 Patten-makers	No hall	Charles II.	1670	6 0 0	
78 Glass-fellers and looking-glass-makers	No hall	Charles II.	1664	5 0 0	
79 Tobacco-pipe-makers	No hall	Charles II.	1663		No livery; yet have a master, 2 wardens, and 18 assistants.
80 Coach and harness-makers	Noble-street	Charles II.	1677	10 0 0	
81 Gunsmiths	No hall	Charles I.	1638	10 0 0	
82 Gold and silver wire-drawers	No hall	James I.	1623		No livery; yet have a master, 2 wardens, and 18 assistants.
83 Long-bow-string-makers	No hall	No charter			No livery; yet a company by prescription, and have 2 wardens, and 19 assistants.

COMPANY.

Companies.	Halls.	Incorporated by	A. D.	Livery fins.	Charitable Gifts paid yearly, and Privileges, &c.
84 Card-makers	No hall	Charles L.	1629	No livery; yet have a master, 2 wardens, and 18 assistants.	
85 Fan-makers	No hall	Q. Anne	1709	No livery; yet have a master, 2 wardens, and 20 assistants.	
86 Woodmongers	were a company incorporated with the carmen by K. James I. 1605. but surrendered their charter in 1668; by an act of common council in 1694, they obtained a privilege of keeping 120 carts, exclusive of the number kept by the carmen, <i>extinct</i> .				
87 Starch-makers, <i>extinct</i>	No hall	James I.	1622		
88 Fishermen, <i>extinct</i>	No hall	James II.	1787		
89 Parish-clerks	Wood-street	Henry III.	1233	By a decree of the Star chamber court in 1625, they obtained a privilege to keep a press in their hall, for printing the weekly bills of mortality, by a person appointed by the archbishop of Canterbury. They are, by their charter, to make a report of all the weekly christenings and burials in their several parishes every Tuesday, and they have a master, 2 wardens, and 17 assistants.	
90 Porters,	are another fellowship, without hall, or livery; consisting of tackle and ticket-porters. They were constituted a fraternity by act of common council in 1646, with a power of annually choosing among themselves twelve rulers, being six of each denomination. However, the court of lord mayor and aldermen have referred to themselves a power of appointing one of their own body, as the chief judge in all controversies. One very laudable custom of the master tackle-porters is, that such of their brethren as happen to be disabled from working, receive their share of all profits, as if actually in business, during life.				
91 The watermen, wherymen, and lightermen	of this city and neighbouring places, were by act of K. William III. constituted a society, or company, under the direction of the lord mayor and aldermen. They are to furnish 1000 men for the navy, upon demand by the admiralty. They have a hall at Coal Harbour, near the Thames; and pay to their poor about 800 <i>l.</i> a year; chiefly raised by ferries over the Thames on Sunday.				
N. B.	The company of Surgeons, Parish-clerks, Porters and Watermen, have not the privilege of making their members freemen of the city of London.				

From the foregoing list, it appears on the whole, that there are ninety-one companies, forty-eight halls, and that the number of livermen, according to the most exact account that could be procured, in 1779, was 8954, but this number is variable. The sums of money yearly distributed in charity by only twenty-three of the companies, amounts to more than 23,655*l.*; and if but forty-pounds each be annually given by the remaining sixty-eight companies, the whole will much exceed 26,375*l.* per annum.

COMPANY seems more peculiarly appropriated to those grand associations, set on foot for the commerce of the remote parts of the world; as the English and Dutch East India company, South Sea company, Mississippi company, &c.; the rise and establishment of which, we shall here set before the reader.

However injurious companies with joint-stock, and incorporated with exclusive privileges, may, at this time, be reckoned to the nation in general; it is yet certain that they were the general parent of all our foreign commerce; private traders being discouraged from hazarding their fortunes in foreign commerce, until the method of traffic had been first settled by joint-stock companies. From this principle it is, that we find several nations that are now endeavouring to improve their trade, and to establish or increase marine power, by the means of joint-stock companies.

But since the trade of this kingdom, and the number of traders have increased, and the methods of assurance of shipping and merchandise, and the navigation to all parts of the known world have become familiar to us; these companies, in the opinions of most men, have been looked upon in the light of monopolies: their privileges have therefore been lessened from time to time, in order to favour a free and general trade; and experience has shewn, that the trade of the nation has advanced, in proportion as monopolies have been discouraged. When companies do not trade upon a joint-stock, but are obliged to admit any person properly qualified, upon paying a certain fine, and

agreeing to submit to the regulations of the company, each member trading upon his own stock, and at his own risk, they are called *regulated companies*. When they trade upon a joint-stock, each member sharing in the common profit or loss in proportion to his share in this stock, they are called *joint-stock companies*. Such companies, whether regulated or joint-stock, sometimes have, and sometimes have not, exclusive privileges. Regulated companies resemble, in every respect, the corporations of trades, so common in the cities and towns of all the different countries of Europe; and are a sort of enlarged monopolies of the same kind. As no inhabitant of a town can exercise an incorporated trade, without first obtaining his freedom in the corporation; so in most cases no subject of the state can lawfully carry on any branch of foreign trade, for which a regulated company is established, without first becoming a member of that company. Of companies of this kind we have had, or still have, in Great Britain, the Hamburg company, the Russia company, the Eastland company, the Turkey company, and the African company. Regulated companies, as sir Joshua Child has observed, though they had frequently supported public ministers, had never maintained any forts or garrisons in the countries to which they traded; whereas joint-stock companies frequently had. And in reality, says Dr. Smith, (Wealth of Nations, vol. iii. p. 116.) the former seem to be much more unfit for this sort of service than the latter; partly, because the directors of a regulated company have no particular interest in the prosperity of the general trade of the country, for the sake of which such forts and garrisons are maintained; whereas the private interest of the directors of a joint-stock company, is connected with the prosperity of the general trade of the company, and with the maintenance of the forts and garrisons which are necessary for its defence; and partly, because the directors of the latter company have always the management of a large capital, the joint-stock of the company, a part of which they may frequently employ, with propriety, in building, repairing, and maintaining such necessary forts and garrisons; whilst

the directors of a regulated company, having the management of no common capital, have no other fund to employ in this way, but the casual revenue arising from the admission fines, and from the corporation duties imposed upon the trade of the company.

Joint-stock companies, established either by royal charter or by act of parliament, differ, in several respects, not only from regulated companies, but from private copartneries. 1st. In a private copartnership, no partner, without the consent of the company, can transfer his share to another person, or introduce a new member into the company. Each member, however, may, upon proper warning, withdraw from the copartnership, and demand payment of his share of the common stock. In a joint-stock company, on the contrary, no member can demand payment of his share from the company; but each member can, without their consent, transfer his share to another person, and thereby introduce a new member. 2dly. In a private copartnership, each partner is bound for the debts contracted by the company to the whole extent of his fortune; whereas, in a joint-stock company, each partner is bound only to the extent of his share. The trade of a joint-stock company is always managed by a court of directors, which is frequently subject, in a variety of respects, to the controul of a general court of proprietors; but these proprietors, being for the most part totally exempted from trouble and from risk, beyond a limited sum, receive contentedly such half-yearly or yearly dividends, as the directors think proper to assign; and many persons are encouraged to become adventurers in joint-stock companies, who would, upon no account, hazard their fortunes in any private copartnership. The directors of such companies being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private copartnership frequently watch over their own. Negligence and profusion must always prevail, more or less, in the management of the affairs of such a company. It is upon this account that joint-stock companies for foreign trade have seldom been able to maintain the competition against private adventurers. They have, accordingly, very seldom succeeded without an exclusive privilege, and frequently have not succeeded with one. Without an exclusive privilege, they have commonly mismanaged the trade; with an exclusive privilege, they have both mismanaged and confined it. For other appropriate and just observations on this subject, in its reference to the African company, the Hudson's bay company, the South Sea company, and the East India company, see Smith's *Wealth of Nations*, vol. iii. chap. 1.

When a company of merchants undertake, at their own risk and expence, to establish a new trade with some remote and barbarous nation, it may not be unreasonable to incorporate them into a joint-stock company, and to grant them, in case of their success, a monopoly of the trade for a certain number of years. It is the ancient and most natural way in which the state can recompense them for hazarding a dangerous and expensive experiment, of which the public is afterwards to reap the benefit. A temporary monopoly of this kind may be vindicated upon the same principles upon which a like monopoly of a new machine is granted to its inventor, and that of a new book to its author. But upon the expiration of this term, the monopoly ought certainly to terminate; the forts and garrisons, if it was found necessary to establish any, to be taken into the hands of government, their value to be paid to the company, and the trade to be laid open to all the subjects of the state. Without a monopoly, however, a joint-stock company, as expe-

rience has shewn, cannot carry on any branch of foreign trade. An eminent French author, of great knowledge in matters of political economy, the abbé Morellet, gives a list of 55 joint-stock companies for foreign trade; which have been established in different parts of Europe since the year 1600, and which, according to him, have all failed from mismanagement, notwithstanding they had exclusive privileges. Although he has been misinformed with regard to the history of two or three of them, which were not joint-stock companies, and which have not failed; yet there have been several joint-stock companies, which have failed, and which he has omitted.

The only trades which it seems possible for a joint-stock company to carry on successfully without an exclusive privilege, are those, of which all the operations are capable of being reduced to what is called a routine, or to such a uniformity of method as admits of little or no variation. Of this kind is, first, the banking trade; secondly, the trade of insurance from fire, and from sea-risk and capture in time of war; thirdly, the trade of making and maintaining a navigable cut or canal; and fourthly, the similar trade of bringing water for the supply of a great city. To render the establishment of a joint-stock company perfectly reasonable, with the circumstance of being reducible to strict rule and method, two other circumstances ought to concur. First, it ought to appear with the clearest evidence, that the undertaking is of greater and more general utility than the greater part of common trades; and, secondly, that it requires a greater capital than can easily be collected into a private copartnership. In the four trades above-mentioned both these circumstances concur.

The joint-stock companies, says this judicious writer, which are established for the public spirited purpose of promoting some particular manufacture, over and above managing their own affairs ill, to the diminution of the general stock of the society, can, in other respects, scarce ever fail to do more harm than good. Notwithstanding the most upright intentions, the unavoidable partiality of their directors to particular branches of the manufacture, of which the undertakers mislead and impose upon them, is a real discouragement to the rest, and necessarily breaks, more or less, that natural proportion which would otherwise establish itself between judicious industry and profit, and which, to the general industry of the country, is of all encouragements, the greatest and the most effectual.

COMPANY, *African*; sometimes called "Royal African Company," the name of the original institution. The first commercial voyage from England to the coast of Guinea was in 1536, but nothing like a company was formed till the year 1583, when queen Elizabeth granted a patent for ten years to come, to some merchants of Exeter, and other persons for an exclusive trade to the rivers Senegal and Gambia. In 1618, king James I. granted a charter for establishing a joint-stock company; but separate traders continuing to resort to the coast, the company was soon dissolved. Another company was erected by charter in 1631, which met with little success; and in 1651, the parliament granted a charter for five years to the East India company, for trading to the Gold coast in their way to India. The demand for negroes in the West India and American plantations increasing considerably, another exclusive African or Guinea company was incorporated in 1662, at the head of which was the duke of York, joined with many persons of rank and distinction. This company, like those that had preceded it, was unsuccessful, and its charter was soon after revoked by consent of the parties associated in the enterprise, in consequence of which another exclusive company

was incorporated by letters patent in 1672. They raised a capital of 171,000*l.* and improved the trade considerably; but at the revolution the West India planters joined the separate traders in asserting that they were always best served with slaves when the trade was free to all persons; and exclusive companies, whose privileges had not been sanctioned by parliament, being considered inconsistent with the declaration of rights, the trade became open again; but all private traders were to pay 10 per cent. to the company, towards maintaining the forts and factories on the coast. This contribution was however found insufficient, and in 1750 parliament granted 10,000*l.* for the purpose, which was continued annually till 1744, when, in consequence of the war, 20,000*l.* was granted, and in almost every year since, a sum has been appropriated by parliament to this purpose.

As all the joint-stock companies which had been established for this trade had appeared incompetent to carry it on with advantage, it was in 1750 (23 Geo. II. c. 31.) transferred to a regulated company, the members of which are deemed a body corporate and politic, under the title of *The Company of Merchants trading to Africa*, but are prohibited from trading in their corporate capacity, from having any joint or transferable stock, and from borrowing money under their common seal. Any person intending to trade to Africa, may become free of this company on payment of forty shillings; and out of the monies thus received, a sum not exceeding 800*l.* is allowed for the salaries of clerks and agents at London, Bristol, and Liverpool, the house-rent of their office at London, and all other expences of management, commission, and agency in England. What remains of this sum, after defraying these different expences, they may divide among themselves, as compensation for their trouble, in what manner they think proper. The forts, factories, &c. possessed by the old company on the coast of Africa, are vested in the present company, who continue to receive an annual sum from parliament (generally about 13,000*l.*) for the support of these establishments: the sum granted in the year 1806 was 18,000*l.* For the proper application of this sum, the committee is obliged to account annually to the auditor baron of the exchequer, which account is afterwards to be laid before parliament.

The company is under the management of a committee of nine persons, three being chosen for London, three for Bristol, and three for Liverpool, annually. The committee are enjoined to lay an annual account of the application of the money granted to them before parliament.

Although by the 4th of Geo. III. c. 20. the fort of Senegal, with all its dependencies, had been vested in this company, yet in the year following (by the 5th of Geo. III. c. 44.) not only Senegal and its dependencies, but the whole coast from the port of Salee, in South Barbary, to cape Rouge, was exempted from the jurisdiction of that company, and vested in the crown; the trade to it being declared free to all his majesty's subjects.

Before the establishment of the Royal African company, there had been three other joint-stock companies successively erected one after another, for the African trade. They were all equally unsuccessful. They all, however, had exclusive charters, which, though not confirmed by act of parliament, were in those days supposed to convey a real exclusive privilege.

COMPANIES, English. The *East India Company* was established by charter dated Dec. 31, 1600, by which the earl of Cumberland and 215 other persons were authorized to carry on an exclusive trade to all parts of the East Indies, for 15 years; under the title of "The Governor and Company of Merchants of London trading to the East Indies." They

raised 72,000*l.* in shares of 50*l.* each, and fitted out five ships, which accomplished their first voyage very successfully, in two years and seven months.

Having carried on the trade for about ten years, with different degrees of success, they obtained another charter dated May 31, 1610, by which the company was made perpetual. They had not yet adopted the mode of trading under one joint stock, but carried it on in several partnerships and lesser stocks. In 1613 the proprietors of the several separate stocks, united them into one general joint-capital; and notwithstanding some opposition to their trade, both at home, and abroad, they preserved and extended it, having at this time established factories at about twenty different places in India. In a vindication of the East India Company before the privy council, at a subsequent period, among other remarks for shewing the great difficulties attending an East India trade, it was asserted, that although they had a stock of 1,500,000*l.* yet in fifteen years time $\frac{1}{2}$ of it from 1617 to 1632, their whole profit was no more than 12 and one-half per cent.

In 1637, Charles I. established a new company to trade to China and Japan, but it was soon ruined. The old company likewise from its differences with the Dutch East India company, the encroachments of private adventurers, and other causes, fell into decay, and in 1655 it was dissolved by Cromwell, and the trade laid open. The mischiefs which followed obliged him to re-establish the company about three years after; their joint-stock was now 739,782*l.* of which only one half, or 369,891*l.* was paid in, and was properly their capital. The total exports of the company in three years, ending with 1660, was 227,820*l.* in bullion, and 23,763*l.* in merchandize. After the restoration, they obtained a new charter from Charles II. dated April 3, 1661. By this charter it appears that the company had not then one sole transferable joint-stock; but that every one, who was free of this company paid a certain sum of money to the company on the fitting out of their fleet, for which he had credit in the company's books, and received his proportionate dividend on the profits of the respective voyage. The whole investments were made by the company in their corporate capacity; but they were not established as an irrevocable corporation, as they might be dissolved on three years notice.

In 1664, the company's stock sold at only 70 per cent., but in consequence of an inquiry into the state of their affairs, the result of which was very favourable, the stock soon got up considerably. New charters were granted in 1669 and 1676, confirming all their privileges. In the latter year, the company having made a considerable profit by their trade, agreed, instead of making a dividend thereof, to add it to their capital stock, so as just to double the same, by which their capital became 739,782*l.* 10*s.* In consequence of the extension and success of their trade, which enabled them to make large dividends, their stock in 1680 sold from 280 to 300 per cent; but these great profits, and the doubtful authority on which they held their exclusive privileges, (not having the sanction of parliament) being a great temptation to individual adventurers, interlopers, who had often given them much trouble, became again very numerous, and attempts were made to get the trade laid open, or to have it vested in a regulated company similar to those by which the trade with Turkey and with some other countries was then carried on. The company, however, in 1683 found means to obtain a new charter, by which all their former privileges were confirmed, and they were empowered to seize the ships and merchandize of all interlopers, to raise and maintain military forces, to exercise martial law, and

and to establish a court of judicature for determining all mercantile causes, within their limits. In 1686 they obtained another charter granting them still greater powers and privileges.

Soon after the revolution much popular clamour was raised against the East India company; and in 1691 the house of commons addressed the king to dissolve the company and incorporate a new one; an opportunity for which soon occurred, as in 1693, the charter of the company became void, from their not paying the duty which had been imposed on their stock within the time limited by the act; but a new charter was granted them, on condition of submitting to such regulations as should be obtained before the 29th of September 1694 and which were contained in two charters soon afterwards executed.

In 1698 the complaints of the weavers of London against the importation of India wrought silks, and the company having been prevented by losses from making any dividends for several years, brought it into much disrepute, and the house of commons thought it necessary to take the state of their affairs into consideration. The company thought it prudent to offer to advance 700,000*l.* for the public service at 4 per cent. interest, provided the exclusive trade was legally settled on them; but a number of merchants, countenanced by the chancellor of the exchequer, proposed to advance 2,000,000*l.* at 8 per cent. interest, for similar privileges. The latter proposal was approved, and an act passed by which a new company was established; many difficulties however appeared, with respect to their engaging in the trade, till the expiration of the three years notice for determining the old company. During this unsettled state of the East India trade, the old company's stock had in about nine or ten years fluctuated from 300 per cent. to only 37 per cent.

The great contentions which ensued between the old and new companies, soon rendered it obvious that little benefit would be derived from the trade, unless a coalition between the two rival corporations was effected. This was accomplished in 1702, by an agreement that the old company should purchase an equal proportion of stock in the new company, and that the separate traders, who had subscribed to the new company, but not to their joint-stock, should be included in the union. The old company was to keep their stock in the new company, in their corporate capacity for seven years, then to transfer it to their respective members, and resign their charter to the crown, from which time the new company comprehending the proprietors of both, assumed their present title of "The united Company of Merchants of England trading to the East Indies." In 1708 the term of their exclusive trade to India, which was determinable upon three years notice after 1711, and repayment of the sum they had advanced, was prolonged to three years notice after Lady-day 1726; for which they advanced to government 1,200,000 without any additional interest. In 1712 they obtained an act for continuing the trade and corporate capacity of the company, although the sums they had advanced to government should be repaid; which repayment or redemption of their annual fund, was not to be made till the expiration of three years notice after Lady-day 1733.

The act of parliament being liable to a different construction from what was probably intended, and the term granted being near its expiration, a very powerful opposition to its renewal, was raised in 1730, and specious proposals were made to parliament for redeeming the fund of the company, and transferring the trade to a regulated

company, with similar privileges. After a very full discussion of the subject, a new agreement was entered into with the company, who agreed to pay 200,000*l.* towards the service of the current year, and to have the interest payable to them by government reduced from 5 to 4 per cent.; in consideration of which all their exclusive privileges were continued till the expiration of three years notice, to be given after Lady-day 1746, when upon re-payment of their entire capital of 3,200,000*l.* their exclusive privileges were to cease, but the company to continue a corporation for ever, to enjoy the East India trade in common with all other subjects. In consequence of this reduction of the interest received from government, they thought proper to reduce the dividend payable to their proprietors from 8 to 7 per cent. and soon after to 6 per cent.

In 1743 the company proposed to advance 1,000,000*l.* for the service of the year 1744, at 3 per cent. interest, on having the term of their exclusive trade enlarged for fourteen years, and being permitted to borrow a million on bonds. This proposal being accepted, the debt from the public to the company became 4,200,000*l.*, and the exclusive trade was now extended to three years notice, to be given by parliament after Lady-day 1780, with the former provision, that, after such determination, the company should continue to have a common right with other subjects in the trade to India.

The company not subscribing to the reduction of interest proposed in 1749, the speaker of the house of commons was ordered to give them notice that the sum due from government would be paid off, unless they subscribed before May 30, 1750: with this it was deemed prudent to comply, but a condition was made, that in order to enable the company to reduce their bond debt, they should be empowered to raise money by the sale of 3 per cent. annuities, to the amount of the debt of government to the company. The annuities thus sold were known by the title of 3 per cent. India annuities, and were for many years payable at the India house, but are now consolidated with the 3 per cent. reduced bank annuities.

Hitherto the company had not aspired beyond their original character of merchants, and merely possessed factories at the principal ports to which they traded; these factories were, for the safety of their merchandize and the protection of their servants, converted into forts, which rendered it necessary to maintain a military establishment. Thus possessed of the means of offence as well as defence, they made considerable exertions to oppose the progress of the French in those parts; and as the two companies each endeavoured to procure the assistance of the neighbouring native princes, the field of interest and ambition became much enlarged. In 1751, the company sent a considerable military force into the province of Arcot to support the nabob against his rival, who was powerfully assisted by the French; in which contest they were engaged with little intermission for several years. In Bengal, the company had carried on their commercial intercourse without any connexion with territorial authority, till the death of the subah Ali-Verdi-Khan, in 1756. This prince had viewed their increasing opulence and power with great jealousy, and a short time before his death gave a remarkable charge to his successor, in which he cautioned him to keep in view the power of the European nations in his country, and to free himself from their influence as soon as possible. "The power of the English is great; reduce them first; the others will then give you little trouble. Suffer them not to have forts or soldiers; if you do, the country is theirs." In attempting to put

this advice into execution, Son-Rajah-Dowla was completely defeated by the company's forces, and the new subah of their appointment, besides paying to the company a very large sum for their losses and expences, ceded to them a considerable territory in the vicinity of Calcutta. On the coast of Coromandel, hostilities were carried on against the French settlements with unequal success, but ultimately to the advantage of the English, upon which the subah of the Deccan concluded a treaty with the company, and ceded to them the entire circar of Masulipatam. In 1760, the company's forces completely defeated those of France, and in the following year captured Pondicherry, the chief of the French settlements in India; since which events the power of France in India has been very insignificant.

Such was the commencement of the company's acquisitions of territory, which they have seized every subsequent opportunity of extending, till the sovereigns of India, whose protection they formerly courted, have sunk into the situation of their dependents, and hold their precarious dignities at the will and pleasure of a society of foreign traders.

The annual sales of the imports of the company for sixteen years preceding 1757, amounted on an average to about 2,055,000*l.*; and for the same period, the exported goods and stores amounted annually, at their prime cost, to 238,000*l.*; the bullion exported to 690,000*l.* per annum, and they paid in discharge of bills of exchange 190,000*l.* per annum.

Early in 1764, on the receipt of some unpleasant news from Bengal, India stock fell 14 per cent. The general administration of the company's affairs, both at home and abroad, became soon after the subject of much discussion; and on 29th August 1766, the court of directors received a notice from the secretaries of state, that an investigation would

take place in the next session of parliament. The administration laid claim to the territories which the company had acquired in India, with the revenue arising from them, as of right belonging to the crown; but as the company were very unwilling to have this new source of wealth taken out of their hands, a temporary agreement was made for two years, by which the company, in compensation for this claim, agreed to pay to government 400,000*l.* a year. In 1769, the agreement was renewed for five years, and the territorial acquisitions and revenues in India figured to the company for that term, with a stipulation that the company should be allowed to increase their dividend to 12½ per cent., but not to increase it more than one per cent. in one year.

They now became involved in a war with the famous Hyder Ally, in consequence of which, and of the misconduct of their servants in India, the concerns of the company, from the most flourishing situation, were brought into the greatest embarrassments. Select and secret committees of the house of commons were appointed to investigate the state of their affairs; and in 1773, it appeared, not only that they were unable to make the stipulated annual payment to government, but that it was necessary to assist them with a loan of 1,400,000*l.* Till this sum should be repaid, the dividend to their proprietors was not to exceed 6 per cent., and afterward not to exceed 7 per cent. till their bond debt was reduced to 1,500,000*l.* From these circumstances, the price of the company's stock fell considerably from the latter part of 1772 till February 1774, when their affairs began to wear a brighter aspect. In 1776, the loan from government had been repaid, and their situation being otherwise improved, the dividend on their stock was raised to 8 per cent.

Statement of the Company's Revenues, at their different Settlements in India, in the Year ending April 1777.

To expences in Bengal, civil, military, and fortifications	£ 1,350,000
To ditto at Fort St. George	560,000
To ditto at Bombay	360,000

	2,270,000
Nett balance of the year's revenues	1,770,000

	£ 4,040,000

By nett revenues in Bengal	£ 2,500,000
Benares tribute	250,000
Oude subsidy	370,000
By revenues of Fort St. George and the Circars	560,000
Tanjore subsidy	160,000
By revenues of Bombay, &c.	160,000

	£ 4,040,000

On an average of ten years, ending with 1777, the company's exports in goods were about 490,000*l.*; in bullion, 110,000*l.*; and the sum paid in discharge of bills of exchange, 458,000*l.* per annum. By the aid afforded from the revenues, their investments were increased, so as to produce about 3,300,000*l.* per annum.

In 1779, an act was passed for continuing the territories and revenues in India in the possession of the company for one year, which in 1780 was continued for another year. In June 1781, it was agreed to offer to pay into the exchequer 400,000*l.*, in full discharge of all claims of the public upon the company up to the 1st of March; and as, in the preceding year, they had received notice that the 4,200,000*l.* due to them from government would be paid off on the 10th of April, 1783, it became necessary to enter into a new agreement, the conditions of which were, that the company should continue to enjoy their exclusive privileges to the 1st of March, 1794, then to cease and determine, upon the former conditions of three years previous

notice, and the repayment of all sums due to them. The surplus of their nett profits, after paying their dividends, were appropriated, three fourths for the service of government, and one fourth to be retained by the company; and they were restricted not to increase the dividend of 8 per cent. more than 1 per cent. in any year. This restriction was, however, soon found unnecessary; for the nett profits of the company for the year ending 1st of March, 1782, did not amount to so much as a dividend of 8 per cent. on their stock by 22,023*l.*; in consequence of which, it became necessary for government to allow a farther time for the payment of 396,466*l.* 2*s.* 6*d.*, which was due from the company for customs, besides a part of the sum which they had agreed to pay in 1781; and they were at the same time empowered, notwithstanding the above deficiency, to continue their dividends at 8 per cent. In the following year, the war in India, and other circumstances, increased the embarrassment of the company's affairs; and, by a statement of their accounts to the 1st of March, 1783, it appeared that

the nett profits of that year did not amount to a dividend of 8 per cent. by 255,813*l.*, which dividend they were nevertheless authorized by parliament to continue; and, to enable them to do, government issued exchequer bills to the amount of 300,000*l.*, which the bank undertook to lend money upon to the company.

The long and expensive war in which the company had been engaged in India, terminated in March 1784, by the ratification of peace with the Mysorean government; but the consequence of this war, in addition to the war in Europe, was the general derangement of the company's affairs both at home and abroad. In December 1783, February and May 1784, the directors laid before parliament such accounts as they then possessed, respecting the general state of their finances. But the impossibility of drawing any satisfactory information from statements made up in such a situation of their affairs, with the apprehensions which the measures then in agitation, relative to the future government of India, had excited in the public mind, reduced the credit of the company to the lowest ebb. Their stock sold as low as 118½; their bonds at home, bearing 5 per cent. interest, were negotiated from 2½ to 4 per cent. discount; their bonds and certificates, at Bengal and Madras, bore from 18 to 40 per cent. discount; at Bombay 50 per cent.; and orders on the treasury there sold at 65, and upwards, per cent. discount.

It now became a general conviction, that the company was incompetent to the political government of the extensive territories which they had acquired. A Board of Control was therefore established, composed of a certain number of commissioners to be appointed by the king, and removable at his pleasure. This board was authorized to check, superintend, and control, the civil and military government and revenues of the company. The dispatches transmitted by the directors to the different presidencies were to be previously subjected to the inspection of the Board. The appointment of governor-general, president, or counsellor in the different presidencies, was made subject to the approbation and recall of his majesty; and such other regulations adopted, as in a great measure deprived the company of that political and civil authority which they had hitherto been so grossly abused.

In 1786 some further regulations were made respecting the government of India; and, as the company's trade was increasing, particularly in the article of tea, their import of which had been greatly augmented by the arrangement of the commutation act, they were said to require a greater capital, and were authorized to create 800,000*l.* new stock, on which they raised 1,240,000*l.* at the rate of 155 per cent. In 1789 they obtained another act, enabling them to add 1,000,000*l.* to their capital, which thus became 5,000,000*l.*

In the beginning of 1793, the term of the company's exclusive privileges being nearly expired, the subject of laying open the trade to India was again discussed, and though it was not thought proper to risk the loss and confusion which must unavoidably attend any attempt to take such an immense concern out of the hands in which it has so long continued, a stipulation was made in the agreement for the renewal of the charter, that such regulations should be adopted as to admit of a free exportation by private persons on their own account, of any goods of the growth, produce, or manufacture of Great Britain or Ireland; and of a free importation of such sorts of the raw materials of the East Indies as are used in the manufactures of Great Britain or Ireland; that the company should be obliged to provide shipping for the carriage of the private trade, at as low a

freight as it could be furnished by private merchants; and that they should license a proper number of agents to reside at the company's settlements, under their protection, for the management of the private trade. On these conditions the company's term in the exclusive trade was enlarged for 20 years, or to the 1st of March, 1814, with the former proviso, that if, after the expiration of that term, their right to the sole trade shall cease, in consequence of three years previous notice being given by parliament, and the repayment of such sums as may be then due from the public, they shall continue a corporation, with power to carry on a free trade in common with other persons.

On this occasion, the total income of the company, arising both from their territorial revenues and their commercial concerns, was stated as follows:

The nett annual income in rents and profits of trade, taken in the most unfavourable light to the company, and supposed to be considerably under the mark, was rated at	£ 2,329,164
Subject to the following payments, viz.	
Interest of 3,200,000 <i>l.</i> on bond, at 4 per cent.	£ 128,000
Ditto of 6,669,082 <i>l.</i> debt in India, at various rates of interest, on a medium about 8½ per cent.	561,923
Dividend of 8 per cent. on their capital of 5,000,000 <i>l.</i>	400,000
	1,089,923
Leaving a nett annual surplus of	£ 1,239,241

Of this surplus it was proposed to appropriate 500,000*l.* per ann. to the reduction of the debt in India, to pay 500,000*l.* per annum to government in half-yearly payments; and to pay an increased dividend of 10 per cent. to their proprietors at 6,000,000*l.* to which sum their capital was now raised.

This annual surplus, if it really existed at the time to which the above account refers, was of very short duration. In 1795 the company found themselves unable to continue the proposed contribution to government; and the intrigues of Tippoo Sab with the French, and with some of the native powers, which obliged the company to keep up a large military establishment, and soon after to engage in another expensive war, not only reduced the surplus of their revenues, but occasioned a considerable increase of debt in India, which has since been further augmented in consequence of hostilities with Dowlut Rao Scindia and Jeswunt Rao Holkar.

In order to furnish some idea of the extent of the company's commercial and financial concerns, the following accounts are subjoined.

The amount of all goods sold at the East India Company's sales, from the 1st of March 1805 to the 1st of March 1806,

Company's goods; viz.	
Teas	£ 3,620,904
Bengal piece goods	621,862
Coalt and Surat piece goods	614,317
Raw and organzine silk	274,459
Nankeens	65,240
Pepper	121,834
Saltpetre	217,769
Spices	114,545
Drugs, sugar, coffee, &c.	348,350
	5,999,290

COMPANY.

Private Trade goods, &c.	
Teas - - - - -	£239,215
Piece goods - - - - -	772,517
Raw silk - - - - -	442,228
Nankens - - - - -	21,489
Pepper - - - - -	10,633
Saltpetre - - - - -	144
Drugs, sugar, indigo, &c. - - - - -	1,693,926
	2,782,152
Total - - - - -	£8,781,442

	£	s.	d.
Dividends on stock and interest on bonds - - - - -	779,429	19	1
Bonds paid off and paid in on sales - - - - -	216,600	0	0
Proprietors of private trade - - - - -	2,169,021	15	0
Pay to marine and military officers on fur- lough, and retired from service - - - - -	141,319	15	0
Duty on tea paid - - - - -	3	184,417	6
Cash in the treasury 1st March 1807 - - - - -	511,978	16	4
	£13,288,527	12	4

An Estimate of the revenues and charges in India, for the year 1806-7.

Revenues.	
Bengal - - - - -	£9,148,711
Madras - - - - -	5,021,325
Bombay - - - - -	677,203
Total - - - - -	£14,847,239

Charges.	
Bengal, civil and military expenses - - - - -	£6,944,607
Madras - - - do. - - - - -	5,379,218
Bombay - - - do. - - - - -	1,826,516
Commercial charges not added to invoices - - - - -	192,769
Interest of debts - - - - -	2,275,300
Supplies to Prince of Wales' island, &c. - - - - -	185,000
Total - - - - -	£16,804,010

Deduct estimated revenues - - - - -	14,847,239
Deficiency - - - - -	£ 1,956,771

Account of the actual receipts and payments of the East India Company, in Great Britain, for one year, ending the 1st of March 1807.

Receipts.			
	£	s.	d.
Cash in the Treasury 1st March 1806 - - - - -	699,794	6	2
For company's goods sold - - - - -	5,294,384	13	8
Of the board of ordnance for saltpetre - - - - -	166,000	0	0
Private trade goods sold - - - - -	2,114,269	8	10
Charges and profit on private trade - - - - -	163,462	19	2
Customs on do. - - - - -	713,380	19	5
Freight on do. - - - - -	119,784	18	10
Interest on red. 3 per cent. annuities - - - - -	32,266	15	10
Of government, on account of a sum due to the company - - - - -	1,000,000	0	0
Alms-houses at Poplar - - - - -	2,416	18	2
Persons returned from India - - - - -	17,516	0	0
Bonds issued - - - - -	517,000	0	0
Duty on tea received - - - - -	3,120,290	12	3
Total - - - - -	£13,288,527	12	4

Payments.			
Customs - - - - -	161,736	14	0
Freight and demorage - - - - -	1,689,040	9	4
Goods and stores exported - - - - -	2,270,793	7	8
India debt - - - - -	50,233	19	5
Bills of exchange from India - - - - -	342,885	1	8
Ditto from China - - - - -	641,994	16	8
Bullion exported - - - - -	514,432	16	8
Charges of merchandize, including supra cargoes, commission, interest on loans, &c. - - - - -	623,652	14	11

The vast concerns of this company are under the management of twenty-four directors, who are formed into different committees; each committee having the superintendance of a particular department of the company's business. At the general courts of proprietors, persons possessing 1000l. stock have one vote; 3000l. two votes; 6000l. three votes; and 10,000l. four votes. The number of proprietors entitled to vote, on the 8th of April 1800, was 2163, and the number of votes 2832.

COMPANY, *Hamburg*, is the oldest trading establishment in the kingdom; though not always known by that name, nor restrained to those narrow bounds under which it was afterwards confined. It was first called, the Company of Merchants trading to Calais, Holland, Zealand, Brabant, and Flanders: then it acquired the general title of Merchant-adventurers of England; as being composed of all the English merchants who traded to the Low Countries, the Baltic, and the German ocean. Lastly, it was called the Company of Merchant-adventurers of England trading to Hamburg.

This company was not a society of dealers, each furnishing a part of the sum to constitute the capital stock of the company; but a mere association, or body of merchants, who had nothing in common, but the grant and privilege of trading to Hamburg, and some other cities of Germany; each managing his own commerce, and trading on his own foundation; only observing a certain discipline, and some regulations, which none but the company could establish or change.

This company was first incorporated by Ed. I. in 1206; and established again, by charter, in 1406, under the reign of Henry IV. It was afterwards confirmed and augmented with divers privileges, by many of his successors; among the rest, by Henry V. in 1413; Henry VI. in 1422; Henry VII. in 1493, 1505; and 1506; Henry VIII. in 1509, 1517, and 1536; Edward VI. in 1547; queen Mary, in 1553; Elizabeth, in 1564, and 1586; James I. in 1603; and Charles II. in 1661. But of all these charters, none but those of Henry IV. Henry VII. Elizabeth, James, and Charles, were of any importance, or gave the company any thing new; the rest being only confirmations. Before the charter of Henry IV. all the English merchants, who trafficked out of the realm, were left to their own discretion, and managed their affairs with foreigners as might be most for their respective interests; without any regard to the general commerce of the nation.

Henry observing this disorder, endeavoured to remedy it, by uniting all the merchants in his dominions into one body; wherein, without losing the liberty of trading each for himself, they might be governed by a company; and be subject to regulations, which should secure the general interest of the national commerce, without prejudice to the interest of particulars. With this view, he granted all the merchants, of his states, particularly those of Calais, then in his hands, a power of associating themselves into a body politic, with directors;

directors and governors, both in England and abroad; to hold assemblies both for the direction of business and the deciding of controversies among merchants; make laws, punish delinquents; and impose moderate duties and taxes on merchandizes and merchants to be employed in the service of the corporation.

These few articles of the charter of Henry IV. were afterwards much augmented by Henry VII. who first gave them the title of Merchant-adventurers to Calais, Holland, &c. gave them a power of proclaiming and continuing free fairs at Calais; and ordered, that to be reputed a member of the society, each person should pay twenty marks sterling; and that the several members should attend the general meetings, or courts, appointed by the directors, whether at London, Calais; or elsewhere.

The inexecution of this last article and contempt of some of the rest, occasioning great inconveniences to the company's affairs, another charter was procured, whereby the pain of imprisonment was menaced, for those who should absent themselves from the meetings without lawful cause, or should disobey the laws. A petition being made to queen Elizabeth, in 1564, for an explanation of certain articles in the charter of Henry VII. and a confirmation of the rest granted by other kings; that prince, by a charter of the same year, declares, that to end all disputes, they should be incorporated anew under the title of the "Company of Merchant-adventurers of England;" that all who are members of the former company should, if they desire it, be admitted members of this; that they should have a common seal; that they should admit into their society what other persons, and on what terms, they please; and expel them again on misbehaviour; that the city of Hamburg, and neighbouring cities, should be reputed within their grant, together with those of the Low Countries, &c. in that of the former company; that no member should marry out of the kingdom, nor purchase lands, &c. in any city beyond sea; and that those who do, shall be *ipso facto* excluded for ever.

Twenty-two years after this first charter, queen Elizabeth granted them a second; confirming the former, and further granting them a privilege of exclusion, with a power of erecting in each city within their grant, a standing council.

The woollen manufacture being the principal object of their application, they met with great opposition; first, from the Hanse, who forced them frequently to change their mart, or staple; and afterwards under king James I. who having erected a corporation in 1616, in favour of some private persons, who offered to set up a manufacture for dyeing and pressing cloths, &c. under pretence thereof the company of merchant-adventurers were prohibited dealing therein. But that project not succeeding, and the charter being revoked two years afterwards, the merchant-adventurers, whose company had been dissolved two years before, were restored in 1617, to their ancient privileges, and a new charter was given them, confirming their exclusive rights; and allowing them to have officers in the several custom-houses, to have an eye that they were not prejudiced in their woollens, under pretence of the like merchandizes, which others were allowed to send to other parts. This charter of king James, is the last of those confirmed by Charles II. in the grand charter of 1661.

The revolutions which had happened in the Low Countries towards the end of the sixteenth century, and which laid the foundation of the republic of Holland, having hindered the company from continuing their commerce with their ancient freedom; it was obliged to turn it almost wholly to the side of Hamburg, and the cities on the

German ocean; from which change some people took occasion to change its name to that of the Hamburgh company, though the ancient title of Merchant-adventurers is still retained in all their writings.

This society was greatly reduced, when its trade was laid open by William III. and the company is now extinct.

COMPANY of *Merchants of the Staple* was incorporated by Edward III. Their factory was at Middleburgh, in Zealand; but the staple being removed, in 1389, to Calais, it was soon after, *viz.* in 1399, removed from thence to England.

COMPANY, *Russia*. This was first projected towards the end of the reign of king Edward VI. executed in the first and second years of Philip and Mary; but had not its perfection, till its charter was confirmed by act of parliament, under queen Elizabeth, in 1566. It had its rise from certain adventurers, who were sent in three vessels on the discovery of new countries; and to find out a north-east passage to China; these, falling into the White sea, and making up to the port of Archangel, were exceedingly well received by the Muscovites; and at their return, solicited letters patent to secure to themselves the commerce of Russia, for which they had formed an association.

The charter was promised them by Edward VI. but he dying, was first dispatched by queen Mary, in 1555. By this charter, the association was declared a body politic, under the name of the "Company of Merchant-adventurers of England, for the discovery of lands, territories, islands, &c. unknown or unfrequented." Their privileges were, to have a governor, four consuls, and twenty-four assistants, for their commerce; for their policy, to make laws, inflict penalties, send out ships to make discoveries, take possession of them in the king's name, set up the banner royal of England, plant them; and lastly, the exclusive privilege of trading to Archangel, and other ports of Muscovy, not yet frequented by the English.

This charter, not being sufficiently guarded, was confirmed by parliament in the eighth year of queen Elizabeth; wherein it was enacted, that in regard the former name was too long, they should now be called "Company of English Merchants for discovering new trades;" under which name, they should be capable of acquiring and holding all kinds of lands, manors, rents, &c. not exceeding a hundred marks per ann. and not held of her majesty; that no part of the continent, island, harbour, &c. not known nor frequented before the first enterprise of the merchants of their company, situate to the north, or north-west, or north-east of London; nor any part of the continents, islands, &c. under the obedience of the emperor of Russia, or in the countries of Armenia, Media, Hyrcania, Persia, or the Caspian sea, should be visited by any subjects of England, to exercise any commerce without the consent of the said company, on pain of confiscation. The said company shall use no ships in her new commerce, but those of the nation; nor transport any cloths, ferges, or other woollen stuffs, till they have been dyed and pressed. That in case the company discontinue of itself to unload commodities in the roid of the abbey of St. Nicolas, in Russia, or some other port, on the north coasts of Russia, for the space of three years, the other subjects of England shall be allowed to traffic to Narva, while the said company discontinues its commerce into Russia, only using English vessels.

This company subsided with reputation almost a whole century, till the time of the civil wars. It is said, the czar then reigning hearing of the murder of king Charles I. ordered all the English in his states to be expelled; which the Dutch taking the advantage of, settled in their room

After,

After the restoration, the remains of the company re-established part of their commerce at Archangel, but never with the same success as before; the Russians being now well accustomed to the Dutch merchants, and merchandize.

This company fulfils Bill, nearly on the foot of that of Hamburg, and the northern and Turkey companies; i. e. each member thereof trafficks for himself, and on his own foundation; only paying an acknowledgement as fine for admission, which was reduced by 10 and 11 W. III. c. 6, to five pounds; besides some other dues imposed, from time to time, for the occasions of the company, and the commerce in general. It is under the direction of a governor, four consuls, and assistants.

COMPANY, *English*, is established on similar ground with that of Hamburg; from whence it appears to have been dismembered.

Its charter is dated in the year 1579. By the first article the company is erected into a body politic, under the title of the "Company of Merchants of the East;" to consist of Englishmen, all real merchants, who have exercised the business thereof, and trafficked through the Sound, before the year 1568, into Norway, Sweden, Poland, Livonia, Prussia, Pomerania, &c. as also Revel, Koningberg, Dantzick, Copenhagen, &c. excepting Narva, Muiucovy, and its dependencies. Most of the following articles grant them the usual prerogatives, of such companies; as a seal, governor, courts, laws, &c.

The privileges peculiar to this company are, that none shall be admitted a member who is already a member of any other company; nor any retail dealer at all. That no merchant qualified, be admitted without paying 6*l.* 13*s.* 6*d.* By 29 C. II. c. 7, the fee of admission into this company was reduced to 2*l.* That a member of another company, desiring to renounce the privileges thereof, and to be received into that of the East, shall be admitted *gratis*; provided he procures the same favour for a merchant of the East, willing to fill his place. That the merchant adventurers who never dealt in the East, in the places expressed in the charters, may be received as members of the company on paying forty marks; that, notwithstanding this union of the adventurers of England with the company of the East, each shall retain its rights and privileges. That they shall export no cloths but what are dyed and pressed, except a hundred pieces per annum, which are allowed them *gratis*.

This charter was confirmed by Charles I. in 1629, with this addition; that no person of what quality soever, living in London, should be admitted a member, unless he were free of the city.

This company was complained of as a monopoly, and first curtailed by legal authority in 1672; and since the declaration of rights in 1689, exists only in name; but they still continue to elect their annual officers, who are a governor, deputy, and twenty-four assistants.

COMPANY, *Turkey, or Levant*. This once flourishing body had its rise under queen Elizabeth, who, in 1581, incorporated a small number of merchants, with the privilege of an exclusive trade to Turkey for seven years. James I. in 1605, confirmed their charter, with the addition of some new privileges. During the civil wars some innovations were made in the government of the company; many persons having been admitted members, not qualified according to the charter, or who did not conform to the regulations prescribed, in consequence of which Charles II., upon his restoration, endeavoured to place it upon its ancient basis, for which purpose he gave them a new charter, containing a confirmation of the old one with some additional

articles. By this charter the company was declared to be a body politic, capable of making laws, &c. under the title of "The Company of Merchants of England trading to the Seas of the Levant." The number of members was not limited, but no person residing within twenty miles of London, excepting noblemen and gentlemen of quality, was to be admitted into the company, unless first made free of the city of London: those under 26 years of age were to pay 25*l.* for their admission, and those above that age 50*l.* These fines were reduced by an act passed in 1753. (26 G. O. II. c. 18) by which it is directed that every subject of Great Britain desiring admission into the Turkey company, shall be admitted within thirty days after such request, and shall enjoy all the liberties and privileges of the company, on paying for such admission the sum of 20*l.*

All persons free of the company may, separately or jointly, export any goods or merchandize (not prohibited) from any place in Great Britain, to any place within the limits of the company's charter, in British or plantation built ships, navigated according to law, at any time, and to any persons whomsoever, being free of the company, or to the sons or apprentices of freemen so long as they shall remain under, and submit to, the direction of the British ambassador and consuls for the time being; and may also import, in like manner, any commodities purchased within the company's limits, on payment of the government duties, and such impositions as shall be assessed upon all merchandize so exported or imported, or upon ships laden therewith, for defraying the necessary expences of the company.

The company is under the management of a governor, a deputy governor, and fifteen directors; they have also a deputy governor in every city and port where there are any members of the company. They present the ambassador which the king is to keep at the Porte, and elect two consuls for Smyrna and Constantinople; allowing a fixed salary or pension to the ambassador and consul, and even to their chief officers, as secretary, chaplain, interpreters, and janizaries, that they may not have any pretence for raising any sum whatever on the merchants or merchandize. For defraying these charges the company have power to levy duties on the merchandize imported or exported by their members; but of late years they have frequently found it necessary to apply to parliament for pecuniary assistance.

The commerce of this company was formerly very considerable, having been estimated nearly equal to that of the East India company in extent, and much more advantageous to Great Britain; but the convenient situation of the French ports in the Mediterranean for the Levant trade, gives that country such a decided advantage, that the commerce of Great Britain with Turkey has long been on the decline. In 1797, in order to avoid the hazard to which British vessels in the Levant trade were exposed in consequence of the war, an act was passed giving permission to the members of the Turkey company to import the goods usually brought from Turkey, Egypt, or other parts of the Turkish dominions in the Levant seas, from any port whatsoever, either in British vessels or vessels belonging to any friendly nation, on paying, if in British vessels, the same duties which would have been payable if the goods had been imported directly from the place of their growth, and, if in foreign vessels, the duties to which they were before liable; but no entry of such goods was to be made at the custom house till the importer produced a certificate of his being a member of the Turkey company, and that he had paid the company's duties, and in all respects conformed to the company's regulations.

COMPANY, *South Sea*, originated in a project for relieving the government from the embarrassment of a large amount of unfunded debts, and considerable deficiencies in the funds appropriated for the payment of others; the proprietors of these debts being incorporated for the ostensible purpose of establishing a trade to the south seas and the N.W. coast of America. The capital of the company was 9,177,967*l.* 15*s.* 4*d.*; but this being subscribed wholly in government securities, they issued bonds in 1712, for raising 200,000*l.* in cash in order to fit out their first mercantile adventure. In the following year, they obtained the *Assiento* contract, by which they agreed to import into the Spanish West Indies 144,000 negroes, within the term of 30 years, at the rate of 4800 in each year, and were allowed to send a ship of 500 tons yearly to trade with the Spanish settlements, on condition that the king of Spain should have a fourth part of the gain by such ship, and receive five per cent. on the net gain of the other three parts. See *ASSIENTO*.

The first voyage of their annual ship was in 1717, and the company were again empowered to borrow money under their common seal, for carrying on their trade, or to enable them to fulfil an engagement with government to advance two millions towards carrying into execution a proposed reduction of interest on the public debts. On the war breaking out in the following year, a stop was put to their trade with the Spanish West Indies, by the seizure of their effects, by which they sustained a very considerable loss.

Soon after this interruption of their commercial concerns, they engaged in a scheme for converting some of the government terminable annuities into redeemable debts. They had, in 1715, for the accommodation of government, agreed to increase their capital to 10,000,000*l.*, which, by the annuities now purchased, and an advance to government, became 11,746,844*l.* 8*s.* 10*d.*; and although the scheme did not completely succeed, it prepared the way for the much more extensive project of taking in all the public debts, and thus reducing all the public funds which then existed into one.

The mere rumour of this mercantile project raised the price of the company's stock to 126 per cent.; and, in the beginning of 1720, while the bill for carrying it into execution was depending in parliament, their stock got up from 177 to 319 per cent. As the transaction consisted merely in taking the public debts at a fixed price, and giving the proprietors, in exchange, a certain quantity of the company's capital stock, at prices agreed upon between the company and the subscribers, it is evident that the great gain which the company expected to make, could arise only from the current price of their stock being considerably above its real value. By a variety of artifices, and a general stock-jobbing infatuation, it was carried up to the enormous price of 1000 per cent.; the rapidity of its fall, however, exceeded that by which it rose, as it was in a few weeks down to 130 per cent.; involving in ruin persons of all descriptions who were engaged in the wild speculations of the time. (See *BUBBLE*.) Had the transaction completely succeeded, the capital of the company would have amounted to 43,411,399*l.* 6*s.* 11*d.*, but from some of the debts remaining unsubscribed, it became 37,802,487*l.* 14*s.* 0*d.* of which four millions were purchased in 1722 by the bank, and in the following year the remainder was divided into two equal parts, one of which was to be called the trading capital of the company, and the other to be distinguished by the title of "The joint-stock of South Sea annuities," since called old South Sea annuities.

In 1724, the company undertook the Greenland whale

fishery, which turned out very unprofitable: after eight voyages, they sold their ships, stores, and utensils, and found that their whole loss upon this business, capital and interest included, amounted to 237,142*l.* 6*s.* 2*d.*

In 1733, three fourths of their trading capital, which had been reduced by sums paid off in 1727, 1729, and 1732, to 14,651,103*l.* 8*s.* 1*d.*, was converted into an annuity stock called "New South Sea Annuities;" only one fourth remaining as their trading stock; and, in the following year, they petitioned the king to be allowed to dispose of the trade and tonnage of their annual ship under the *Assiento* contract, on account of the little profit they made by it, and to accept of such equivalent as they could obtain from the king of Spain, who at length, to put an end to the many disputes which had arisen from this contract, agreed, in 1750, to pay 100,000*l.* to the company, as a compensation for all claims under the *Assiento* contract, and from that period they have not carried on any trade whatever. The whole business of the company, therefore, now consists in the management of the following public funds.

Their capital stock	-	-	£ 3,662,784	8	6
Old South Sea annuities	-	-	11,907,470	2	7
New South Sea annuities	-	-	8,491,830	2	10
Three per cents., 1751	-	-	1,919,600	0	0

The interest received from government on all these funds, is 3 per cent., but the dividend paid to the proprietors of the company's stock, is 3½ per cent.; on the old and new annuities, 3 per cent.

The company is under the management of three governors, and 24 directors; the qualification required for governor, is the possession of 5000*l.* in the company's stock; for sub-governor, 4000*l.*; for deputy-governor, 3000*l.*; and for a director, 2000*l.* Five hundred pounds stock, gives a right to one vote at the general courts; 2000*l.* to two votes; 3000*l.* to three votes; and 5000*l.* to four votes.

COMPANY, *Scotch Darien*. This was established with good prospect at Edinburgh, in 1695, for the commerce of South America. In 1698, they sent an armament and a colony, which they endeavoured to establish in the isthmus of Darien, which parts North and South America; but the English ministry not thinking proper to avow and support the first successes of the company, which had alarmed Spain, ever jealous of this part of her territories, the Scotch colony was dispersed by the Spaniards in 1699, and thus vanished the best project that ever was formed for disputing with that nation the possession of those countries, from which she pretends to exclude all other nations.

COMPANY, *Hudson's Bay*, was incorporated by charter, dated the 2d of May, 1670, under the title of "The Governor and Company of Adventurers of England, trading into Hudson's Bay," with the exclusive privilege of trading to all parts within the entrance of the freight commonly called Hudson's freights. The charter, however, not being confirmed by act of parliament, the company possess no exclusive rights whatever, any British subject being at liberty to sail into Hudson's Bay, to fish or traffick with the Indians as freely as the company; all the advantage the company have over other adventurers thither is merely the benefit of their own forts, such as they are, by which their agents can reside in inhospitable a country during the winter, preparatory to their trading with the Indians against the arrival of their ships in the summer. According to the evidence given before a committee of the house of commons in 1749, the company then possessed four small factories, erected at the mouths of the principal rivers, in which they employed about 130 persons

fors, and two small houses with only eight men in each; these buildings are necessarily strong, as well to guard against the climate as against other dangers, and are furnished with artillery to command respect from the Indians; they have therefore been generally called forts, although no military force is kept for defending them: their utility in resisting any serious attack, was obvious in 1782, when the French, who at former periods had done the company much injury, destroyed their settlements, forts, merchandize, &c. to the estimated amount of near 500,000*l*.

The capital of the company, it is said, does not exceed 110,000*l*. which is divided among a very small number of proprietors. The commerce carried on by them is not of great extent, as it seldom employs above four or five ships of about 300 tons each. The articles exported by them are coarse duflle cloth or blanketing, guns, pistols, sword blades, hatchets, powder and shot, spirits, tobacco, brass kettles, buttons, fish hooks, looking glasses, &c.; the imports consist of large quantities of beaver skins, and peltry of all kinds, bed feathers, quills, castoreum, walruskins, oil, and a few smaller articles.

The company is under the management of a governor, deputy governor, and a committee of seven members.

COMPANY, *Sierra Leone*, was set on foot in the year 1791, with the philanthropic view of introducing civilization into Africa. The principal means proposed for effecting this end was the establishment of a secure factory for carrying on an extensive commercial intercourse with the interior; but before the arrangements for this purpose were completed, the reception into the settlement of near 1,000 blacks, who had taken part with Great Britain in the American war, and had petitioned the government to be removed from Nova Scotia on account of the coldness of the climate, involved the company in considerable difficulties, and gave a new character to the undertaking. Their expences, from various causes, became much greater than could have been foreseen, amounting in the first two years and a half to 111,500*l*. and were still further increased in 1793 by the war, which at the same time greatly interrupted their trade, and subjected them to depredations. In October 1794, the colony was attacked by a French Squadron, and all the moveable property of the company was either carried off or destroyed, every building belonging to them burnt, and several ships captured. The company's loss on this occasion has been estimated at 52,000*l*. This calamity, combined with their previous expences, so greatly diminished the company's funds, as to lay them under a necessity of contracting their trade, and reducing considerably the scale of their establishment, which had been at all times so limited as scarcely to afford sufficient means of transacting the business and attending to the various wants of an infant settlement.

In the year 1798 the colony had made considerable progress, notwithstanding the many obstacles to its advancement. The town consisted of about three hundred houses, with the necessary public buildings, and had become a place of considerable resort. It was estimated that from one to two hundred natives visited the settlement every day, many of them coming from a distance of eighty or a hundred miles, for the purpose of exchanging articles of African produce, for British manufactures. The total number of inhabitants of the colony at this time was about 1200.

In 1800 the company obtained a charter, creating their settlement an independent colony, and authorizing the directors to frame laws for its government, to appoint a governor and council, and to make other arrangements for the administration of justice; a small military force was at

the same time sent for the defence of the colony. The sum of 7000*l*. being part of the sum granted by parliament for the maintenance of African forts, was paid to the company for the erection of a fort; 10,000*l*. was about the same time received from government as a partial indemnification for the expence to which the company had been put in settling the Nova Scotians; 4000*l*. was also granted for the support of the civil government of the colony. About this time the company agreed to receive in their colony the Maroon Indians, and soon after their arrival, employed them to quell an insurrection among the Nova Scotians, who had endeavoured to possess themselves of the government. A more serious attack on the colony was afterward made by some of the native chiefs in the neighbourhood, which rendered it necessary to adopt additional means of defence.

The sums since granted by parliament for defraying the charges of the civil establishment of the company, and for the erection of fortifications, have been as follow:

For the year	1801	£	4,000
	1802		10,000
	1803		14,000
	1804		14,000
	1805		14,000
	1806		18,000

The trade of the company appears to have been successful, supposing it to have been burthened only with those charges which are strictly commercial, and to have been exempt from the extraordinary losses by fire, and the destruction of the settlement which it has had to sustain. The abolition of the slave trade will remove some great obstacles to the success of this laudable undertaking, and probably enable it to improve and extend its commercial intercourse with the natives very considerably.

COMPANY, *for the Manufacture of Flour, Meal, and Bread*. During the distress occasioned by the great scarcity of corn, in the year 1800, a number of persons formed themselves into a company, for the purpose of establishing in London a manufactory of flour, meal, and bread, to be sold out at reasonable prices. They were incorporated by parliament, and empowered to subscribe a joint capital, not exceeding 120,000*l*. in shares of 25*l*. each; their profits being limited to 10 per cent., and the surplus, if any, to be at the disposal of parliament. They were limited to sell only 120,000 sacks of flour, or meal in a year, to make only 200 sacks into bread in a week, and to sell not more than 1000 quarters of wheat in any one week. The managers of the company were prohibited from dealing in corn, flour, or bread, for their own private account; and were required to lay before parliament an annual statement of their receipts and payments, of the quantities of grain purchased, with the prices paid for the same, of the quantities of grain and flour in store, of the quantities of flour and bread manufactured by the company, and of the debts and credits of the company, with the names of all the members of it, and the number of shares held by each. By these regulations sufficient publicity is given to the concerns of the company to prevent it from ever being perverted from the original principle of the establishment, and made subservient to schemes of monopoly or speculation; and though upon the scarcity ceasing, they discontinued making bread, they have carried on the manufacture of flour and meal, and probably contributed to prevent these essential articles from being unnecessarily enhanced in price.

The total quantity of wheat purchased by the company in the year 1806, was 9182 quarters, for which they paid 32,657*l.* 19*s.*; the quantity of flour manufactured was 10,536 sacks. The number of proprietors of the company was 330.

The king by an order in council may dissolve this company on six months previous notice being given.

COMPANY, *Dock.* See *DOCK.*

COMPANY, *Dutch East India*, had its rise in the midst of the struggle which that people had for their liberty; and the Spaniards having forbid all commerce with them, and shut up all their ports, necessity inspired some Zealanders to seek a new north-east passage to China.

This enterprise proving unsuccessful to three several armaments in 1594, 1595, and 1596, a second company was formed under the name of the "Company of remote Parts;" which, in 1595, took the ordinary route of the Portuguese to the Indies, and returned in two years and a half's time, with little gain, but good hopes.

This company, and a new one just established at Amsterdam, being united, equipped other fleets; and these occasioned other companies at Amsterdam, Rotterdam, in Zealand, &c. inasmuch that the states soon began to apprehend they might be prejudicial to each other. Under this concern they called all the directors of the several companies together, who all consented to the union, the treaty whereof was confirmed by the states in 1602, a very remarkable epocha, as being that of the most solid and celebrated establishment of commerce that ever was in the world.

At this time they obtained a charter from the states; and prevailed upon that body, by administering to its exigencies in the Spanish war, to grant them the exclusive privilege of trading to the southern parts of Africa, for a short term of years. The company's capital of 6,500,000 florins (about 541,833*l.* sterling) was divided into transferable shares, or *actions*, as they are called on the continent, of 300 florins (about 250*l.* sterling each), which were all speedily bought up. The superiority of their trading capital, together with their greater skill in commerce and navigation, enabled them to undersell all other nations, even in the foreign markets of Europe. As they also fixed the prices of their merchandize to all consumers, their profits for some years were enormous. The annual dividends for the 6 years ending in 1610 were as high as 36 per cent.; and in a short time, the *actions* rose from 3000 to 15,000, and at one time stood as high as 24,000 florins, 8 times the amount of their prime cost. The charter, first granted in 1602, and since renewed from time to time, conferred upon them, besides the exclusive right of trading to the East, the sovereignty (under the superintendance of the states-general) of all the territories which they might acquire in that part of the world, by purchase, treaty, or conquest, with the full power of appointing their own servants; of raising whatever force they might deem necessary for the defence of their territories; and of enacting laws for the internal administration of their dominions. In consequence of this charter, the most extensive that was ever granted to any trading corporation, the company proceeded to arrange their establishment, both in Europe and the East Indies. Their affairs were under the management of sixty directors, divided into several chambers; twenty in that of Amsterdam, twelve in that of Zealand, fourteen in that of Delft and Rotterdam, and a like number in those at Sluys and Hoin. As each grant expired the company was obliged to procure a new one, which it has already done, four times since the

first; *viz.* one in 1623, for forty-one years, like the first; another for twenty-one years, commencing in 1643; and a third in 1665, for forty years; a fourth in advance, commencing in 1698, to end in 1740. Each grant cost the company a considerable sum; that of 1647 cost 1,600,000 guilders, and the two following ones more; that of 1698 was confirmed by a placard of the states-general, granted them an exclusive privilege, which was prolonged in 1761, for thirty years more. The average premium paid for these renewals was about 270,000*l.* sterling, or three millions of florins.

Their factories, residences, &c. in the East Indies, were very numerous; reaching from the Persian gulf to the coast of China: the principal was that of Batavia, the centre of their commerce: here resided the general, with the state and splendor of a sovereign prince; making war and peace with the eastern kings and emperors at pleasure. They had also several other considerable factories on the coast of China, in Japan, Malacca, Surat, Amboyna, Banda, Siam, Moluccas, &c. several on the coast of Coromandel, and at Ispahan, Cape of Good Hope, &c. in all, they numbered forty factories, and twenty-five fortresses. They engrossed the whole trade of the spicery in their own hands.

At so early a period as the year 1616, this company had no less than 45 large vessels engaged in war and trade, with 10,000 soldiers and sailors in their service, and 4,000 pieces of artillery. However, the flourishing state of their affairs was of short duration. The mismanagement and plunder of the company's servants, and the disputes in which their cruelties, avarice, and imprudence involved them with the native powers during the 17th century, and the dissensions which arose among the different chambers of the general direction at home, greatly reduced the trade, wealth, and power of the institution. The expence of the military establishment also increased; so that at the end of the 18th century, it amounted to 80 vessels, carrying from 30 to 60 guns, and 25,000 men, soldiers included, while the whole dominions in Java, and its dependencies, were farmed for 361,260 dollars. The directors acknowledged that, in 1780, their loss in the war had exceeded 10 millions of florins, nearly twice the amount of their original capital. In the 18th century the Ostend East India company excited the jealousy of the Dutch company. In 1721, a law was passed by the states, prohibiting their subjects from sailing under the Ostend colours, upon pain of death: and in 1731, this unfortunate association was dissolved in consequence of representations from the different European states interested in the East Indian trade; among which Holland, that is the Dutch company, took the lead. Various precautions have been used to support the credit of this company, some of which were oppressive to the country; nevertheless, its shares have continued to fall with augmented rapidity. In the period from 1605 to 1779, the dividends have varied from 75 to 10 per cent.; and in many years no dividend at all was issued. From 1605 to 1610 (both inclusive), the dividend was, at an average, 36 per cent. From 1610 to 1643, the average was only 21; and from 1771 to 1780, it was no more than 12½ per cent. The price of the *actions*, which had at first risen to 500, and even 800 per cent. of the prime cost, fell, in the period from 1770 to 1780, to about 340 per cent., and during that time continued regularly to fall. The last dividend this once flourishing company made to their proprietors was in the year 1796; but it was not paid till 1799, as their commerce, which had been rapidly declining for the last 30 years, was entirely suspended.

COMPANY, *Dutch West India*, was established in 1621, with an exclusive privilege to trade twenty-four years along the coasts of Africa, between the tropic of Cancer and Cape of Good Hope; and in America, from the fourth point of Newfoundland, through the straits of Magellan, that of Le Maire, or others, to the straits of Anian, both in the north and south Sea.

Besides these commercial privileges, the states conferred upon the corporation the right of governing and defending any new colonies which it might acquire; and made it a present of several large vessels, well manned. They retained to themselves, however, the nomination of the company's governor-general abroad. The original capital of this association amounted to 72,000 florins, in transferable shares, or actions, of 6000 florins each.

The 74 directors were divided into five chambers (as in the East India company), out of which, eighteen, with a deputy appointed by the states, were chosen for the general direction of affairs. In 1647, the company renewed its grant for twenty-five years; but it was scarce able to hold out the term, on account of its great losses and expences in taking the bay of Todos los Santos, Fernambuc, and the greatest part of Brazil, from the Portuguese. The weakness of this company, which had several times in vain attempted to be joined to that of the East Indies, occasioned its dissolution at the expiration of its grant.

In 1674, a new company, composed of the ancient proprietors and their creditors, was settled in the same rights and establishment with the former. It was to undertake the burden of the old company's debt, amounting to six millions, but reduced to 30 per cent.; and was to accredit in its books the proprietors of the old company's stock, at the rate of 15 per cent. The creditors, on their part, were to advance an addition of 8 per cent. on their loans; and the stockholders were to advance 4 per cent. on their shares. The new capital, thus scraped together, amounted only to 630,000 florins. The exclusive commerce of the company was limited to a certain part of the African coast, besides the conquests they should make; and its principal establishments were at Cape Verd, on the Gold Coast, at Tobago, Curaffoa, &c. in America. The rest of the trade monopolized by the former company was now thrown open to all the subjects of the republic. In 1730, when the charter was renewed, the African slave-trade was made free, on condition of a certain lading being paid to the company; and in 1734, the whole African trade was laid open upon the same terms. As the united privileges of the company were not sufficient to counterbalance the various disadvantages under which all fresh institutions labour, they obtained, in 1682, the exclusive management of the colony of Surinam, for the trifling sum of 260,000 florins paid to the states-general. This grant was accompanied by certain conditions, framed with the manifest view of preventing the abuses common to trading corporations. Under these restrictions, the company was not able to delay the expense of the original purchase-money paid for the charter; and, therefore, in the next year, one-third share was sold to the city of Amsterdam, and another to the rich family of Sommelidyk, reserving the remaining third to themselves. The three co-proprietors have since continued to form a society or partnership, under the name of the "Surinam Company," regulated by the charter originally granted to the West India company. Except in the government of Surinam, this association has had no connection with the West India company, which, of course, continued to furnish negroes to the settlement, in its capacity of African company, until the year 1730.

The progress of the dividends and prices of West India stock will enable us to judge concerning the prosperity, not only of the Surinam society, but also of the concerns of the West India company. The average dividend in ten years, ending 1690, was 2½ per cent.; and from 1770 to 1779 inclusive, nothing at all was divided. The actions have never been at par; their price has varied from 92½ to 18 per cent. since the year 1723. The average price during ten years, ending 1732, was about 8½ per cent. During ten years, ending 1779, it had fallen to 3¾ per cent. The settlements of Essequebo and Demerary have been always under the charter of the West India company, as well as Surinam, and governed in the same manner. Berbice, though within the company's charter, owed its origin to the speculations of the family of Van Peere; and all the cultivated part of the colony belonged to them. In 16-8 they obtained a perpetual grant of it from the company, which was confirmed in 1703; and when the French attacked it in 1712, the colony bought them off with a considerable composition. The money was paid by their great mercantile houses, and one fourth of it by the Van Peeres, who thus transferred three-fourth shares of the colony to the other merchants as co-proprietors; and the four houses together formed a copartnery or company at Berbice, administered exactly in the same manner with the Surinam society. The proprietary governments of North America differed from the company administrations of Guiana in many important particulars. They were the consequence of large and thoughtless grants, made by the court to favourites, of waste and uninhabited lands. As the British colonies were subservient to the legislature of the mother-country, the Dutch colonies owed the same allegiance, not to the states-general, but to the proprietors. The ill success of the West India company furnishes an useful example of the manifold evils of company government. This company must of late have been annihilated by the capture of all their settlements.

COMPANY, *Dutch North*, has no exclusive privilege; the advantage of its patent being of another kind, and very considerable.

There are also, in Holland, companies for the Baltic sea, the fishery of Nova Zembla, Davis's Straights, and Greenland; yet none of their fisheries are interdicted to private traders; all the difference between these and the companies consisting in this, that the former may not go ashore to cut their fish in pieces, and meet their lard: but must bring their luggage to Holland.

COMPANY, *Dutch Levant*. In strictness, there is no Levant company in Holland: but the commerce of the private traders is so considerable, that the state has taken the regulation thereof on itself.

To this end, they have established a chamber of direction at Amsterdam, composed of six deputies, and a register; who, under the burgomasters, take care of every thing relating to the commerce of the Mediterranean; especially that of Smyrna and Constantinople.

This company names the consuls, appoints the number and strength of convoys, terminates differences among the traders, and has also a right, on occasion, to add new regulations to the old ones; though those be of no force, till confirmed by the states general.

COMPANY, *French East India*, was established in 1664, with an exclusive privilege to trade for fifty years in all the seas of the East Indies and South Sea; no adventurer to be admitted without a thousand livres in stock; and foreigners, who have twenty thousand livres in stock, to be reputed regnicoles.

The patent grants them the island of Madagascar; and the

the king to be at one fifth of the expence of the three first armaments, without interest; the principal to be refunded in ten years; or, if the company finds it loses on the whole, the loss to fall on the king's side.

The capital fund of the company, which was mostly furnished by the king, was seven or eight millions of livres, but was to have been fifteen millions.

In effect, though no means were wanting to support the company, yet it still drooped, and still struggled; till, having subsisted ten years without any change in its form, and being no longer able to discharge its engagements, there were new regulations concerted, but to little purpose. At length, things not being disposed for a new East India company, nor much good to be expected from the old one, in 1708, the ministry allowed the directors to treat with the rich traders of St. Malo, and resign to them their privilege under certain conditions. In the hands of these last, the company began to flourish.

Its chief factory was at Pondicherry, on the coast of Coromandel; this was the residence of the director-general; the other factories were inconsiderable. The merchandizes which the company brought into France were, silks, cottons, spices, coffee, rice, salt-petre; several kinds of gums and drugs, wood, wax, printed calicoes, muslins, &c. The trade was laid open in 1769, which soon reduced the company to a set of mere holders of the government funds. A new company was established in 1785 with the privilege of an extensive trade to all parts of the East Indies, except the Isle of France and its dependencies. This exception must have prevented the company from succeeding; but the experiment had scarcely been made when the trade was again laid open by the national assembly in 1790. As for the other French companies, such has been the state of the country, they are all, we presume, extinct; and it is needless to give any account of them. Such were the *French West India company*, established in 1664, and possessing by their charter the property and seigniority of Canada, Acadia, the Antilles island, the isle of Cayenne, and the Terra Firma of America, from the river of the Amazons to that of Oroonoko; with an exclusive privilege for the commerce of these places, as also of Senegal, and the coasts of Guinea, for 40 years, on condition of paying half the duties; but in 1674 the grant was revoked, partly on account of the poverty of the company, and partly because it had answered the purpose of its establishment by recovering the commerce of the West Indies from the Dutch:—the *French Mississippi company*, first established in 1684, in favour of the chevalier de la Salle, who failed in search of the Mississippi, but miscarried with his colony, and came to an untimely death. He was succeeded by M. Hiberville, who found the Mississippi and settled a colony there; but this adventurer being poisoned, M. Crozat obtained in 1712 the sole privilege of trading to the French territories called Louisiana, granted to him for 15 years:—*Company of the West*, formed in 1717, when M. Crozat surrendered his grant before mentioned; and obtaining besides every thing granted to the former company the commerce of beaver, enjoyed by the Canada company from the year 1706, but expiring in 1717:—*India company*, formed by a junction of the former company with that of Canada and with that of Senegal in 1718, and also by an union with the East India company, and with those of China and St. Domingo, with the two first in 1719, and with the third in 1720;—the *Bastion company*, arising from the association of two merchants of Marleilles in the 15th century for fishing of coral in the gulf of Storacourcory on the coast of Barbary, on the frontiers of Algiers and Tunis; so called from a small fort called the

“*Bastion of France;*” built in 1561, but it sunk in 1633;—and several other companies, which either fell of themselves, or upon the expiration of their grants, and which it is therefore needless to mention.

COMPANY, Danish North, was established at Copenhagen in 1647. Its establishments are very considerable in Norway; besides which, it sends vessels to Waranger, whence they convey their merchandizes by land into the Danish Lapland; and by sledges drawn by rein-deer into the Muscovite Lapland. It also sends others for Borandai and Siberia; where its agent takes them up, and conveys them, in like manner, on sledges, to Panigorod, the capital of this part of the Muscovite empire.

The commodities it sends thither are six-dollars, tobacco, and linens; it returns nothing but furs and skins.

COMPANY, Danish Iceland, established in the same year with the North Company, its chief factory is at Kirkebar, a large town in that island.

COMPANY, Danish East India, established in the year 1616, and invested not only with the exclusive privilege of trading to the East, but with the powers of civil and military administration; their chief factory was at Tranquebar. In 1634 this corporation was dissolved, and another, with similar privileges, substituted in its place. This also rapidly declined; and in 1686, a third institution was tried for the same purposes; but this too failed in about 23 years; and the project was tried for the fourth time in 1732. The new company was provided with ample privileges and powers; and the possession of these preserved its existence, and increased the profits of the stock-holder, at the expence of the country, and of the Indian settlements. In 1772 the charter expired, and was renewed under restrictions which proved ruinous to the prosperity of the company. In 1777, the king purchased the rights of the company, and the private trade began to flourish. When the charter was renewed in 1792 to 20 years, the private trade was rendered still more free; all Danish subjects, and all foreigners were permitted to trade with the Indian settlements, upon receiving passports, either from Copenhagen or the Asiatic seats of government, and upon condition of returning with the cargoes to Copenhagen.

COMPANY, Levant, of the Genoese, established in 1664, and confirmed by the Porte; notwithstanding the opposition of the French. From 1670 this company has languished and sunk.

For a more particular account of the rise and progress of most of the above mentioned and other companies, see “Anderson’s Hist. of Commerce.”

COMPANY, New River. This corporation consists of a governor, deputy governor, treasurer, and twenty-six directors, who hold a weekly board for appointing officers, granting leases, and redressing grievances. The projector of this canal for bringing water to London, with the assistance of king James I. and the corporation of London, is supposed to have expended 50,000l. upon it: the profits, which are divided into seventy-two shares, for the first thirty years admitted of little more than five pounds to each share; but their value is much increased, and its original shares of 100l. are now estimated at upwards of twelve thousand pounds each.

COMPANY, in French compagnie. A certain number of people of war under the inspection and command of a chief called captain. The number, however, is never fixed, but varies. In the guards, as in the artillery, a company consists of 120 men. In the Austrian service a company consists of 200 men. A *compagnie d'ordonnance* was originally composed of fifteen companies of *gens d'armes* of a hundred

Hommes d'armes each. In former times the word *enseigne* denoted the company of infantry, and the word *cornette* the company of cavalry. A company seldom consists of fewer than 50 men. It generally has three or four sergeants, three or four corporals, and two drums.

COMPANY, *Artillery*. See ARTILLERY.
COMPANY, *of Musicians*, in the city of Westminster. See CHARTER.

COMPANY, in *Sea Language*, denotes the whole crew of a ship, including her officers.

COMPANY of *Ships*, is used for a fleet of merchant vessels, who make a kind of charter-party among themselves; whereby, under several clauses and conditions tending to their common safety, they engage not to quit one another, but to defend each other reciprocally, during their voyage.

These associates, in the Mediterranean, are called *conferres*. The chief conditions of the charter-party are, that such and such shall be owned admiral, vice admiral, and rear-admiral; and those that bear no guns, shall pay so much per cent. of their cargo, for the expences of the admiral; that such and such signals shall be observed; that if they be attacked, the damages shall be reimbursed by the company in general, &c.

COMPANY, *Rule of, or Fellowship*, in *Arithmetic*, is a rule whereby we discover or ascertain the share of the profits, or losses, belonging to the several partners, or associates, in any enterprize, in proportion to the stock each contributed thereto, and the time that stock was in bank. See FELLOWSHIP.

COMPARATES, COMPARATA, in *Logic*, the TERMS or subjects of a comparison; or the two things compared to each other.

COMPARATIONE—*Punctum ex COMPARATIONE*. See PUNCTUM.

COMPARATIONIS *Homogeneousum*. See HOMOGENEUM.

COMPARATIVE *Anatomy*. See ANATOMY.

COMPARATIVE *Degree*, in *Grammar*, is an inflexion between positive and superlative degrees; whose effect is, to set a thing above or beneath the level of another.

The Latins expressed their comparative degree by a particular termination of their adjectives, and particles; wherein they are followed by the English, though by few others of the modern languages.

The French form most of their comparatives by adding the particles *plus*, *moins*, and *aussi*; the Italians, by *piu*, *meno*, &c. as the thing is to be raised, lowered, or equaled to another.

COMPARE, VAL DI, in *Geography*, an island in the Ionian sea, anciently called Ithaca, noted for having been the country and kingdom of Ulysses.

COMPARISON, the relation of two persons or things, considered as opposed, or set against each other, in order to find wherein they agree or differ; or wherein one has the advantage of the other.

COMPARISON of *Ideas*, an act of the mind, whereby it compares its ideas one with another, in respect of extent, degree, time, place, or any other circumstances. This operation of the mind is the ground of relations.

Brutes seem not to have this faculty in any great degree: they have, probably, several ideas distinct enough; but cannot compare them rather than as to some sensible circumstances an end to the objects themselves: the power of comparing general ideas, which we observe in men, they have not, as we may probably conjecture.

COMPARISON, in *Rhetoric*, is a figure, or rather place, in

speech, whereby two things are considered with regard to some third, which is common to them both.

Thus, Cicero, *Topic*. "Catonem licuit sequi bellum civile, igitur et Ciceroni hæcbit." "It was allowed Cato to engage in the civil wars, therefore it may be allowed Cicero:" where, to engage in the civil wars is common to both.

There are three kinds of comparison; the first a *majori*, *i. e.* from the major to the minor, as that of Cicero against Anthony, "Quid feceris domi tuae, cum alienæ tam sis intolens?" Or that of Terence, "Quem feret, si parentem non fessit fœm?" From the same place, Ovid endeavours to appease Cæsar.

"Cur ergo posse negem leniri Cæsaris iram
Cum videam mites hostibus esse Deos?"

The second, a *minor*, *i. e.* from the minor to the major: thus Cicero, "Majoris nostri sæpe mercatoribus, ac navicularibus injuriosus tractatus, bella pesserunt; vos tot civium Romanorum millibus uno nuntio atque uno tempore necatis, quo tandem animo esse debetis?"

The third a *pari*; as when we contend, that what obtains in one thing, ought to obtain in another of the same kind: "It was a law that he who killed his father should be sewed up in a sack, and thrown into a river; therefore, he who killeth his mother deserves the same punishment."

"Capto tuam, pudet heu, sed capto, Maxime, cœnam:
Tu capis alterius; jam sumus ergo pares.

Mane salutatum venio, tu dicis esse,

Ante salutatum; jam fumus ergo pares," &c.

Mart. lib. ii.

COMPARTIMENT, or COMPARTMENT, a design composed of several different figures, disposed with symmetry, to adorn a parterre, a ceiling, panel of joinery, or the like.

The term of compartment is also used in painting. The Turkish and Moorish paintings are only compartments; the fine bindings of books are in compartments, &c.

COMPARTITION, in *Architecture*, the useful and graceful distribution of the whole ground plot of an edifice, into rooms of office, and of reception, or entertainment. Compartment makes one of the great divisions of the art of building.

COMPARTMENTS, in *Gardening*, are beds, plats, borders, and walks, laid out according to the form of the ground, and depend more on a good fancy, than on any set of rules, for their construction. They are also sometimes merely diversities or knots of flower-gardens or parterres, of which there is an infinite variety, according to the fancy of the designer. Plain compartments are pieces of ground divided into equal squares and flower-beds, marked out by lines, and made of regularly equal length and breadth. Some allow to these squares borders of two feet broad, if the plot of ground be small, and if larger of three feet, and edge the borders with box, or with upright hardy thyme; the alleys up between are to be laid with sand or gravel, and kept clean weed.

COMPARTMENT of *tiles*, is an arrangement of white and red tiles varnished, for the decoration of the covering of a roof.

COMPARTMENT, *alley of*. See ALLEY.

COMPARTMENT, in *Heraldry*, is the term for a partition in coat armour, when the arms of several families are borne by one, either on account of intermarriages or otherwise.

COMPASS, the *Mariner's* or *Nautical*. A period of about 500 years is now elapsed, since an admirable property of a natural production was either discovered by, or introduced

duced amongst, the nations of Europe. To the simple application of this remarkable property, mankind is indebted principally for the discovery of a new continent nearly equal to the old one, for an extensive commerce between the most distant nations, and for an accurate knowledge of the shape and size of the world we inhabit. The *magnet* or *loadstone* is the natural production, and its directive property forms the active part of that wonderful guide, the *mariner's compass*, or as it is more commonly called, simply the *compass*, probably from its moving in a circle, or from its compassing the whole horizon. Whatever relates to the history, the construction, the use, and the defects, of this singular machine, is rendered extremely important by the curiosity, the interests, the security, and the wants of the human species.

The time when the attractive property of the magnet was first discovered, is by no means known. The opinions are various, but they are not established upon historical documents of sufficient accuracy and authenticity. Certain however it is, that mankind was acquainted with it at a very early period. Father Kircher, in his work, *De Magnete*, l. i. cap. v., endeavours to prove that the Hebrews were acquainted with the magnet's singular property of attracting iron; and from Plutarch it appears, that the Egyptians were not ignorant of it. Pythagoras, Ptolemy, Hippocrates, Empedocles, Democritus, Lencippus, Epicurus, and several other ancient philosophers, knew and admired this wonderful property of the magnet. Thales and Anaxagoras were so struck with it, as to imagine that the magnet had a soul; and Plato said that the cause of its attraction was divine. Aristotle, Theophrastus, Dioscorides, Galen, and others, were likewise acquainted with this property of the magnet. But its directive property (*viz.* that property by which, if placed upon a piece of cork, or wood, &c. to swim on the surface of water, or if it be suspended by a very flexible thread, so as to have sufficient freedom of motion, it will constantly place itself in a certain situation with respect to the cardinal points of the world) does not appear to have been known to the ancients; and though the time of the discovery of this property is of a much more recent date, yet this too is involved in much doubt and obscurity. It seems, however, that the use of this property, or (what amounts to the same thing) the use of the magnetic needle, was not known in Europe before the thirteenth century. The honour of its discovery has been much contested. The Spanish Jesuit Pineda, and Kircher, affirm that Solomon knew the use of the compass, and that his subjects actually used it in their navigations. Plautus in *Mercatore*, act v. scene ii., has the following remarkable passage, *Huc secundus ventus est, cape modo vorforiam*. Now some authors are of opinion, that by the word *vorforiam* or *versforium*, is meant the mariner's compass; but some learned critics affirm that *versforiam* or *versforium*, meant a particular rope. And Dr. Lorrimer is inclined to believe that it only meant the helm.

By the consent of most writers, it seems that a certain Flavio, or Johs, de Gioja, or Giova, or Gira, a Neapolitan, who lived in the 13th century, has the best title to the discovery. Flavius Blond affirms that about the year 1302, the above-mentioned John de Gioja, a noble citizen of Amalphi, a town of Principato, in the kingdom of Naples, first discovered the mariner's compass; and he quotes the following verse from Antony of Palermo, recorded by the Neapolitan historians, *viz.*

Primo dedit nautis usum magnetis Amalphi.

The arms of the territory of Principato have, it appears, ever since been a mariner's compass. See *Callinas, et Frome-*

bellus de acus magnetica inventore. Inst. Acad. Bonon. tom. ii. p. 3. p. 372.

Dr. Gilbert, an English writer of the 16th century, in his book *De Magnete*, affirms that Paulus Venetus (the Venetian Marco Paulo) brought the invention of the compass to Italy in the year 1260; having learned it of the Chinese. But this cannot be true; for Marco Paulo did not set out for China before the year 1269, nor did he return before the year 1295 (see Purchas's Pilgrim, vol. iii.); whereas the directive property of the magnet, and the communication of that property to steel, was known in Europe before that time; though in all probability it was not used in navigation till some time after, which may very reasonably be attributed to the clumsy mode of suspending the magnetic needle, which must at first have been practised. Ludi Vestomannus asserts, that when he was in the East Indies, about the year 1500, he saw a pilot direct his course by a magnetic needle, fastened and formed like those now in use. And Mr. Barlow, in his *Navigator's Supply*, anno 1597, relates, that in a personal conference with two East Indians, they affirmed that, instead of our compasses, they used a magnetic needle of about six inches in length, suspended upon a pin in a dish of white China earth filled with water, in the bottom of which there were marked two cross lines to indicate the principal winds; the rest of the divisions being left to the skill of their pilots. But these two last observations, being of a date much posterior to the use of the magnetic needle in Europe, conclude nothing with respect to its original discovery; since the use of that magnetic property might have been introduced into Asia by some European.

P. Duhalde, in his "General History of China," vol. i. in the annals of the Chinese monarchy, speaking of the emperor *Hoangti*, when he gave battle to *Tchi Yeou*, says, "He perceiving that thick fogs saved the enemy from his pursuit, and that the soldiers rambled out of the way, and lost the course of the wind, made a carr, which showed them the four cardinal points. By this method he overtook *Tchi Yeou*, made him prisoner, and put him to death. Some say there were engraven in this carr, on a plate, the characters of a rat and a horse, and underneath was placed a needle to determine the four parts of the world. This would amount to the use of the compass, or something very near it, being of great antiquity and well attested." And in another part of the same book, speaking of certain ambassadors, he says, "After they had their audience of leave in order to return to their own country, *Tcheou Kong* gave them an instrument, which on one side pointed towards the north, and on the opposite side towards the south, to direct them better on their way home, than they had been directed in coming to China. This instrument was called *Tchi Nan*, which is the same name as the Chinese now call the sea-compass by; this has given occasion to think that *Tcheou Kong* was the inventor of the compass." This happened in the 22d cycle, above 1040 before Christ. Renaudot adduces strong reasons against the knowledge of the mariner's compass amongst the ancient people of China, and of Arabia. See Kircher, *De Magnete*, lib. i. cap. v.

In the works of Claude Fauchet, entitled, *Recueil de l'origine de la Langue et Poésie François*, fol. 555, there is a quotation from an old French poem, called *la Bible Guict*, in which the mariner's compass is evidently mentioned. This same passage is likewise quoted by Muschenbroeck, in his *Dissertation de Magnete*. The passage in which the compass is mentioned forms part of the above-mentioned poem, contained in a curious quarto manuscript of the 13th century, on vellum, belonging to the royal library at Paris, which was never published. The poem entitled *la Bible Guict*,

Guiot, forms the first article of the volume; the author of which. *viz. Guiot de Provins*, as mentioned in the poem itself, was at the court of the emperor Frederic Barbarossa, held at Mentz in the year 1181, when the emperor's two fons were knighted. See Chron. Abbot. Usperg. p. 311.

Here follows this remarkable passage in its antiquated language, to which is subjoined a literal translation made by a native of Provence.

Extraict from la Bible Guiot.

Icelle estoile ne se muet,
Une arts font qui mentir ne puet,
Par la vertu de la manete
Une pierre laide et brunete,
Ou il fers volenters se joint.
Ont regardet lor droit point
Puez c'une aguile lont toucheie,
Et en un festo lont fishie,
En longue la mette fens plus,
Et il feltui la tient defus;
Puis se torne la point toute
Contre letoile sans doute,
Quant il nuis est tenebre et brune
Cen ne voit estoile ne lune,
Lor font a laguille alumer;
Puiz ne puent ils afferer,
Contre letoile vers le point;
Par ce font il mariner cointe,
De la droite voie tenir;
C'est uns ars qui ne puet mentir.

Literal Translation of the preceding.

This same (the pole) star does not move, (and)
They (the mariners) have an art which cannot deceive,
By the virtue of the magnet
An ugly brownish stone
To which iron adheres of its own accord.
Then they look for the right point,
And when they have touched a needle (on it)
And fixed it on a bit of straw
Lengthwise in the middle, without more,
And the straw keeps it above;
Then the point turns jult
Against the star undoubtedly,
When the night is dark and gloomy,
That you can see neither star nor moon,
Then they bring a light to the needle;
Can they not then assure themselves
Of the situation of the star towards the point (of the
needle?)
By this the mariner is enabled
To keep the proper course;
This an art which cannot deceive.

Francis Cabens, a jesuit of Ferrara, says, that the first thing he knows professedly written respecting the directive property of the magnet, was an epistle of *Petrus Peregrinus Gallus*, about the latter end of the 13th century. A few years after, this epistle was disguised by one John Taffner, who published it in his own name, under the title of *Opusculum perpetua memoria dignissimum de natura et effectibus magnetis*. Some years ago, Mr. Senebier of Geneva sent the following memorandum concerning this letter to Dr. Lorimer in London.

“*Epistola Petri Peregrini de Marcourt, Ad Sigerium de Foucaucourt, Militeni. De Magnete.*”

“The work contains a description of that stone, the means of finding the poles, its property of attracting iron, and proves that the part of the magnet which is turned to the north, attracts that which is turned to the south. It then teaches the manner of employing the magnet in astronomy, and of playing tricks like those of Comus. It deserves to be remarked, that the author knew not that the magnet could be employed in navigation; for though he frequently speaks *de stella nautica*, he never speaks of the use that might be made of the magnetic needle in sea voyages. *Vide Bibliotheca Bibliobecarum, fol. 11. p. 1400.* Catalogue of the manuscripts in the library of Geneva, by Senebier. p. 207.”

Amongst the manuscripts of the university of Leyden, there is a volume containing several scientific tracts, one of which is a Latin letter of Peter Adiger, on the properties of the magnet. It is, in fact, a little methodical treatise, divided into two parts, the first of which is subdivided into ten, and the second into three chapters. This letter, which seems intended for the instruction of some particular friend, is dated in the year 1269. A few years ago, Mr. Cavallo obtained an exact copy of this curious letter, of which he inserted very ample extracts, both in the original Latin and in English, in the supplement to the second and third editions of his treatise on magnetism, from which it appears that the writer, at that early time, was acquainted with all the principal properties of the magnet. The following is the translation of the most remarkable part of the above-mentioned letter, which describes the compass, and mentions the declination of the magnetic needle.

“Part II. Chap. 2. *On the construction of a better instrument to answer the same purpose, viz. to find out the Azimuth of the Sun, the Moon, or any Star upon the Horizon.*”

“In the present chapter, you will be informed of the construction of another instrument of more certain effect. A vessel must be made of wood, copper, or any other material, and let it be turned like a box of small depth, and competently wide. Let a cover of some transparent substance, as glass or crystal, be adapted to it; and if the whole were made of some transparent matter, it would be still better. A slender axis of copper or silver must be adapted to the middle of this vessel, applying its extremities to the upper and lower parts of the box, *viz.* to the cover and to the box; the axis, however, must not be so firmly fastened, as not to be capable of moving very freely. Two holes must be perforated in the middle of the axis, at right angles to each other, and an iron style, like a needle, must pass through one of those holes, whilst another style of silver or copper passes through the other hole in a direction crossing the iron one. The cover must first be divided into four parts, and each of these into ninety parts, agreeably to the instructions given concerning the other instrument in the preceding chapter, and upon it mark the north and the south, the east and the west, points; and let a ruler of some transparent substance, with sights on its extremities, be adapted to it. Then place whichever part of the magnet you please, *viz.* the north or the south, near the glass, until the needle be moved towards the said magnet, and acquires the virtue from it; after which, the magnet being removed, the extremity of the needle will turn itself towards the pole. This being done, turn the box until one extremity of the needle remains directed towards the north part of the instrument, or the north part of the heaven; then turn the ruler towards the sun in the day time, and towards the stars in the night time, after the manner mentioned in the preceding chapter. By means of this instrument, you may direct your course towards cities, and islands, and all other

other parts of the world, either on land or at sea, provided you are acquainted with the longitudes and latitudes of those places; for, if the town or island to which I intend to go is in a lower latitude than the place in which I am, I shall go straight before me, towards that end of the ruler which is directed to the sun or star; but if the latitude of the place be greater, I shall proceed in the opposite way, *viz.* in the direction of the other extremity of the ruler. Observe, that the fourth part of the needle, which is to be used as a guide, must be made to decline towards the west by one point; and this must be done by the declination of the north part towards the east, because the fourth part of the instrument is destitute of divisions."

"Take notice that the magnet, as well as the needle that has been touched by it, does not point exactly to the poles, but that part of it which is reckoned to point to the south, declines a little to the west; and that part which looks towards the north, inclines as much to the east. The exact quantity of this declination I have found, after numerous experiments, to be five degrees. However, this declination is no obstacle to our guidance, because we make the needle itself decline from the true south by nearly one point and a half towards the west."

To this letter, Mr. Cavallo, in his treatise, subjoins the following observation. "It appears that the suspension of the needle in the above description, is a very clumsy one; and that the beautiful suspension by a cap upon a pin, which is now universally used, was unknown to the author. It is likely, therefore, that for want of this suspension, the needles at that time not moving sufficiently easy, were not actually used in navigation, at least in Europe, though the suspension by means of a cap upon a pin, seems not to have remained long unknown after the date of this letter."

Sir G. Wheeler says, that he had seen a book of astronomy older than the year 1502, which mentions the use of the needle in astronomy, but not in navigation.

Gassendus adduces, as an argument of the French having been the inventors of the mariner's compass, that the north point of it is always marked with a flower-de-luce. Lib. x. Diog. Laert. t. 1. p. 139. As for Goriopius's pretence, that the compass must have been invented by the Danes, Dutch, or Germans, because the 32 points on it are written and pronounced in the Dutch, or Teutonic language, it is hardly deserving of a reply. Dr. Wallis attributes it to the English, for no other reason, but for its being called compass. Vincentius Bellucentis, and Albertus Magnus, who lived about the year 1245, also Lavinus Lemnius, make mention of the direction of the poles of the magnet, as from a tract *de Lapilibus*, which had been attributed to Aristotle; but is, with more probability, supposed to have been written by some Arabian author, not long before their own time. This tract has been since lost.

Notwithstanding the foregoing remarks, it is still very doubtful whether the use of the compass in navigation, or even the directive property of the magnet, was known by any people before the Europeans, in or about the 13th century; and it appears, that in the same century, or soon after, the above-mentioned Neapolitan, Flavio, or John de Gioja, if not the original discoverer, was at least the first who used the mariner's compass, or constructed it for the use of vessels in the Mediterranean.

The principle of the construction of the compass is extremely simple. A magnet, or a piece of steel that has been rendered magnetic by means of natural or artificial magnets, must be freely suspended, so as to be able to move without obstruction; for such magnet or piece of steel will,

in that case, direct itself to certain parts of the world, which will of course indicate to the observer the direction of any other place, provided its situation on the surface of the earth be known. Suppose, for instance, that you are at sea near Portsmouth, and wish to go towards Newfoundland, which lies to the west. By looking at the magnetic piece of steel or magnet, one extremity of which looks nearly towards the north, and turning your face to that part of the world, you proceed towards your left hand, at right angles to the direction of the needle; for in that direction Newfoundland is to be found. And after the same manner, you may proceed in any other direction. Such is the simplicity of the principle; but the practical application of it, especially in the present accurate mode of constructing instruments, and of making observations, requires a great degree of mechanical nicety, and a considerable degree of attention to a variety of circumstances, upon which the accuracy of the instrument, and its various applications, absolutely depend. On account of those particulars, and in consequence of various contrivances made at different times, the compass or magnetic needle has undergone innumerable alterations, both in shape and size; and every kind of construction is attended with peculiar advantages, as well as defects; the most essential of which we shall endeavour to point out in the sequel. From its various uses, the compass has obtained different names and different forms. These are reducible to the four following species, *viz.* 1. The *land compass*, which is used either for the pocket, or is adapted to theodolites, to celestial and terrestrial globes, &c.; 2. The *steering compass* for the use of vessels at sea. 3. The *azimuth compass*, which serves to find the sun's or star's azimuth, whence the actual or true direction of the magnetic needle may be ascertained (this seldom being due north and south); and, 4. The *variation compass*, which, being situated in a proper place on land, shews the daily variation of the magnetic needle from its ordinary direction. See *MAGNETICAL Declination*, and *MAGNETICAL Variation*.

A common sewing needle rendered magnetic, and simply laid upon water, or fastened to a cork, or straw, &c. and so laid upon water, in a glass, or earthen or wooden cup; or else suspended by a very flexible thread, which must be fastened to its middle, forms a simple but imperfect compass; and such, in a probability, was one of the first modes of constructing the compass, whence the magnetized steel, wire, or bar, has, ever since, been called the magnetic needle. The defects of the last-mentioned construction are too evident to need any particular remarks. The needle laid upon water is continually running to the sides of the cup, the water is liable to be spilt, or if a thread be used, the stiffness of it will always influence the action of the needle. To avoid these inconveniences, an excellent contrivance was substituted. It is a conical cavity made in the middle of the needle or steel bar, as shewn in *Plate, Magnetism. fig. 1.* the open of which rests upon a pointed wire *a*, which enables the needle to move with the greatest freedom imaginable. The open of this cavity should come as near as possible to the upper surface of the needle, or rather a little above it, as in *fig. 2.* in which case the upper surface of the middle part of the needle is left a little more elevated than the rest. But, in order to avoid any irregularity in the shape of the needle, as well as any difficulty in the mechanical formation, the needles are mostly pierced quite through, with a pretty large hole; a piece of hammered brass is riveted into this hole, and the conical cavity is made into the brass, so that the open of it may stand even with, or very little above, the upper surface of the needle. The upper part of the wire upon which the needle rests, is generally made of hard steel,

while the lower part is made of brafs. This conftruction answers very well for a confiderable length of time; yet, by continual rubbing, a fmall prolongation or irregularity of the cavity, is at length produced, which will in fome degree obftruct the free motion of the needle; hence, in the beft needles, the upper part of the above-mentioned cavity is formed in a piece of agate, which is not in the brafs piece, as fhewn in *fig. 3.* where *AB* is the needle, *cd* the brafs piece riveted in a hole in the middle of it, and *e* is the piece of agate. The needles thus conftructed are faid to have an agate cap. The defect to which thofe agate caps are fubject, is, that on account of the hardnefs of the ftone, the cavity in it feldom runs to a point; the confequence of which is, that the pin which fupports the needle is apt to fhift from one part of the agate cap to another, and of courfe the centre of the needle cannot always coincide with the point of fufpenfion.

The forms of the needles have likewife been very numerous. Some are flender and long, others broad and fhort; feveral needles of the common fort are made broad towards the end, but tapering towards the middle, or they terminate in two very fharp points. Sometimes that extremity of the needle, which points towards the north, is formed like a crofs; but the moft objectionable of all, are thofe which confift of two wires, and may be frequently met with on board of merchant fhips. Two pieces of ftel wire, each bent in the middle fo as to form an obtufe angle, and when fixed under the card, in the centre of which a brafs cap is fattened, form a lozenge. All thofe fhapes may, in great meafure, answer for common purpofes; but they are far from being accurate or regular in their performance, the reafon of which is, that a piece of ftel of irregular form generally has more than two magnetic poles; almoft every corner or protuberance being a fouth or north magnetic pole; in confequence of which the axis of the needle never coincides with its magnetic axis, the latter of which changes its fituation in proportion as fome of the above-mentioned poles become ftronger or weaker than the reft; and this is continually the cafe.

In order to avoid every irregularity of fhape, and even the perforation, needles, for certain purpofes, have been fufpended in the following manner: *AB* (*fig. 4.*) is the magnetic needle of a parallelepipedal form, which is fattened to a piece of brafs *CED*. In the middle of this piece of brafs at *g*, there is a fmall conical cavity, wherein an agate cap is fet. In order to fufpend this needle, a bar *FH* (*fig. 5.*) of brafs, or copper, or wood, is made fall to the box *KL*; in the middle of this bar a fhort pointed wire is fixed, which, when the bar is made to pafs through the brafs piece *CED* *viz.* through *g*, enters the agate cap, and fupports the needle. *Fig. 5.* represents the whole together, where *FH* is the bar fattened to the box, *AB* is the brafs piece, feen lengthways, or in the direction of the needle, which paffes through the hole *AB*, and moves below the bar *FH*. It is evident that in this conftruction the needle cannot turn quite round, confequently this fort of fufpenfion is not ufeful for navigation.

The Chinese method of fufpending the magnetic needle is exceedingly ingenious (fee *fig. 6* and *7.*); the firft of which represents a fection of this fufpenfion as viewed in the direction of the needle; and the fecond exhibits a lateral view of the fame. The letters refer to the fame parts in both figures. *I* is a brafs cap very thin and light, and towards the edge of it there are two holes, oppofite to each other. *BB* is a very flender flip of brafs, the upper part of which *A*, is fhaped like a ring, through which the needle *CD* paffes. The extremities of this flip of brafs go through

the holes in the lower part of the cap, and are fattened to it by being turned over its edge. The magnetic needle *CD* confifts of a cylindrical ftel wire about an inch long, and not above a fortieth part of an inch in diameter; having its northern extremity only painted red by way of diftinction. All this is fupported by the pin *E*, which is fattened to the bottom of the box, and upon which it moves very freely. In this conftruction the needle is above the point of fufpenfion; yet the centre of gravity of all the three pieces (*viz.* cap, needle, and flip of brafs) taken together, is below the point of fufpenfion, which prevents the cap, &c. falling off from the pin when the compafs is fixed in an horizontal pofition; but to prevent the cap with the needle being fhook off by any fudden jerks, or by inverting the inftrument, there is a very thin brafs plate fixed to the box, a fection of which is indicated by *FG*. It has a hole through the middle, which, being fmall than the diameter of the aperture of the brafs cap, prevents its falling off. It appears, from a variety of experiments, that the perforation through the magnetic needle is not attended with any bad confequences. The external fhape of the needle requires to be formed with greater attention, this being more apt to produce a multiplicity of poles. A very broad needle feldom has its magnetic axis coinciding with the axis of its figure. A very flender and long needle almoft always has more than two magnetic poles. There is a certain breadth, proportionate to the length of a needle, which is lefs fubject to an irregular difpofition of the magnetical virtue; this proportion, however, cannot be accurately determined. The little fwelling generally left about the middle of the magnetic needles in order to give them ftrength, where the perforation for the cap would otherwife weaken them, has not been found to produce multiplicity of poles, provided it be made fmooth and free from corners. The lengths of the needles commonly ufed at fea are from three to fix inches, but thofe that are ufed as variation needles are generally made longer, though they need not, however, exceed eight or at moft nine inches. With refpect to the fubftance of the needle, it muft be obferved that certain kinds of ftel are more apt to acquire the magnetic virtue than others; but this muft be determined by actual trial. The common fort of magnetic needles are brought down to what is called by the workmen a blue temper, becaufe in that ftate they are eafily magnetized; but it muft be obferved that if in that ftate they are eafily magnetized, they are at the fame time liable to lofe that power very eafily; therefore the magnetic needles ought to be made quite hard; for in that cafe when they are once rendered magnetic, which is eafily done, they will retain that power almoft for ever after. The magnetic needles, though perfectly balanced before they are magnetized, will, after that operation, incline one of their extremities towards the horizon, which is in confequence of the dipping property of the magnet. See **MAGNETISM**, and **DIPPING Needle**. Therefore after the communication of the magnetifm, it becomes neceffary to balance the needle again; but this muft not be done either by grinding off part of that extremity of the needle, or by adding a fixed weight to the oppofite extremity of it, becaufe the quantity of that dipping varies according to the change of fituation on the furface of the earth. The beft way of adding this weight is by placing a fmall piece of brafs on one arm of the needle, capable of being fud nearer to, or farther from, the centre of the needle, by which means the balance of the needle when loft may be eafily reftored. Upon all thefe confiderations, a needle of the beft form and fize is exhibited at *fig. 8.* and *9.*; the former of which represents a vertical, and the latter a lateral, view of it. *A D*

is the needle of hard steel, C is the agate cap set in a piece of brass, B a mark made on that extremity which points towards the north, in order to distinguish it from the other, and E is the piece of brass which may be slid upon the arm C D, for the purpose of balancing the needle.

The shapes and sizes of the compasses used upon land are very numerous; some being of the usual size of a watch seal, and they are actually fixed in such seals; others are of the size, and externally in the form of a pocket watch; others again are made in a wooden box, square on the outside, but circular within; some are of a larger size, in a brass box. Sometimes a little sun-dial is affixed to some compass boxes, and so forth. But though the shape be different, the principle of the construction is the same in them all. The box, whether of wood, or brass, or silver, or other substance, must have no particle of iron or steel in its construction; and even the brass, when that metallic substance is used, must be tried by presenting the extremity of a very delicate magnetic needle to every part of it; for if any attraction be observed, that brass must be rejected, otherwise the needle would not move with sufficient freedom. Brass is frequently magnetical, especially after being hammered, which is generally done by the workmen, for the purpose of rendering it hard. A pin of hard steel is fixed in the centre of the box, upon the point of which the needle rests; and a glass plate covers the cavity. This glass plate rests upon a shoulder, and stands very little above the piece C (fig. 9.), so as not to touch that piece, whilst at the same time it prevents the needle's falling from over the pin. In several of the compasses a little piece of wire with a button is affixed to the box, which is formed so as to stop the motion of the needle when the compass is not intended to be in action, as when it is carried in the pocket, &c.

The friction which must naturally take place in cleaning the glass cover of a compass, frequently excites its electricity, in which case the needle is attracted more or less by the glass, and its free motion is thereby partly or entirely obstructed, Phil. Trans. N^o. 480. p. 243. This inconvenience may be removed by passing a wet finger in various directions over the surface of the glass. Few needles of land compasses are furnished with cards like those which are used at sea. In general the principal points of the horizon are marked in the bottom of the box, and a divided circle is added to the box, so that the edge of it may be even with, and so near as almost to touch, the extremities of the needle.

The compasses used at sea for ascertaining and directing the course of vessels, differ from the former principally by their having a circular card, whose diameter is equal to the length of the needle, fixed upon the needle, so as to turn with it, and by the box being set in a mechanism on four cross centres, called gimbals, the office of which is to keep the compass box always in an horizontal position, whilst the external box moves with the ship, as the latter rolls and pitches. This construction will be easily understood, by observing fig. 10, which exhibits a steering compass as viewed by an eye placed perpendicularly over it. A B C D is the external wooden box, which is fastened to and moves with the ship, E F is a brass circle having two pivots or axes, G, H, which turn in two holes in the opposite sides of the wooden box; *ic*, in the compass box, which is likewise furnished with two pivots or axes, *r, u*, and these turn in two holes made in the brass ring F E. Now as the direction of these last pivots, *r, u*, is at right angles to the direction of the pivots, G, H, it will be easily understood, that in whatever direction the vessel, and the box A B C D, which is fixed to it, may incline, the compass box, *ic*, re-

mains always in an horizontal position, for it will turn either upon the pivots, *r, u*, or upon the pivots, G, H. K is the card which is fixed to the magnetic needle and moves with it, under the glass cover, through which it may be distinctly seen. The outer edge of this card is divided into 360 degrees, and within the circle of those divisions it is again divided into 32 equal parts or arches, called the *points of the compass*, or *rhumbs*. These rhumbs are usually divided into quarters. Their names, beginning from the north point, and going all round, are as follow: the letters standing N, for north; E, for east; S, for south; and W, for west.

N.	S. E. by E.	W. S. W.
N. by E.	S. E.	W. by S.
N. N. E.	S. E. by S.	W.
N. E. by N.	S. S. E.	W. by N.
N. E.	S. by E.	W. N. W.
N. E. by E.	S.	N. W. by W.
E. N. E.	S. by W.	N. W.
E. by N.	S. S. W.	N. W. by N.
E.	S. W. by S.	N. N. W.
E. by S.	S. W.	N. by W.
E. S. E.	S. W. by W.	

The construction which has been more generally used in the royal navy, is an improvement of the late Dr. Knight, a gentleman of very extensive knowledge in magnetism. In this construction the weight of needle, card, &c. is removed considerably below the point of suspension or centre of motion, by the addition of a brass circle, whose diameter is equal to that of the card, which is made very thin. This ring being fixed below the card, and the needle above it, the centre of gravity of the whole comes low enough to admit of the cap being situated below the needle; hence the needle needs not be perforated. This needle is a perfect parallelopiped. The figs. 11 and 12 represent the lower and upper parts of this (Dr. Knight's) card, needle, &c. about one half of the real size. A B is the needle, and C represents the upper part of its cap, situated below it. The under part of the cap is seen at G; A D D B is the card. The brass edge, or circle, is represented by F E O, and is fastened to the extremities of the needle, (the card being interposed) by means of two screws. H, I, are two sliding weights to balance the card.

A few years ago another sort of construction was contrived by Mr. K. McCulloch, for which he obtained a patent. The figs. 13 and 14 represent this compass, the former being a section, and the latter a perspective view of it. In this compass, both the compass-box and the needle, with the card, are suspended upon pivots, the extremities of which come very near to each other; which construction keeps them horizontal without any gimbals, as will be easily manifested by the following description. Fig. 13. A *aaaa*, is the common wooden box, with its lid; *bb* the brass compass box; *cc* the glass cover to it; *dd* the hollow conical bottom; *e* the prop, upon which the compass is supported instead of gimbals; the spherical top of which is finely polished, and the apex of the hollow cone is fitted to receive it; *ff* is a quantity of lead run round the bottom and cone of the compass box, to balance and to keep it steadily horizontal; *g g* is the card, and the magnetic needle, bent in such a manner as to bring the point of the conical pivot, on which it moves and is supported, very near to the centre of gravity, as well as to the centre of motion; *bb* are two guards, which, by means of the two pins *i, i*, affixed to the compass-box, prevent its turning round, and deceiving the seaman. In fig. 14, both the lid and

the front of the box are removed; *b b* are the guards; *b* the compass-box, and *e* is the prop which supports the box.

The greatest inconvenience that attends the use of the compasses at sea is the irregularity of motion induced by shocks of sudden impulses. In those cases the vessel is suddenly moved out of its direction, and the card of the compass is set vibrating for a considerable time, during which the seaman is unable to regain his course. Several methods have been tried for the purpose of removing this inconvenience, and the above described compass of Mr. M'Culloch's contrivance was supposed to accomplish this end in a considerable degree; but the experience of some years shews that this is not the case. The least skilled seamen do not like the needles of their compasses too powerfully magnetized, because, they say, then the needles are not steady. The fact is, that when the needle is not strongly magnetic, it follows the irregularities of the ship's motion in a great degree; which renders it apparently more steady; but the very same cause which enables it to follow the irregular motion of the ship, prevents at the same time its placing itself in the magnetic meridian. With the same degree of impropriety, some persons have endeavoured to prevent the irregular shocks or vibrations of the magnetic needle by increasing the friction between the cap of the needle and the pointed wire which supports it. Sometimes pieces of paper, like wings, have been stuck to the lower surface of the card, which, by offering a resistance against the air in the box, check in some measure the irregular movements of the card. In the year 1779, Dr. Ingenhousz presented a paper to the Royal Society, which is published in the 69th vol. of the Philosophical Transactions, and in which he describes some experiments, made by magnetic needles in water, where he found that a strong magnetical needle placed itself in the magnetic meridian, nearly as well under water as in the open air, and that by the resistance of the medium, much of its too great versatility was taken away. In consequence of those experiments the Dr. proposed to enclose the magnetic needle in some fluid for the use of vessels. "Common water," he says, "would be, perhaps, the best medium for these different contrivances, if steel was not so easily rusted by it, and if in cold weather water was not so apt to freeze; therefore, I think, that some of the thinnest expressed oils would answer the purpose better. The glass basin containing such a compass should be full of the liquid to the cover, to obstruct undulating motions." But though this proposal appeared at first very promising, and some eminent philosophical instrument-makers were much struck with it; yet it does not appear that it was ever adopted.

The use of the compass in general is to direct a person along any required track, which makes a known angle with the direction of the magnetic needle; and this renders the compass applicable to a variety of purposes; thus it guides travellers in deserts, as in Arabia, in the woods of America, &c.; it enables the navigator to proceed in any required track; it is highly useful to the miner, by shewing the direction of subterranean places; it serves for measuring horizontal angles; hence it is useful in land-surveying, taking plots, finding bearings in dialling, &c. And lastly it serves to set sundials, and other astronomical instruments when no great accuracy is required. The application of the compass to those purposes is so very obvious, as not to require any farther illustration. But for some of these purposes, sights must be applied to it, as in the azimuth compass.

The azimuth compass is a steering compass of any of the above-mentioned constructions, to which two sights are adapted, through which the sun is to be seen, in order to find its amplitude or its azimuth, whence the declination of the

magnetic meridian from the true or astronomical meridian may be determined; those two meridians seldom coinciding. At present (1807) in London, the declination of the magnetic needle is about $24^{\circ} 9'$ west; that is, the northern extremity of the magnetic needle, points to a part of the heavens, which makes an angle of about $24^{\circ} 9'$ with the true North. But this declination is various at different times in the same place, as well as at different places at the same time.

The more usual sort of azimuth compasses is represented in fig. 15, where *F, G*, are the sights, or sight vane, in one of which, *G*, there is an oblong aperture, with a perpendicular thread or wire through its middle; and in the other sight, *F*, there is a narrow perpendicular slit. A thread or wire, *H I*, is stretched from one side of the edge of the box to the other. The ring *A B* of the gimbals rests with its pivots on the semicircle *CD*, the foot, *E*, of which turns in a socket, *f*, that whilst the box, *KLM*, remains steady, the compass may be turned round, in order to place the sights, *F, G*, in the direction of the sun, or other celestial object. The pivots of the gimbals of this, as well as of the steering compass in general, should lie in the same plane with the point of suspension of the needle or card, for the purpose of avoiding the irregularity of its vibrations as much as possible. In the inside of the box there are two lines drawn on its sides perpendicularly down, from the points where the thread, *H I*, touches the edge of the box. These lines serve to shew how many degrees the north or south pole of the needle is distant from the azimuth of the sun; on which account the middle of the apertures in the sight vane, *F* and *G*, the thread *H I*, and the above-mentioned two lines must stand exactly in the same vertical plane. The use of the thread *H I*, which is sometimes omitted in compasses of this sort, is to shew the degrees between the magnetic meridian and the azimuth, &c. when the eye of the observer stands perpendicularly over it. On one side of the box of the azimuth compass, there generally is a nut or stop, which, when pulled in, bears against the card and stops it; and this is done for the purpose of reading that degree, half degree, &c. of the card, which coincides with one of the perpendicular lines in the inside of the box.

Mr. M'Culloch's azimuth compass is represented in fig. 16, where *b* is the compass-box, *b* one of the guards, *e* the prop, which stands in a brass socket, and may be turned round at pleasure, *r* is a brass bar upon which the sight vane are fixed; *2*, a dark glass, which moves up or down on the sight vane; *3*, *4* is a magnifying-glass, which is also moveable on the other sight vane; *5* is the nonius or vernier; *6* a slide for moving the vernier so as to stop the card in taking the azimuth; and *7* a double convex glass, through which the divisions on the vernier may be read with accuracy.

In order to observe at sea the magnetic amplitude of a celestial object (*viz.* its bearing by the compass when in the horizon) with the azimuth compass, place the instrument on a steady place, whence the horizon may be clearly seen; and looking through the sight vane of the compass, turn the instrument round, until the centre of the sun's disk, or other celestial object, may be seen through the narrow slit in one of the sight vane exactly on the thread which bisects the other sight vane; and at the instant that the centre of the celestial object, whether rising or setting, is in the horizon, push the stop in the side of the box, so as to stop the card, then read the degree, half degree, &c. of the card, which stands against one of the perpendicular lines in the inside of the box, and this is the magnetical amplitude sought.—In this observation, some allowance must be made for the height of the observer's eye, above the level of the sea.

sea. The true amplitude of the celestial object is an arch of the horizon contained between the east or west points of the horizon, and that point of the horizon which the centre of that celestial object cuts in its rising or setting. In order to find the true amplitude of the celestial object, the latitude of the place of observation, and the actual declination of that object, must be known; then say, as the cosine of the latitude is to radius, so is the sine of the declination to the cosine of the amplitude sought.

To observe at sea the magnetic azimuth of a celestial object, (*viz.* its bearing by the compass when above the horizon), situate the instrument in a steady place, and looking through the narrow slit in one of the sight vanes, turn the box round until the centre of that object appears to coincide with the thread in the slit of the other sight vane, or till the shadow of that thread, when the sun is observed, falls exactly along the line on the surface of the compass-box, and at that instant stop the card; then read the degree, &c. as above directed with respect to the amplitude, and thus you have the magnetic azimuth of that object.—The true azimuth of that object is an arch of the horizon intercepted between the north or south point, and that point in which a plane passing through the zenith and the celestial object, cuts the horizon. In order to find this azimuth, the latitude of the place of observation, the declination of the celestial object and its altitude must be known; and since to determine the declination of the magnetic needle, this true azimuth of a celestial object must be taken at the same time that its magnetic azimuth is taken; therefore the altitude of that object must be taken with a sextant, at the very instant that its magnetic azimuth is taken; *viz.* at the time the card is stopped; then proceed in the following manner: If the declination and latitude be both north or both south, call the co-declination A; but if they be one south and the other north, add 90° to the declination, and call the sum A. Call the difference between the co-latitude and co-altitude B. Let the half of the sum of A and B be called D; and the half of their difference be called C; then add together the four following logarithms, *viz.* the arithmetical complement of the logarithmic sine of the co-altitude, the arithmetical complement of the logarithmic sine of the co-latitude, the logarithmic sine of D, and the logarithmic sine of C. Half the sum of those four logarithms is the logarithmic sine of half the azimuth sought.

Now, having shewn how to find the true and the magnetic amplitudes as well as azimuths, we shall briefly add the method of determining from them, the declination of the magnetic needle for the time and place when and where the observations are made. Let the amplitudes, as well as the azimuths, be all reckoned from the north point, which is effected by subtracting the amplitude from 90° when it is on the northward of the east or west points; or by adding it to 90° when it is southward of the said points. Then the magnetic amplitude is either smaller or greater than the true amplitude. When the magnetic amplitude is less than the true, and they are both on the same side of the north point, their difference is the declination of the magnetic needle towards the contrary side of the north point. But if they be on different sides of the north point, then their sum is the declination towards the same side with the true amplitude. When the magnetic amplitude is greater than the true, and they are on the same side of the north point, their difference shews the declination towards the same side. But if they be on different sides, then their sum is the declination towards the same side with the true amplitude. Thus, for example, if the magnetic amplitude is 80° eastward of the north point, and the true amplitude is 82° to-

wards the same side; then the declination is 2° west. And if the magnetic amplitude be 76° eastward of north, whilst the true amplitude is 5° westward of north, then the declination is 81° west. The same directions, *mutatis mutandis*, are to be followed for finding the declination from the magnetic and true azimuths.

Ever since the discovery of the declination of the magnetic needle from the true meridian, which appears to have been first observed by Columbus in his first voyage towards the continent of America, in the year 1492, the cause of that phenomenon has been earnestly sought after by inquisitive persons in the scientific world; and especially when it was found that this declination varies continually, in a manner, which has not, as yet, been reconciled to any theory. The most promising method of investigating the subject appeared to be that of observing attentively the daily, and even the hourly, variation of the declination, in order to discover, if possible, any period in it, or any dependence of it upon other natural phenomena. And in fact, the late ingenious Mr. Canton, who made numerous observations relative to the subject, found a periodical increase and decrease of the magnetic variation, in great measure corresponding with the temperature of the different parts of a natural day. For this purpose accurate compasses were fixed in various observatories, and the variation of the magnetic needle has been observed, at least once every day, for a great many years; such observations having frequently been inserted in meteorological journals, and elsewhere.

The variation compass being intended to shew the daily variation of the magnetic needle upon land, is generally made longer than those that are used at sea; and, as it is not necessary to turn it round, the box generally is of an oblong form, so that the angular motion of the needle in it may amount to about 40° or 50° . The divided arches are either within the box, concentric with the point of suspension of the needle; or out of it, on a frame, the particular construction of which will appear from the description of the variation compass of the Royal Society of London, which will be given presently. When the divided arches are within the box, in which case a nonius is often placed on one extremity of the needle, the variation is known by observing the division which coincides with the axis of the needle. In either construction, it is evident that the beginning of the divisions of the arch or arches must be placed exactly in the meridian of the place; or else its deviation from the meridian must be accurately known and allowed for in reading the degrees of magnetic variation. And it is almost superfluous to add that such compasses must be situated in very steady places, out of the influence of iron; so much so that it will be proper for the observer, when he examines the compass, &c. to take out of his pockets, keys, knives, or any other article of steel and iron; for otherwise they will sensibly alter the direction of the needle. We shall now subjoin the particular descriptions of two variation compasses of the best construction, *viz.* of that which is used at the Royal Society, and is described by the honourable Henry Cavendish, in the 66th vol. of the Philosophical Transactions; and of that which was contrived by Mr. Cavallo, and is described in his "Treatise on Magnetism;" the former of which, being much larger, is well calculated for a fixed observatory, whilst the latter is smaller, more compact, and may be easily fixed in any place.

Fig. 17, is a plan of the Royal Society's variation compass. "In this instrument, the box which holds the needle is not fixed, but turns horizontally on a centre, and has an index fastened to it, pointing to a divided arch on the brass frame on which it turns; and the method of observing is to

move the box, till a line drawn on it points exactly to the end of the needle; which being done, the angle that the needle makes with the side of the frame is shewn by the index. *ABba* is the brads frame, the sides *AB* and *ab* being parallel: *Ee* is a circular plate fastened thereto, on which *CDdc*, the box which holds the needle, turns as on a centre; *Nn* is the needle, the pin on which it vibrates being fixed in the centre of the plate *Ee*; *Bb* is the division on the brads frame; and *G* the index fastened to the box, *CDdc*, furnished with a vernier division; the division and vernier being constructed so as to shew the angle which the line, *Ff*, makes with *AB*, or *ab*. The instrument is placed in the meridian by the telescope, *Mm*, the line of collimation of which is parallel to *AB*, and is pointed to a mark fixed due north of it. *Fig. 18*, is a vertical section of the instrument passing along the line *Ff*; *AB* is the brads frame; *CDdc* is the box which holds the needle; *Ee* the circular plate on which it turns; *Nn* is the needle; *P* and *p* are small plates of brads fixed to the ends of it, on each of which is drawn a line serving by way of index. These pieces of brads are raised to such a height that their tops are on a level with the point of the pin on which the needle turns. The use of them is, that it is much easier observing this way, than when the lines, serving by way of index, are drawn on the needle itself, as by this means the inconvenience proceeding from one kind of vibration in the needle is avoided. *S*, and *s*, are two brads plates, on each side of which is drawn a line, to which the index at the end of the needle is to point; there is also a line parallel to these, drawn on the bottom of the box; these three lines form the line, *Ff*, in *fig. 17*. *R* is a double microscope intended to assist us in judging when the index, *P*, points exactly to the line, *F*, that is, to the line drawn on the plate *S*. It is placed so that a wire, *Ww*, in its focus, appears to coincide with this line; and in observing, the box is moved till the wire appears also to coincide with the index *P*. The cap in the centre of the needle is made to take on and off readily, and to fit on upon either face; so that we may on occasion observe with the under face of the needle uppermost. The intention of inverting the needle is to shew whether the axis of the figure of the needle coincides with its magnetic axis.

The *figures 19* and *20*, exhibit a vertical view, and a section of Mr. Cavallo's variation-compass, and those representations are two thirds of the real size of the instrument. The letters of reference indicate the same parts in both figures. *ABD* is a brads bottom with a circular brads piece, *cei*, screwed fast upon it. *FGHK* is a rim likewise of brads, that slides on the outside of the circular piece *cei*, and to which the flat glass, *M*, is fastened; so that when the rim is removed, the glass comes off with it. The shape of the needle is clearly indicated by the figures. It has a hole in the middle to receive the agate cap, which is burnished into a brads socket, and is so situated into the needle, that the apex of its cavity does not rise higher than the surface of the needle; hence the point of suspension upon the pin, *B*, is even with the upper surface of the needle. By this means the pendulum-like oscillations cannot disturb the direction of the fine lines marked on the extremities of this needle. The upper and lower surfaces of this needle are quite alike, and the brads socket, which contains the agate cap, is made so as to admit of the needle's being turned with either of these surfaces upwards. The hole in the middle of the needle is quite cylindrical, and is on the outside of the brads socket, which fits the said hole exactly, but projecting a little way beyond the needle, has

a screw cut on that projection, upon which another circular piece of brads is screwed to fix it, as may be seen in *fig. 20*. It is evident, therefore, that when the last-mentioned piece of brads is unscrewed, the socket with the agate cap, may be put in on either side of the needle, and may be fastened on the opposite side of it. By this means a great source of error may be avoided, namely what arises from the magnetical axis of the needle being not in the axis of its figure, which is frequently the case; for, if the direction of this needle be observed with one side of it upwards and then (the needle being turned) be observed again with the other side upwards; either the second observation coincides with the first, and then we may conclude that the magnetical axis of the needle is truly in its middle; or the observations differ, and thence we shall know that the magnetical axis of the needle is not in the axis of its figure; but in this case we may have the real magnetic direction *By* taking a mean of the two observations; or we may thereby ascertain, once for all, how much the line of direction of the needle deviates from its magnetic axis, which, when once ascertained, becomes a fixed quantity to be either subtracted from, or added to any other observation."

"The upper side of the circular piece *cei* is silvered, and divided into degrees and half degrees; but those divisions, being too minute, are omitted in the figure. The bottom *ABD* has two projections, *A* and *D*, opposite to each other, and on each of their chamfered edges a line is marked, which, being drawn at the same time that the circle, *cei*, is divided by the circular dividing engine, coincide exactly with the commencement of the numeration of the degrees on the opposite sides of the circle, from which places the degrees run on both sides as far as 90°. The needle, therefore, which lies with its upper surface even with the divided circle, points to the same degree and part of a degree with both its extremities."

"We come now to describe the method of measuring the parts of a degree on the circle, which is only divided into half degrees. This is obtained by means of the microscope, *fig. 21*, which is furnished with one of my mother-of-pearl micrometers. (*Phil. Transf. vol. 51.*) The external construction of the microscope, and likewise the manner of placing it perpendicularly upon the compass box, are indicated by *fig. 21*; at *N* in *fig. 19*; and by the dotted lines at *K*, in *fig. 20*. *P* is a short tube supported by the uprights *F*, *R*, the lower parts of which project horizontally. These horizontal projections, *O*, *O*, are not tied at *Y*, so as to fit the mouldings, *H*, *K*, of the rim *FGHK*, when the parts, *O*, *O*, rest upon the glass. By this means the microscope may be moved all round the compass-box, whilst it keeps some of the divisions of the circle always in the field of view. The body of the microscope may be moved up and down in the tube *P*, in order to adjust it for distinct vision. It consists of the tube *SS*, into the upper part of which slides a short eye-tube *T*, and at its lower extremity, *H*, a lens is fastened. Two other lenses are fixed into the tube *T*, which is about nine-tenths of an inch long, and within it; the exact y in the focus of the eye lens, the mother-of-pearl micrometer is situated. Those three lenses are all of the plano-convex sort. The focus of the upper one is about four-tenths of an inch, and the focus of the second and third is about six-tenths of an inch. The divisions of the micrometer are 300ths of an inch, and when viewed through the microscope, and the microscope is placed upon the compass, 15 of them appear to be exactly equal to half a degree on the circle *cei*. But there is no need for those divisions to be exactly

ooths of an inch. It is sufficient if they are nearly so, as, for instance, from about 280 to 320 in an inch; because by pulling the tube T more or less out of the tube SS, and by moving the last mentioned tube up or down into P, the divisions of the circle may be magnified more or less, till 15 divisions of the micrometer appear to be exactly equal to the space between any two contiguous divisions on the circle; *viz.* to half a degree. When the microscope has been once so adjusted, it requires no farther alteration, excepting to be moved round the box until it comes over the end of the needle, in which situation the field of view appears as shewn in *fig. 22*, where the middlemost part is occupied by the micrometers 1, 2, 3, 4; the other large divisions are the magnified divisions of the circle, and W is the extremity of the needle, with its directive line pointing to some division on the micrometer."

"Fifteen divisions of the micrometer being equal to half a degree, or to 30', it follows that each division is equal to two minutes, and as it may be easily discerned whether the line on the end of the needle is directed exactly to one of those divisions or midway between two of them, therefore the direction of the needle in this compass may be read off to a single minute. In order to observe the daily variation, when this compass is properly fixed, the microscope need not be moved, because its field of view takes in about two degrees, which is a much greater space than the needle will go through in ten years time. In moving the microscope round the box, care must be taken to place it so that the divisions of the circle may appear to coincide with some of the long divisions of the micrometer.—N. B. This microscope inverts the objects; therefore what appears to be on the right hand must be understood to lie on the left, and *vice versa*."

"In order to observe the real direction of the magnetic needle, or the daily variation, the compass must be placed so as that the two lines marked on the projections A and D, *fig. 19*, may coincide with a meridian line drawn upon a board, a stone, a block, &c. and then the degrees and minutes, to which the extremity of the needle is directed, will shew the required variation."

Having, in the preceding paragraphs, mentioned all the important particulars relating to the discovery, the construction, and the use of one of the most remarkable, and the most useful, philosophical instruments, we shall conclude by

mentioning a deception which has sometimes been offered to the credulous and unskilled part of mankind. It is a compass, or a magnetical needle which was pretended to point due north and south, without any variation at any time or place; and compasses apparently of this description have actually been offered for trial and have even been sent abroad. But upon examination it has been found either that the north and south points of the card were not placed over the north and south points of the needle; or that the needle, having been made purposely broad, had been magnetized so that the direction of its poles made an angle with the axis of its figure, just equal to the magnetical declination at that particular time and place. The consequence of this artifice is, that though the needle may appear to have no declination at that particular time and place; yet at any other time, or if moved to another place where the magnetical declination is different, its direction will deviate from the true meridian. The declination or variation, like the attraction and repulsion, belongs to every piece of magnet, be it natural or artificial, and the magnetic needle is of the latter sort; nor can, at the same time and in the same place, one needle point to one part of the heavens whilst others point to a different part; provided they are freely suspended, and be uninfluenced by iron or other magnets.

COMPASS of voices, in Music. In early times of counterpoint, human voices of different compass, occasioned by age, sex, and natural organ, were classed and divided into four distinct kinds, at the distance only of a third above each other, which the base, or F clef, placed from line to line, expressed. The lowest of these was called the tenor, the next contratenor, motetus the third, and triplum the highest, or treble; of which term this was the origin.

After this, about the middle of the fifteenth century, as different parts began to be multiplied, the scale received six divisions: base, baritone, tenor, contralto, mezzo soprano, and soprano. The natural pitch of these is about three or four notes above each other, as their several clefs, which originally served as barriers, will discover.

It seldom happens that a voice has more than ten real, steady, and full, natural notes, in its compass, without a mixture of falset, which, being of a different register, is easily discovered. The following are the names and usual extent of the several species of human voice.



But as there are sometimes base voices which go down to double F, and even lower; so there are in the treble, among modern vocal phenomena, singers that go higher than F in altissimo; which make the whole diapason of voices exceed four octaves. And there is at present (1802) in England, a German buffo singer with a base voice that goes down to double gamut in real musical tones; and in falset, up to G on the second line in the treble. No public use was made of this extraordinary voice. He arrived in autumn, when no theatres were open, and remained but a short time.

But though parts in choral music were multiplied, not only to six, but even thirty-six, before the close of the fifteenth century; yet the general, and established number, in the pope's chapel, by which probably all other choral service

was regulated, amounted to no more than four: cantus, altus, tenor, and base; which see severally.

If it be asked why so many clefs are used? It may be answered, to keep the melody of these several voices within the compass of the five line staff; to prevent the perplexity of a great number of leger-lines, which in singing and playing at sight, frequently alarm and embarrass the performer.

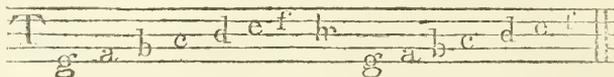
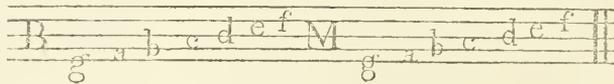
Of all the expedients proposed by speculative and ingenious men, for the abolition of tenor clefs, the only one that seems practicable, and has the merit of great simplicity, was published in our own country in the time of Charles II. under the title of "An Essay on the advancement of Music, by casting away the perplexity of different clefs; and uniting all sorts of music, lute, viols, violins, organ, harpsichord, voice, &c. in one universal character, by Thomas Salmon,

Salmon, A. M. of Trinity College, Oxford." London, 1672. This book is well written, and, though very illiberally treated by Lock, Playford, and some other professors, contains nothing that is either absurd, or impracticable; nor could I discover, says Dr. Burney, any other solid objection to its doctrines being adopted, than the effect it would have upon old music, by soon rendering it unintelligible. At present the tenor clef alone is thought an insuperable difficulty in our country, by Dilettanti performers on the harpsichord; but if Salmon's simple and easy musical alphabet were chiefly in use, the base clef would likewise be soon rendered as obso-

lete and difficult as the tenor; so that two parts or clefs out of three, in present use, would become unintelligible. The author's plan was simply this: instead of the eight or nine clefs that were then in use, as,



to express the whole scale of sounds on the five lines and spaces in this simple manner:



G in every part of the scale being on the first line, *a* on the first space, *b* on the second line, &c. the letters preceding each septenary implying base, mean, treble, supreme. To this proposal there seems no cogent objection; professors would not be humbled by having any thing to learn. The base clef, which every tyro knows, repeated in octaves, without changing a single name or character, would accomplish the whole business. The principal evil, and a great evil it would be, is the certainty of soon rendering all former music, printed or in manuscript, obsolete and unintelligible. This has been effected in a great measure, lately, by new editions of the harpsichord and organ music of the last century, and the total rejection of every tenor clef in music for keyed-instruments; of which we have already pointed out the inconvenience. See ACCOMPANIMENT and CLEF.

COMPASS of proportion. See SECTOR and PROPORTION.

COMPASS dials, are small dials, fitted in boxes, for the pocket, to shew the hour of the day by direction of the needle; which indicates how to place them right by tuning the dial about, till the cock or style stand directly over the needle, and point to the northward; but these can never be very exact, because of the variation of the needle itself. See DIAL.

COMPASS Saw. See SAW.

COMPASSES, or pair of COMPASSES, a mathematical instrument, used for the describing of circles, measuring lines, &c. The common compasses consist of two branches or legs, of iron, brass, or other metal, pointed at bottom; and joined by a rivet, whereon they move, as on a centre. Those are reckoned the best, part of whose joint is steel, and where the pin on, which the joint turns is a steel screw. The points should also be made of hardened and polished steel. In some the points are fixed; in others they may be taken off, and a drawing-pen, pencil, or dotting wheel, substituted in their room.

The invention of compasses is ascribed to Talaus, nephew of Dædalus, by his siler, whom the poets say, Dædalus killed out of envy. We have compasses now of various kinds and contrivances, accommodated to the various uses they are intended for; as,

COMPASSES of three legs, or triangular compasses. Their structure is like that of the common compasses, letting aside the excess of a leg, which has a motion every way: their use is to take three points at once, and so to form triangles: to lay down three positions of a map to be copied at once, &c. Two of the legs A, B (*Plate, Compasses, fig. 1.*) are jointed together like a common pair; the pin *a*, which connects them, has another leg D, jointed to it; the legs, A, B, are first set to two of the points, and the leg D is then moved farther from, or nearer to, the other legs by bending its joint; or it is turned round the pin *a* of the other legs as a centre, as occasion may require.

Fig. 2. is another construction of the triangular compasses. A, B, C, are three arms, at whose ends are jointed the arms *a, b, c*, carrying steel points; they are of such lengths, that when closed they shall nearly meet in one point; by opening them as in the figure, they can be made to coincide with any three points within the reach of the arms.

COMPASSES, Beam, consist of a long branch, or beam, carrying two brass cursors; the one fixed at one end, the other sliding along the beam, with a screw to fasten it, on occasion. To the cursors may be screwed points of any kind; whether steel, pencils, or the like. To the fixed cursor is sometimes applied an adjusting or micrometer screw, by which an extent is obtained to very great nicety. Mr. Ramsden constructed compasses of this kind whose micrometer screw shews very perceptibly a motion of $\frac{1}{1000}$ th part of an inch. It is used to draw large circles, to take great extents, &c. See *Plate, Compasses, fig. 3.* which exhibits a common pair of beam compasses. A A is a five-sided bar, of mahogany, made very straight and true; B, D are two frames of brass, sliding on the bar, that can be fastened at any place by a clamp screw *ab*, at the top of each; *ce, f* are two pieces into which are inserted the points, and are fastened by a screw; the sliding frame B has a collar *g* screwed to it, in which the screw *b*, with a divided head, turns; this screw is tapped into a piece of brass fastened at the end of the mahogany bar, so as to move the point at *f* very slowly when the screw is turned.

COMPASSES, Bow, or Bows, are a small sort of compasses,

passes, that shut up in a hoop, which serves for a handle. Their use is to describe arcs, or circumferences of circles of very small radius. *Fig. 4.* is a small pair of compasses, with a screw for measuring small distances very accurately, and describing small circles: *a* is one of the points fastened to a socket, in which the screw *b* works; *d* is a steel-bar attached to the same socket; *e* is a piece sliding on the bar *d*, and carrying the other point; it has a projection above it, in which the screw works; *f* and *g* are two pieces jointed to the points at one end, and to a small handle *b*. at the other, which is used to hold them by. The head *l* of the screw is divided into equal parts, which divisions are read against a projecting part of the piece, holding the point *a*, and by turning it round one of the divisions, the points are moved some fractional part of an inch, as $\frac{1}{10}$, or $\frac{1}{100}$, according to the number of threads in an inch of the screw's length, and the number of divisions on the lead of the screw.

COMPASSES, *Caliber*. See CALIBER.

COMPASSES, *Clock-makers*, are very substantial, serving to cut pasteboard, brass, &c. jointed like the common compasses with a quadrant, or bow, as the *spring compasses*, only its use is different; as serving here to keep the instrument firm at one opening. See CLOCK.

COMPASSES, *cylindrical and spherical*, used in taking the diameter, thickness, or caliber of round or cylindrical bodies; such as cannons, balls, pipes, &c. They consist of four branches joined in a centre, two of them circular, and two flat, a little bent at the ends.

To use them, one of the flat points is put within the cannon, the other without: the two opposite points shew the thickness. See CALIBER *Compass*.

There are also *spherical compasses*, differing in nothing from the common ones, but that their legs are arched, serving to take the diameters of round bodies, &c. Another sort of compasses has been lately invented, for measuring the diameter of round bodies, as balls, &c. which consist of two flat pieces of metal, set at right angles, in a straight bar or beam of the same; the one being fixed, and the other sliding along it, so far as just to receive the round body between them; and then its diameter, or distance between the two pieces, is shewn by the divisions marked on the beam.

COMPASSES, *Elliptic*. Their use is to draw ellipses, or ovals of any kind: they consist of a beam *AB* (*Plate, Compasses, fig. 5.*) about a foot long, bearing three cursors; to one of which may be screwed points of any kind: to the bottom of the other two are rivetted two sliding dove-tails, adjusted in grooves made in the cross branches of the beam. The dove-tails having a motion every way, by turning about the long branch, go backwards and forwards along the cross: so that when the beam has gone half-way about, one of these will have moved the whole length of one of the branches; and when the beam has got quite round, the same dove-tail has got back the whole length of the branch. Understand the same of the other dove-tail.

Note. the distance between the two sliding dove-tails is the distance between the two foci of the ellipsis; so that by changing that distance, the ellipsis will be rounder or slenderer. Under the ends of the branches of the cross are placed four steel points to keep it fast.

The use of this compass is easy; by turning round the long branch, the ink, pencil, or other point, will draw the ellipsis required. Its figure shews both its use and construction.

COMPASSES, *German*, whose legs are a little bent outwards towards the top; so that, when shut, only the points meet.

COMPASSES, *Hair*, so contrived within side, as to take an extent to a hair's breadth. The outward appearance of the hair compasses is like that of a common pair of compasses; the peculiarity consists in one of the legs *A*, being attached to the brass by a spring *B* (*fig. 6.*), whose action throws the leg inwards, and is counteracted by a small screw *D*; by turning which the leg can be moved small distances, and set to the greatest nicety, without moving the joint.

Fig. 7. represents a pair of pocket compasses, the legs, *a, b*, of which are hollow, and contain, the one a pen, *d*, and the other a port-crayon *e*, at the opposite end of each point, *f* and *g*.

COMPASSES, *Lapidary's*, a piece of wood in form of the shaft of a plane, cleft a-top, as far as half its length; where-with they measure the angles, &c. of the precious stones, as they cut them. In the cleft is a little brass rule, fastened there, at one end, by a pin; but so that it may be moved in the manner of the level; with this kind of square they take the angles of the stones, laying them on the shaft as they cut them.

COMPASSES, *Proportional*, are those whose joint lies between the points terminating each leg: they are either *simple* or *compound*. In the former sort the centre is fixed, so that one pair of these serves only for one proportion.

COMPASSES, *Compound proportional*, consist of two branches (*see fig. 8.*), each pointed at either end with steel: the length of the branches is cut through, for a cursor to slide up and down; in the middle of which cursor is a screw, serving to join the branches, and to fix them at any point required.

On the one leg are divisions, serving to divide lines into any number of equal parts, for reducing of figures, &c. On the other are numbers, for inscribing any regular polygon in a circle proposed.

The use of the first is easy: Suppose *v. gr.* a right line required to be divided into three equal parts; push the cursor till the screw be just on the figure 3; where fixing it, take the length of the given line between the two longest parts of the legs: the distance between the two shortest will be one third of the given line. In the same manner may the line be divided into any other number of parts.

For the use of the line of polygons: Suppose, *v. gr.* a pentagon required to be inscribed in a circle: push the cursor till the middle of the screw be against 5, the number of sides in a pentagon; between the shortest parts of the legs take the semidiameter of the circle: the legs thus opened, the distance between the points of the longest parts will be the side of the pentagon to be inscribed in the circle. And thus for a figure of any other number of sides.

Fig. 9. is a pair of proportional compasses; the brass part of the two legs *A, B*, have longitudinal openings in them, for the pin, round which they move as a centre, to slide in, and can be fixed at any place by a screw *a*, so that the distance from the centre to the points *c, d*, shall be twice, three times, (or any other aliquot part) of the distance to the points *e, f*, and of course the openings at each end will be in the same proportion.

Fig. 10. represents a method of adapting a quick and slow motion to a pair of these compasses; *a* is a brass bar, with an oblong opening cut in it, to receive a screw, *b*, fastened to one leg of the compasses; the other end of the bar, *a*, is cut into a screw, with a fine thread, and has a nut, *j*, on it, turning in a collar jointed to the other leg of the compasses. When the screw, *b*, is loose, the compasses can be set to any opening; but when it is fast, they can only

be moved by turning the nut *f*. The screw, *h*, is put into a hole in one of the legs of the compasses, so that it can easily be removed, and inserted into a hole made in the moveable centre *g*, to give it a slow motion if required.

COMPASSES, *Proportional*, with the *sector lines*. The structure of these is so like that of the common proportional compasses, only a little nicer, that it needs no particular description. See *fig. 11*.

The lines on the first face are the line of lines, marked *lines*: it is divided into 100 equal parts, every tenth numbered: and the line of chords, which goes to 60° , is marked *chords*.

On the other face are a line of sines to 90° , and a line of tangents to 45° . On the other side are the tangents from 45° to $71^\circ 34'$; on the other, secants from 0° to $70^\circ 30'$.

For the use of these compasses: 1. To divide a line into any number of equal parts, less than 100: divide 100 by the number of parts required: slip the cursor till the line on the sliding dove-tail be against the quotient on the line of lines; then the whole line being taken between the points of the compasses most remote from the centre, the aperture of the other will shew the division required. 2. A right line given, supposed to be divided into 100 parts, to take any number of those parts; slip the line on the sliding dove-tail to the number of parts required; the whole line being taken between the points farthest from the centre, the aperture of the other two will include the number of divisions required. 3. The radius being given, to find the chord of any arch under 60° ; slip the line on the sliding dove-tail to the degrees required on the line of chords; the radius being taken between the points farthest from the centre of the cursor, the aperture of the other line will be the chord required, provided the number of degrees be greater than 29 ; if it be less, the aperture taken from the radius will leave the chord required. 4. If the chord of an arch under 60° be given, and the radius required, slip the line on the dove-tail to the degrees given on the line of chords; the given chord being taken between the two points next the cursor, the aperture of the other will be the radius required. 5. The radius being given, to find the sine of any number of degrees. Slip the line on the dove-tail to the degree on the line of sines whose sine is required; the radius taken between the points farthest from the cursor, the aperture of the other will give the sine of the angle required. But if the sine sought be less than $30'$, the difference of the apertures of the opposite points will be the sine required. 6. The radius being given, to find the tangent of any number of degrees under 71° : if the tangent required be under $29^\circ 30'$, then slip the line on the dove-tail to the degree proposed on the tangent line; the radius taken between the points farthest from the cursor, the aperture of the others will be the tangent of the degrees required: if the tangent required be above $29^\circ 30'$, but under 45° , the line on the cursor must be slipped to the degrees given on the tangent line; then the radius being taken between the points farthest from the cursor, the aperture of the others will be the tangent. If the tangent required be greater than 45° , but less than $56^\circ 20'$, slip the notch on the tangent side of the turned check to the degree 0 in the tangent line on the side of the compass; the radius taken between the points farthest from the cursor; the difference between the aperture of the other, and these, added together, will be the tangent required. Thus, for the tangents of other degrees under 71 . After the like manner may the secant of any number of degrees under 71 be found.

Mr. Heath, a mathematical instrument-maker in London,

constructed a pair of proportional compasses in 1746, with a curious and useful contrivance for preventing the shorter legs from changing their position, when these compasses were used. It consisted of a small beam soldered to a screw, and running parallel to the leg of the compasses, nearly of the length of the groove; in this beam a slit was made, which admitted of a sliding nut, the other end of which fell into a hole in the bottom of the screw, belonging to the great nut of the compasses. The screw-pin of the beam passed through an adjuster, by means of which the mark on the slider might be brought exactly to any division. But the proportional compasses have been much out of use since the invention of the *sector*, which see.

COMPASSES, *Spring*, or *Dividers*, are made of hardened steel, the head arched; which, by its spring, opens the compasses; the opening being directed by a circular screw, fastened to one leg, and let through the other, worked with a nut.

COMPASSES, *Triangular*. See COMPASSES of three legs, and TRIANGULAR.

COMPASSES, *Trifsecing*, the invention of M. Tarragon, for the trifsection of angles, geometrically.

The instrument consists of two central rules, and an arch of a circle of 120 degrees, immovable, with its radius; the radius is fastened with one of the central rules, like the two legs of a sector, that the central rule may be carried through all the points of the circumference of the arch. The radius and rule must be as thin as possible, and the rule fastened to the radius hammered cold, to acquire an elasticity; the breadth of the other central rule must be triple the breadth of the radius. In this rule there is a groove, with a dove-tail, to be fastened on it, for its motion; in the centre of each rule must likewise be a hole. See the *Journ. des Sçavans*, Sept. 1688.

COMPASSES, *Turn-up*, a late contrivance to save the trouble of changing the points; the body is like the common compasses; towards the bottom of the legs, without side, are added two other points, beside the usual ones; the one carrying a drawing pen-point, the other a port-crayon; both adjusted so as to turn round, and so be in the way of use, or out of it, as occasion requires.

The points of small compasses are tempered by a lamp and blow-pipe, heating them red-hot; when cold, they are hard: the larger are tempered by a charcoal fire and a blow-pipe, heating them to a cherry colour, then plunging them in water.

See M. Bion's Construction and Uses of Mathematical Instruments, by Stone; and Robertson's Treatise on the same subject.

COMPASSEMENT *de feux*, in *Military Language*, a manner of fixing the distances between the chambers of mines, and disposing of the fauciflons, so as to communicate the fire to them at one and the same instant of time.

COMPASSING, in *Naval Architecture*, a term used to denote such pieces of timber as are incurved into the figure of an arch.

COMPASSING the *king's death*, in *Law*. See TREASON.

COMPASSION, in *Ethics*, a mixed passion, compounded of love and sorrow, and excited by the sight or recital of distress; or, as Dr. Hartley concisely defines it, it is the uneasiness which a man feels at the misery of another. Accordingly he traces it to several associations, both in children and adults, upon which it seems to be grounded; and he observes, that persons, whose nerves are easily irritable, and those who have experienced great trials and afflictions, are in general, more disposed to compassion than others; and that we are most apt to pity in those diseases and calamities

which we either have felt already, or apprehend ourselves in danger of feeling hereafter. A compassionate temper, says this writer, being great matter of praise to those who are endued with it, and the actions which flow from it being a duty incumbent on all, men are led to practise these actions, and to inculcate upon themselves the motives of compassion, by attending to distress, actually present, or described in history, real or fictitious.

Hobbes makes this a merely selfish passion, and defines it, as being fear for ourselves; Hutcheson resolves it into *Instinct*; but Dr. Butler much more properly considers compassion as an original, distinct, particular affection in human nature.

According to Dr. Cogan, in his "Treatise on the Passions," compassion is that species of affection, which is excited either by the actual distress of its object, or by some impending calamity which appears inevitable. It is, says this writer, a benevolent sorrow at their suffering or approaching misery. The etymology of the word expresses this idea with strict propriety, as it signifies "suffering with the object." Compassion is always connected with a disposition to relieve, and will always prompt to vigorous exertion, wherever there is a possibility of success; unless some important considerations should render the endeavour improper or unjust. It has no necessary connection with the character of its objects; their distress being a sufficient excitement. From the great extent and universality of this affection, it may be justly considered as a generic name, comprehending several other affections which have a more specific application, as *mercy*, *commiseration*, *pity*, &c. Dr. Reid remarks, that it seems to be false religion alone that is able to check the tear of compassion. We are told, he says, that in Portugal and Spain, a man condemned to be burned as an obdurate heretic, meets with no compassion, even from the multitude; observing, that they are taught to look upon him as the enemy of God, and doomed to hell fire. But should not this very circumstance, he adds, move compassion? Surely it would, if they were not taught that, in this case, it is a crime to show compassion, or even to feel it. Hobbes of Human Nature, cap. ix. sect. 10. Hutcheson's Enquiry into Moral Good and Evil. Butler's Sermons, serm. v. and vi. Hartley's Observations on Man. Cogan on the Passions. Reid's Essays on the Active Powers of Man, ch. iv.

COMPATIBLE, something that may suit, or consist with another. See **INCOMPATIBLE**.

COMPENDIUM, an abstract, epitome, or reduction of a large matter into a little compass. See **ABSTRACT** and **EPITOME**.

COMPENSATION, an action whereby any thing is admitted as an equivalent to another.

COMPENSATION, in the *Civil Law*, is a kind of right, whereby a debtor pursued by his creditor, for the payment of a debt, demands that the debt may be *compensated* with what is owing him by the creditor. *Compensation* is equivalent to payment, and answers to that which is called *Set-off*, in common law.

COMPENSATION-BALANCE, in *Horology*, is the balance of a chronometer, so ingeniously contrived, that two opposite actions counteract each other's natural effects at all times upon it, and equalise its momentum under all the changes of temperature experienced in different climates and seasons. The opposition of two natural effects, produced by an artificial arrangement of the acting parts, is very properly called the *compensation*, which has been effected in various ways. The most simple compensation that has been produced in a machine for measuring time, is that

which depends upon the variable fluidity of the oil applied to the pivot holes of the balance arbor, and of the arbors of a watch; oil, it is well known, however good, is more fluid in hot weather than in cold, and therefore diminishes the friction at the pivots more in summer than in winter, the consequence of which variation in the friction of a watch with the ordinary crown-wheel escapement, would have its rate accelerated in the former season, and retarded in the latter, by this simple cause, if there were no compensating property in the structure of some part of the mechanism; this property naturally exists in the balance and balance-spring, both which are subject to have their dimensions enlarged by heat, and contracted by cold; and these changes alternately occasion retardations and accelerations in the rate of going; but in such a way, that when the watch is disposed to have its rate accelerated by the most fluid state of the oil, it is also disposed to have the same retarded by the contemporary enlargement of the balance and balance-spring; hence the quantity that one of these dispositions prevails over the other in any watch, when regulated to mean time at a mean temperature, constitutes its liability to vary its rate of going in different months of the year. Berthoud, who attempted to proportion the thickness of his pivots to suit the oil with a given balance, so as to produce an approximation towards a good compensation, has called this the *natural compensation*, which is a very proper appellation, as it exists in a certain degree in all chronometers and watches that have oil applied to them. This natural compensation, however, is found to be a very imperfect one, and unfortunately interferes with the effects produced by the better compensations, which, in opposition to this, may be called the *artificial compensations*. To banish the interference of the variable effects produced by oil, is one of the difficulties, and indeed now the principal one, that opposes the efforts of the chronometer-maker, to make the action of his mechanism permanently uniform.

The mechanism of the artificial compensations may be arranged under three divisions, *viz.* 1st, That which applies exclusively to the balance-spring; 2dly, That which applies exclusively to the balance itself; and, 3dly, That which applies partly to the spring and partly to the balance: for the sake of order, we propose to describe the different compensation-balances agreeably to these divisions, which are also nearly agreeable to the order of time in which they were invented.

Compensations at the Spring.

1. *Harrison's Compensation Curb*.—We have said, under our article **CHRONOMETER**, that Mr. James Harrison of Barton, in Lincolnshire, was the first person who applied a self-compensating piece of mechanism to the balance of a watch, which contrivance, according to his provincial dialect, he called a *curb*, and which we have taken the liberty to name a *curb*. Fig. 1. of Plate XXVIII. of *Horology*, represents the balance, balance-spring, small cocks, and curb, as they would be seen by an eye placed directly over the back of the pillar-plate, when the large cock is taken off, that bears the verge-pivot: AA is the plate on which the mechanism is placed; B the balance of one uniform metal; C the spiral spring of regulation; DE the thermometrical curb, so contrived as to lengthen the effective length of the spring in the different degrees of temperature, without manual adjustment; Gg a double cock to which the curb DE is attached; and F the small cock, or stud, to which the exterior end of the spring is pinned. The thermometrical curb, DE, is composed of two long slender slips, one of brass and the other of steel,

joined together in different places, and is attached to the smaller half *g* of the double cock G *g*, so that it may be brought nearer to G, or removed farther from it at pleasure, before *g* is fixed to G, in order to place it at the requisite point between *a* and *b* of the spiral; the double cock is represented in the figure as though it were fixed fast by a screw and steady pin to the plate; but in the original time-keepers, it was adjustable between two parallel pieces, that allowed it to approach the fluid F, or recede from it, for the purpose of ascertaining particularly the best length of the curb, for effecting the requisite compensation: the side of the curb next to D was steel, and the side next to E brass, and the effect produced by changes of temperature was thus: when the time-keeper was exposed to heat, the balance, and balance spring, had their dimensions enlarged, so that the momentum of the balance was increased, supposing its arc of vibration unaltered, and the force of the spring was diminished, or at least would have been by its elongation, if the curb had not been applied; and the natural consequence would have been for the piece to retard; but the same heat, which naturally produces these changes in the balance and balance spring, produces such a change in the shape of the curb, as counteracts these natural effects; in the case of heat, the brass part, E, of the curb becomes more lengthened than the steel part D, by reason of its superior expansibility; the consequence is, that the compound piece, D E, becomes convex on the brass side E, and concave on the steel side D; that is, the remote or free end of the curb, considered as an index, moves from *a* towards *b*, and as this end carries two pins between which the straight end of the spring passes, these pins, and not the fluid, form the limit of length at all times of the regulating spring, which consequently is curved as to its effective length, under all the variety of elongations, that it experiences from different degrees of heat; so that it may be said to be always both lengthening and shortening in nearly the same proportion: on the contrary, when the piece is exposed to cold, or to speak more scientifically, is exposed to a low temperature, the steel side, D, becomes convex, and the brass side, E, concave from its greater contraction, and the free end of the curb moves from *b* towards *a*, thereby mechanically lengthening the spring, as it naturally contracts, in a degree sufficient to check the velocity which the balance would acquire from its diminished dimensions. Thus, whether it is summer or winter, in hot or in cold climates, the compensation curb is calculated to counterbalance the natural effects of changes of temperature on the dimensions of the balance and of its regulating spring.

It has been asserted, that the *elasticity* of the balance-spring is affected by changes of temperature; but we conceive it to be its *force*, or that power which depends on its *length* that is naturally altered, and not, at least in any sensible degree, that property which depends on its *temper*. This contrivance, we have said, in another place, laid the foundation of modern chronometry, though it was afterwards found to be a better application of the compound bar, that the balance itself should bear it, in order that the dimensions of the balance and of the compensation pieces might be affected in a contemporary manner by the variation of atmospheric temperature, so that the artificial changes going on in the balance itself might compensate the changes naturally produced in it and in the spring, instead of the artificial changes in the spring being made to compensate the natural changes in its dimensions, and in those of the balance. We have before said, that this mechanism was invented and used so long ago as the year 1726, and that it is incapable of the usual adjustment for rate, except at the

fixed fluid, from which the fastening pin must necessarily be taken, to admit of the spring's being lengthened or shortened.

Compensation by F. Berthoud.

In the year 1760, which was about seven years before the Board of Longitude published the principles of Harrison's Time-keeper, Mr. F. Berthoud, the famous clock and watch-maker of Paris, contrived and introduced, into No. 1, of his marine clocks, a compensation-curb, acting on the spiral spring of the balance in a manner similar to the action of Harrison's curb, except that the backward and forward motion of his *pince-spiral*, or curb, was produced by the difference of two direct expansions agreeably to the disposition of the grid-iron pendulum, which Harrison had previously invented, (for the description of which see the section, "Astronomical clock," by Mr. Reid of Edinburgh," under the article Clock.) The mechanism by Berthoud, is represented in *fig. 2. of Plate XXVIII.*, the eye being, as before supposed, to be directly over the pillar plate of the frame; the circle ΔA denotes the plate just mentioned; B B, the grid-iron frame, attached to the said plate, and composed of alternate bars of steel and brass, joined together by end-pieces like the compensation-pendulum alluded to, which therefore need not be again minutely described; the pair of brass bars in the middle of the frame, or grid-iron, are those which act by protruding more or less in different degrees of heat against the tail-piece D, of the double lever D E, moveable on an arbor with pivots borne by the plate and cock G, or by G made as a double cock; H is the principal cock, in which the balance pivot runs in the triangular hole, made by three friction-rollers, not shewn in the figure; the *pince-spiral* *b*, and arm *a* are fast to an arbor which is pivoted into the cock H, and a small cock under it, which is attached to it; this arbor is parallel to the balance verge, and is so contiguous to it, as to be in one of the eccentric points, from which the spiral of the spring which it holds is geometrically described; that is, at half the distance from the verge, that the two nearest spirals are from each other; on each of these two levers, *a* and *b*, is a sliding piece of metal; that on *a* for the lever E to rest against, and that on *b* to have a slit for receiving the thread of the spiral spring; they are both fixed by pressing screws to their respective levers, when adjusted to their proper places thereon; but *b* is prolonged to *d*, which is attached to the graduated L piece by the screw *e*, and this L piece has a pointer, used as an index for the graduations on the bridge I, that lies across the grid-iron frame, when attached to the plate ΔA . K is a spring, pressing against a tail-piece of the lever *a* to keep it always in contact with the lever E; C is the spiral regulating spring, as in an ordinary watch, and F an adjustable fluid, for the exterior end of the spring, with an oblong perforation for the pressing screw; the interior end of the spring being fast to a collet on the verge, which is adjustable by friction. The mechanical action is thus produced; the difference of the expansibilities of the steel and brass rods of the grid-iron frame becomes sensible at the pin D, in the tail-piece of the bent lever D E, moveable in a point of bridge G, between those two letters; the part E, being longer from the centre of motion than the part D, which is acted on, moves faster and carries before it the lever *a*, and together with it the *pince-spiral* *b*, and L piece with the screw *e*; and it is obvious, that, as the sliding piece, borne by lever *a*, limits its effective length from its place of contact with lever E, the relative lengths of these two levers may be varied at pleasure by adjustment, till the effect produced

duced on the spring by the grid-iron frame, through the medium of these levers, is according to its due quantity; and the pince-spiral will go and come in a manner similar to the motion of Harrison's curb, though the law of their motion is different, one depending on direct expansion, and the other on lateral curvature. The graduations of the L piece are for bringing the machine to time, the end, *d*, being the index, and the screw, *e*, the instrument of adjustment; and the index of the L piece shows, on the graduated cock I, the situation of the pince-spiral under all the variations of temperature. Besides Nos. 1, Nos. 3, and 8 of the marine-pieces of this author had the compensation we have here described, which, though complex, would no doubt answer its purpose as well as Harrison's more simple contrivance; and though the idea did not originate with the contriver, yet it will be acknowledged, that there is evident ingenuity in the arrangement and adaptation of the acting parts of the mechanism; the effect also produced by the mechanism before us must be regular and permanent, when the materials are good, and the work well executed. (See "Traité des Horloges Marines" par F. Berthoud. Paris 1773.)

Harrison's Compensation improved by F. Berthoud.

After the Board of Longitude had published the principles of Mr. Harrison's Time-keeper, Mr. F. Berthoud perceived that Harrison's compensation-balance might be improved by introducing the action of a lever, capable of adjustment for any given quantity of effect, without moving the cock that holds the compensation bar; the construction he adopted was thus: A, in fig. 3; of the plate already named, is the cock for the balance pivot, ("Histoire de la Mesure du Temps") which balance is not necessary to be shewn, B is the curb lever, detached from the compensation bar, and turning on a short arbor pivoted into the cock A, and an under cock borne by this not seen, the centre of its motion being at one side of the balance verge, as in Berthoud's former balance; the spring under the cock, that urges it towards the screw C, is concealed from sight; C is the compound or compensation bar, fixed in the chops of a fast bridge D, and having, at its free end, a screw with its point bearing on the tail-piece H of the curb-lever B, which curb-lever has a sliding piece with a narrow groove to admit the thread of the spring, and is fixed by a pressing screw in any given situation; E is what the French call a *piton*, or adjustable frame of the stud, standing on four screws, as feet, which allow it to be brought into the plane of the spiral-spring, so as not to force it from its natural position; the stud F, that holds the exterior end of the spring slides in the *piton*, when under adjustment for distance, and is then fixed by a pressing screw, passing through the contiguous end of the spring G, which turns on a stud or screw, at its remote end when loose. The manner in which this mechanism acts will be readily apprehended from what we have said of Harrison's, and the preceding compensation curb, of which it constitutes an union, thus: when the temperature is high, the compound bar, C, is affected exactly in the way we have just described Harrison's to be affected, and the chops of the bridge, D, allow the lengths of the curb lever B, and of its tail-piece, pressed by the screw, to be adjusted according to any given ratio as they respect each other; and as the quantity of effect to be produced on the spiral spring depends upon this ratio, with a given compound bar balance, escapement, and maintaining power, it is obvious that the adjustment for temperature may be brought to the requisite degree of exactness by a few successive trials in the opposite extremes of temperature.

The Application of Harrison's Curb to a common Watch.

After Berthoud had made the alterations, which we have just described, in Harrison's curb, he turned his mind towards simplifying it so as to become useful in a common watch; the manner in which he succeeded in doing this is shewn in fig. 4 of our present plate, where it will appear by inspection how the action takes place, particularly as we have placed the same letters of reference to the same parts, as in fig. 3; the difference of the two contrivances consists chiefly in the stud, F, being here fixed fast to the circular plate of the frame; in the curb-lever being bent and having its centre of motion on a separate small bridge, H; and in the opposing spring, K, being attached to the face of the plate itself; otherwise the adjustment for temperature is performed as in fig. 3, and is equally capable of taking in the extreme limits of temperature. (For another disposition somewhat similar to the present one, see Berthoud's "Supplément au Traité des Horloges Marines." Plate III. fig. 8.)

Compensation by Mr. Alexander Cumming.

Mr. Cumming published his book on "The Elements of Clock and Watch-work," in the year 1766, in which he has given an ingenious though complex method of compensating the effects of heat and cold on the balance and balance-spring, different from the foregoing ones, and depending on the difference of the direct expansions of two separate and different metals, aided, like Berthoud's, by the introduction of adjustable levers; whether the invention preceded or followed Berthoud's grid-iron frame and lever, is a consideration which does not, perhaps, affect either of their two claims to originality, as Harrison's curb was most probably heard of, if not previously known, by both the mechanists in question; nor does it appear that either of the two complex methods here spoken of has been copied by others in practice. Fig. 1. of Plate XXX. of *Horology*, represents a view of Cumming's mechanism of compensation, without the balance, as viewed by the eye placed directly above it, when fixed to the back of the pillar-plate of the frame. The outermost circular rim, AAA, is of steel, and has eleven small rollers revolving on as many pins or studs inserted into the plane of the rim, and the interior rim, BBB, which rests against the rollers, is of brass, but is not an entire circle: one end of this interior, or brass rim, is screwed fast to the plane of the steel rim, by means of its enlarged extremity being made to lie upon the plane of the steel rim, as shewn in the figure; in this situation it is clear that the excess of the brass rim's expansibility will make its opposite ends approach each other in a high temperature, and recede in a low one, while the friction-rollers will prevent jerks; hence any object opposed to the free end of the brass rim will be pushed forwards by it, as the temperature is raised, which effect affords the means of alternately lengthening and shortening the spiral spring of the balance in the following manner; the free end of the brass rim presses against the end, *a*, of a lever moveable on a stud about the middle of it, and the oblong slit made in the opposite end of the same lever receives a pin inserted into the contiguous end of a second lever *b*, moveable about its remote end round a socket concentric with the balance-verge, or nearly so; the lever, *b*, which may be called the curb-lever, has two pins in underneath, not seen in the drawing, between which the outermost thread of the spiral spring passes; hence it is plain, from an inspection of the figure, that when the end, *a*, of the slit lever is pushed outwards, its opposite end draws inwards the pin of the curb-lever, and with it the curb, so as to shorten the active length of

the spring in this case; and on the contrary, when the brass rim shortens by a low temperature, the contrary effect takes place: for the end, *a*, of the slit lever follows the free end of the said rim as it retires in contracting, in consequence of a spring, not seen, impelling it into contact with this end at all times; the ratio of the two acting ends of the two levers from their respective centres of motion is adjusted by the horizontal arbor, *d*, squared at the end to receive a key; for as the interior end of this arbor is formed into a screw that passes into a tapped hole in a square nut on which is the centre of motion of the slit lever; the said square nut is made to slide in an oblong hole of the plate below the lever; and thus the different parts of the slit may be made, successively, to impel the pin of the curb-lever, as the compensation may be found on trial to require. The balance, of course, is placed above this mechanism, and vibrates free from it. We observe that in the original drawing given by Cumming, (*fig. 5* of his *Plate XIV.*) the spiral is made to turn the wrong way about, so that the effect of heat will be to elongate the spring, which contraction would double the natural effect of variations of temperature instead of compensating them, as the contrivance is intended to do, and would do, if rightly constructed; but we see no reason to doubt this being as effectual and permanent as any of the foregoing modes of producing a compensation, when the spiral is bent the right way round, as we have placed it.

Berthoud's Compensation by a Brass Arch.

Another method of producing a compensation, different from any of the preceding ones, in its mode of application, comes next under our consideration, as another production of the French clock and watch maker, whose name we have had frequent occasion to mention with respect.

Fig. 5, of *Plate XXVIII.* exhibits the plan of all the essential parts of this contrivance, in an intelligible manner; *A*, as usual, is the principal cock over the pillar plate; *B*, the balance of one metal; *C*, the spiral spring; *D*, an arch of brass with its ends resting in two sloping notches filed into the steel bar, *E*, which is fixed by a screw, near *E*, in the middle, to the plate, so that it may be at liberty to yield both ways to the action of increased or diminished temperature on its total length; *F* is, as before, the stud to hold the exterior end of the spring, while the interior one is fast to a collet on the balance-veerge; *G*, is a bent lever, with a pin in its short end, *g*, and its long end pointed as an index, to reach to the divisions, *H*, made on the plane of the plate, which bears the mechanism; the effect is thus produced; the brass arch, *D*, being elongated than the freight steel bar, *E*, with the long increase of heat; this arch carries a small screw, the head of which is just opposite the pin, *g*, already mentioned, between which screw and pin the outermost coil of the spiral spring passes; now if the screw and pin were made to approach, till they both should touch the spring at opposite sides, they would become in place of a curb, and there limit the length of the spring that comes into action; on the contrary, if they were made to recede from each other, till the spring rested up to the stud, *F*, placed on the plate, they would be inopinionous; but when they are placed at such an intermediate distance from each other that the screw limits the opening of the spiral, and the pin its closing, before the part of the spring near the stud is moved by the motion of the balance, then the natural effective length of the spring is contrained, and the pin and screw together become a species of curb, that limits the effective length of the spring from an undisturbed point, lying somewhere between the stud and the said pin and screw; which indiscriminate point will always be nearer to the stud the more the pin and screw are removed

from each other, and *vice versa*; hence it is easy to see, that moving the index, *G*, forwards or backwards, on the graduated portion of a circle, *H*, will bring the pin, *g*, nearer to, or remove it farther from, the screw head, than a mean distance, and will thence affect the rate depending on the effective length of the spiral spring, with a given balance, maintaining power, and escapement; but it is the same thing if the index be suffered to remain, and the screw be brought nearer to the pin; for the one limits the right hand and the other the left hand excursion of the balance; this is the precise operation of the contrivance; the superior elongation of the brass arch over the steel bar shortens the radius of curvature of the arch, and makes the screw-head approach the spring, more or less, agreeably to the change of temperature, to which the acting parts are exposed. The law by which the approach is effected is somewhat different, however, from that by which an expansion-rim is guided, with one of its ends at liberty; and the manner also in which the effective length of the spring is limited, allows a long scale of lengths, in a corresponding short scale of distances between the screw head and pin; the latter of which laws is evidently disadvantageous to the nicety of the adjustment for temperature; besides, when the brass arch and the steel bar are found on trial not to be in their due proportions to each other, the remedy cannot be applied without varying the original proportions, by lengthening or shortening the verfed line, as the case may be, which alteration will require the mechanism to be displaced.

Improvement on the last Compensation.

Berthoud, having discovered the inconvenience and objections to the last described compensation curb, proposes another in his "Histoire du Temps," tom. ii. p. 101 and 102, thus: *A*, *fig. 6*, *Plate XXVIII.*, is the principal cock, mounted as usual on the pillar plate behind; *B* is again the balance of one metal; *C*, the usual spiral spring; *D d b*, a rack moveable on a socket concentric with the balance verge, with some additional apparatus carried by it; *E* is a second cock; and *F* a third, bearing the *pinion*, or sliding stud, with its frame and securing spring as in *fig. 3* of the same plate already described; *G* is a pinion with an arbor squared at the projecting end, to receive a key, which pinion has its teeth formed suitable to impel the teeth of the rack *D d*; *a* and *b* are two compound bars of brass and steel, soldered together with hard solder, inserted at *d* into a bearing piece, and kept fast by a pressing screw *c*, urging them together with the loose piece, *d*, interposed, and kept parallel by a clamping piece *e*; the rack has a circular perforated groove, which allows it to pass backward and forward by the action of the pinion, while the heads of the two screws, *f* and *g*, confine it to the same plane on the back of the plate; and, lastly, the compound bars, *a* and *b*, have each a pin at their free extremities, which contain between them the last coil of the spiral spring, the action of which is limited precisely in the manner described in our last compensation mechanism; here, however, the law of flexure is again the same as in Harrison's, though the law of limitation in the effective length of the spring is different: the latter, as we have seen, depends on the quantum of play between the pins, whereas, in the former, there was no play at all, and the curb itself was the limit; seeing the effective length of the spring diminishes as the pins approach each other, the exterior laminae of the compound bars, *a* and *b*, must necessarily be brass, and the interior ones steel, to shorten the spring in high temperatures, and the contrary; when the effect produced is too great, the clamping piece, *e*, is carried outwards towards the pins, in order to shorten the bars, which have their lengths measured from this clamp; but when the ef-

fect produced is too little, the said clamp must be brought inwards towards *d*, to lengthen the bars; so that the scale of adjustments here runs along the length of the two parallel compound bars, as it relates to the variations of temperature; while the adjustment for a mean rate is made by the index *b*, which shews the quantum on the contiguous portion of a divided circle. Still, we think, that while a small variation in the play, between the curbing pins, produces a great variation in the effective length of the spring; this contrivance can have no pretensions to rank in utility with some of the more recent inventions, that place the compensating parts on the balance itself.

Compensation by Breguet.

A compensation similar in effect to the two foregoing ones by Berthoud, but more simple than the latter, is that which Breguet of Paris has applied with success to his common watches; this compensation is shewn in *fig. 7 of Plate XXVIII.* where the bounding circle denotes the back plate of the frame; *A* the principal cock; *B* the balance of one metal; *C* the common spiral spring; *D* *de* a three armed piece, called by the French a *rateau*, to which is attached the mechanism of compensation thus: the curvilinear fork, *a b*, is composed of two metals: each prong consisting of a slip of steel and a slip of brass, so attached together, that the steel is the exterior, and the brass the interior part in each; the end *a* is screwed to the lever *D*, and the end *b* is loose, consequently at liberty to approach or recede from the spiral spring, as the changes of temperature affect the fork; the interior end, *a*, of the fork bears a pin near the letter *b*, not seen by reason of the lever *D*, which lies over it, and a second pin similar to the other is carried by the lever *D*, between the two largest coils of the spiral: these two pins limit the effective length of the spring exactly in the way that the two preceding compensating contrivances have been explained to do, for which reason we do not repeat what we have already said on this part of the subject; the alternate inward and outward motions of the pin, *b*, regulate the distance between the two pins, on which the play depends, and consequently the length of the spring also, as it has regard to the action; the prong *a* has a tendency to become straight by heat, in consequence of the concave part being brass, but the prong, *b*, has a tendency to become still more convex in consequence of the brass being the convex part; the joint effect of which alterations of shape and position will be, that, as the balance and its spring become enlarged, the space between the curbing pins will become diminished, and the contrary. The watch is regulated for mean time by the index part *d* of the three-armed *rateau*, and the third arm, *e*, contains a pin about the middle of the spiral spring, which we conceive to be the banking pin, though no mention is made of it in the original description. "Histoire de la Mesure du Temps, by Berthoud."

Compensation by Mr. James Scott.

In May of the year 1805, Mr. James Scott, of Grafton Street, Dublin, published an account in Mr. Nicholson's Journal, (vol. XI. p. 19—21., 8vo. series) of a compensation curb which acts in a manner somewhat analogous to that which we have described as the invention of Cumming; but it is evident he had not previously seen the one alluded to, nor yet Berthoud's, otherwise he would not have said in his letter to Mr. Nicholson, that "artists have not been able to invent a compensation curb adjustable to the exact expansion required." The contrivance now before us is ingenious, and we presume might be applied to an ordinary watch with con-

siderable advantage; though we cannot persuade ourselves that any method of curbing the regulating spring, after it has been adjusted for isochronism, affords so good a compensation, as the mechanism of compensation now usually applied to the balance itself. *Fig. 2 of Plate XXX of Horology*, shews all the parts of Mr. Scott's compensation-curb, as given by himself in the original account; but as his description did not seem very intelligible to us at the first reading, we hope to be excused the liberty we take of giving our own account of the contrivance: *A A* is an index of steel, with a circular part embracing a dove-tailed groove that surrounds the balance verge in the upper plate of the frame; to this steel index is attached, by a screw and steady pin, one end of a compound circular bar, *B B*, so formed, that the steel part is the exterior, and the brass part the interior; to this compound bar is fastened a second compound bar *C C*, also circular, by means of a clamping piece and screw at *D*; a loose piece of metal, interposed between the two circular bars, being pressed by the screw, the outer one keeps the inner one close to the shoulder of the clamping piece, which cannot be seen in the figure; but it is easy to conceive that such a clamping piece will apply at any part of the circular bars; the bar, *C C*, has the brass part exterior, and the steel part interior; *E* is the stud in the plate, that holds the outward end of the spiral regulating spring, intended to be curbed; and the interior compound bar, *C C*, passes between two steady pins, inserted in the plate at *a*, a short distance from *b*, where the curbing pins are fixed, that embrace the last coil of the spring: whenever the index, *A A*, is moved, in regulating for mean time, it carries with it the two concentric compound bars, and the curbing pins slide along the coil of the spring, so as to lengthen or shorten it as the case may be; suppose, now, that the regulation for rate be made, and that the balance has its temperature elevated, the tendency of the outer circular bar will be to open, or enlarge its radius of curvature, which action will bring the interior compound bar and its curbing pins nearer to the index, and shorten the balance spring a little; but this action is not sufficient to produce the whole requisite effect; the tendency of the interior circular bar *C C*, on the contrary, is to close, that is, to approach the index, in consequence of its radius of curvature becoming shorter, while its end at *D* is clamped to the free end of *B B*; and it is the amount of these two contemporary motions, produced in the interior compound bar, *C C*, that constitutes the motion of the curbing pins at *b*, along the spiral spring, in a direction towards the index *A A*. In a low temperature, just the reverse takes place; the outer compound bar, *B B*, has its radius of curvature shortened, and the inner one, *C C*, has its radius of curvature, on the contrary, lengthened in this case, so that the joint effect is to make the curbing pins retire from the index to lengthen the regulating spring; which alternate lengthening and shortening of the balance-spring's effective length in heat and cold, form the compensation for the corresponding variations in the momentum of the balance and force of the spring. The excellence of the present contrivance consists in its affording a scale of adjustments; for moving the clamping piece, *D*, forwards, towards the middle of the concentric circular bars of compensation, lessens the effect, and removing them back, towards the open ends, increases the effect to be produced on the balance spring, by giving a greater or smaller range of motion to the curbing pins. The inventor's rule for the thickness of the compound bars is, that each lamina be of the thickness of an ordinary main spring of a common watch, so that the compound pieces may be each of twice the said thickness.

COMPENSATIONS on the Balance.—*Thermometer of Peter le Roy.*

We have said under our article CHRONOMETER, that Harrison was the first person who suggested the idea of the balance carrying its own compensation, and Peter le Roy was the first who in 1766 succeeded in such a construction; in our notice of this invention, however, there is a typographical omission which we beg leave to correct here before we proceed to our description; it is said under the article just referred to, that the compensation was effected "by means of two thermometers, one of mercury and the other of alcohol, attached to, and carried by, the balance itself;" instead of ("one end of each bearing mercury, and the other end alcohol, &c." as will now be more clearly understood. *Figs. 1 and 2 of Plate XIX. of Horology*, exhibit so much of the balance of Peter le Roy as is necessary for explaining its construction; A A, in *fig. 1*, is a portion of the arbor or verge to which the balance B is attached by screws; C is a small ring attached to the inferior part of the verge which holds the two screws of regulation for mean time, and which also clamps the horizontal parts of the two glass thermometrical bent tubes, D and E, placed diametrically opposite to each other, one of which is seen in a detached state in *fig. 2*; these tubes are also held fast by two other clamps, to the middle of the verge, as may be seen in *fig. 1*; the inferior end of the straight vertical part of each tube is open to admit the pressure of the atmosphere on the mercury, which is now seen standing at the same level in both the upright portions of each thermometer. after the inferior or horizontal connecting part is filled; but the bulbs and parts above the letters D, and E, are filled at a mean temperature with alcohol, respectively resting on the columns of mercury: when the balance and balance-spring are enlarged by heat, the alcohol has also its bulk increased, and descends below the letters D and E, for instance, in very high temperatures as low as the horizontal connecting part, in which case the mercury pressed upon by it descends under the alcohol, but ascends in the same proportion at the other end, till it reaches nearly the open superior end of the vertical straight part of the tubes respectively; the mercury which was before in a column parallel to the verge, but at a distance from it, is now also parallel but contiguous, and, as it is a ponderous fluid, the momentum of the balance is considerably diminished by the approach of the mercury to the centre of motion, which change of position of the mercury constitutes the compensation required to balance the effect of an enlargement of the balance itself, and of an elongation of its regulating spring taken jointly: in a low temperature the contrary change takes place in the situation of the mercury, for as the bulk of the alcohol contracts and retires round the acute angular point into the bulb, the exterior vertical branch becomes filled by the mercury. Peter le Roy, we have before said, was disposed to prefer this balance to the balances he made entirely of metal, but the fragility of the bent tubes, and the liability of the fluids to be agitated, if not to be mixed, sometimes constituted objections to its portability, that prevented its being copied by other chronometer makers. The adjustment for the extremes of temperature must have been made by varying the quantity of mercury in a given tube; and probably tubes of various dimensions were tried successively before the exact effect was produced, both at the extremes, and at all the intermediate degrees of temperature. The balance being heavy, was supported by a thread above the superior end, A, and the slender cylindrical part, underneath the same A, rotated in a triangular hole, made by three surrounding friction rollers, not shown in our figure; lastly, two regulating springs, wound in contrary directions,

were placed under the ring, C, near the lower pivot of the verge, which springs are purposely left out, that the reader may not have to view more parts than are necessary for explaining the compensation balance itself.

Compound metallic Balance of P. le Roy.

Peter le Roy, however, was not content with trying his thermometrical tubes, only to effect a compensation on the balance, but he so far adopted Harrison's idea on the requisite construction of a balance, carrying its own compensation in motion, that he tried moreover his compound bars of steel and brass, not, indeed, as curbs, applied to the springs according to Harrison's method, but as rims to the balance itself: *fig. 3 of Plate XXIX.* shews a balance of this contrivance, where A is the diametrical bar fixed to the verge, and BB and CC two separate semicircular portions of the compound rim, which were each composed of laminae of steel and brass respectively riveted together in different places, in such a way that the brass pieces were the exterior or concave ones, and the steel pieces the interior or convex ones; the loads are not given in the drawing, but the inventor says "Memoire sur la meilleure maniere, &c." that his contrivance made a considerable portion of the circumference to approach the centre of the balance in a high temperature; so that either he must have had loads on the ends of the semicircular parts of the rim, or otherwise these parts themselves must have been thick, which would prevent their due obedience to the variations of temperature. *Fig. 4* is a kind of register contrived to examine the law by which the flexure of a compound bar was guided, as compared with a mercurial thermometer, thus; A is the crosses and rim of a balance of one metal, steel, we will suppose, and the compound piece B, screwed at the end *a*, to the plane of the rim, has its end, *b*, at liberty to obey the changes of temperature; near *b* is a small cock into which a roller, bearing the index C, is pivoted above, against which roller the free end, *b*, of the compound bar, B, acts, whilst the interior end of the index points at the divisions made on the portion of a circle, D, near the centre of the balance: the experiments that were made with this instrument, according to P. le Roy's account, shewed that the rim of the index, so circumstanced, corresponded very well with the rim of a mercurial thermometer, in all the different parts of the scale; and if this was found to be really the case, we cannot help thinking it extraordinary that the contriver of the compound metallic balance, which has stability and portability to recommend it, did not prefer it, in actual practice, to the mercurial balance, which was liable to the objections we have stated.

Arnold's Balances.

Some pains have been taken to prove that Mr. Arnold, senior, did not invent his compensation balances himself, but borrowed them from Peter le Roy; we confess that we have not met with any conclusive argument in favour of such a supposition, but, on the contrary, have asserted under our article CHRONOMETER, that, "a variety of different shapes were given by Arnold to his balances, and actually tried in practice, before he adopted the one in present use, some of which balances are yet in existence;" and we have it now in our power to say further, that many of the balances here alluded to are yet in use, as ourselves have witnessed very lately; which balances have been proved to be excellent regulators, and some of which have public testimonies in their favour. We propose therefore now to describe them in succession, or at least such of them as have fallen in our way.

No. 1. In his preface to his printed certificates, Mr. Arnold, senior, says, that his first attempt to improve clocks and watches commenced in the year 1764; but we find it was not till the year 1767, that he turned his mind seriously to the construction of chronometers; the first compensation balance that he actually brought into use, was the one represented in *fig. 5.* of *Plate XXIX.* which was taken from one of the original balances while in our possession. The rim is 2.4 inches in diameter, and is, together with the three radial arms, of slender brass: the compensation bar is of brass and steel coiled round the balance verge, at a little distance from the mechanism which lies between it and the plane of the balance; the exterior part of this compound spiral bar is brass, and the interior part steel; *a b* is a piece of steel moveable round a tube surrounding the balance verge, and having a longitudinal aperture or slit, each way from the centre to nearly each extremity, *a* and *b* respectively; the end, *a*, is turned up a little, and has the exterior end of the compound spiral bar of compensation attached to it, so as to partake of its motion under all the changes of temperature; *c d* and *e d* are two bracket pieces of metal carrying each a pin under them, that exactly fit the longitudinal slit of the piece, *a b*; consequently these bracket pieces also partake of the motion produced by the compound spiral bar; the ends, *e* and *c*, of the bracket pieces are attached to the balance rims at the points, *e a* and *c*, by the straight slender springs, *e e*, and *c c*, respectively; to the ends *d* and *d*, of the said brackets are attached the long pins, *d f* and *d f*, which pass through the small steady bridges on the rim, and carry the sectoral loads of temperature, *f* and *f*; the action produced on this mechanism by the changes of temperature may be thus explained; when the temperature is elevated, the exterior end of the compensation spiral bar, moves in a direction from *a* towards *c*, and carries with it the end, *a*, of the cross-piece, *a b*, at the same time the opposite end of this piece moves from *b* towards the *e* which is contiguous to it; these opposite motions of the ends, *a* and *b*, of the cross piece carry the two brackets in such direction that the loads of temperature, *f*, and *f*, are both made to approach the balance, so as to lessen its momentum when in motion; which is the effect required in the above-named temperature; on the contrary, when the temperature is low, the motion of the ends, *a* and *b*, is towards *d* and *d* respectively, and the loads of temperature are thrown outwards, to increase the momentum of the moving balance. The quantum of effect is regulated by enlarging or diminishing the loads, *f*, *f*, of temperature, as compared with the screws, *g* and *g*, or weights of adjustment for mean time; or otherwise, by screwing them into a new situation, cut or in, as the case may be; the springs, *e e* and *c c*, do not interfere with the inward and outward motions of the loads of temperature, but only confine the brackets to the plane of their action, and limit the direction of their motion. This compensation-balance was applied to ten or twelve different chronometers, between the years 1775 and 1778, but we have not been able to ascertain its comparative merit; its principle is simple, in that there is but one compound bar, to move two loads of temperature, but its mechanism is complex, which was probably the principal reason why it came into disuse.

No. 2. The next balance, which Mr. Arnold contrived, was that which is represented in *fig. 6.* of *Plate XXIX.* in which the mechanism is much more simple than in its predecessor; the rim and diametrical bar, by which it is attached to the verge-collet, are both steel, the parallel bars, *a b* and *a b*, are composed of brass and steel respectively, the brass being here interior and the steel exterior, and

are inserted into pivot-holes made in the rim of the balance; in some of the chronometers, the end, *b*, was fast to the balance, and the end, *a*, of the same bar loose, while the end, *a*, of the other bar was fast, and the end, *b*, of the same was loose, but in other chronometers both the ends of each bar were formed into pivots with shoulders, and were inserted loosely by bending the bars about the middle; the cross pieces, *c* and *c*, which carry the loads of temperature, are of steel, and the rim itself is so notched as to admit of the loads being contiguous, that they may meet with very little resistance from the air, when in motion; the mode of action is obvious from a view of the figure, and from what has been previously said of a straight compound bar, being liable to become convex on the brass side by an elevated temperature, and the reverse in an opposite temperature; the bars, *a b* and *a b*, becoming convex, with increased heat, towards the centre of the balance, draw the loads, *d* and *d*, nearer to the rim, than they are when the bars are straight at a mean temperature, and, on the contrary, as the heat diminishes, the same parallel bars become convex on the sides next the rim, and carry the loads from the balance; and these alternations of motion, keeping pace with the changes made in the dimensions of the balance itself and of the balance-spring, constitute the compensation for the effects of temperature: the exact quantum of effect is adjusted as before, by altering the magnitude of the loads, *d* and *d*, as compared with the weights of the adjustment-screws, *e* and *e*, for mean time; or otherwise have their relative positions altered in regard to their distances from the centre. About twenty of these balances were made and applied as regulators, all of which performed their office, we are told, very well; the famous gold chronometer, No. 36, tried for 18 months by Dr. Maskelyne, at the Royal Observatory, while worn in the pocket, under the different degrees of temperature, agitations of the body, and changes of position, had, and still has, one of these balances; and its rate, which has been published, established its credit so highly, that it was sold for 1000 l. or guineas, notwithstanding the detent of its escapement, after the fashion adopted by the French, is fixed to an arbor revolving on pivots. The balances of the present construction were made from the year 1778 to the year 1783, and the only objection we have heard alleged against them, was the play they necessarily had in their pivot-holes, which we think must have been scarcely perceptible when the pivots were well made and fitted tight into their holes.

No. 3. The objection to the motion at the pivot holes in the last balance, (No. 2.) was attempted to be remedied by the construction exhibited in *fig. 7.* of the same plate, where the expansion pieces are of brass and steel, arranged in the form of a long S, which form was afterwards adopted by Emery, the Swiss watch-maker, who settled in London, and who has been the reputed inventor of this arrangement; the two halves of the S are joined at the middle, and the brass, as before, is interior throughout; the rim and diametrical bar of steel, in the balance we examined, which was 1.2 inches only in diameter, by reason of its having been used in a pocket-chronometer; the exterior end, *a*, of the S is attached to one of the shortened crosses of the balance, and the interior end of the same bears the long pins, *c* and *c*, that carry the loads of compensation *d* and *d*; the long pins, *c* and *c*, do not pass through the rim, but are held to their proper positions by the two slender springs, *e e* and *e e*, as in No. 1, or *fig. 5.* as before, the relative weights of the loads of compensation, *d*, *d*, and *f*, *f*, the loads of adjustment for mean time, constitute the limit of effect to be produced by the expansion bars,

sup^o

supposing their distances from the centre fixed; but if the loads remain unaltered, the effect to be produced may be adjusted by varying the distances of the screws respectively as they regard the centre of the balance. Of these balances about forty were made and applied to use between the years 1779 and 1782, and have been found to perform well.

No. 4. The length of the S pieces in the last balance having been found difficult to execute of uniform thickness and shape, by reason of their great length, the construction represented by *fig.* 8. was substituted, which is very nearly allied to its predecessor, and indeed differs from it only as the bends are united by an interposed piece of solid metal, thereby dividing what was before one half of the S, into two parallel compound bars; in all other respects, the description just given of No. 3, together with the letters of reference, will equally apply to our present balance; which circumstance renders a further detail superfluous.

Of these balances not more than six or eight were constructed, by reason of the more simple form, which is now in general use, having been adopted in 1782, when a patent was taken out for it. The specification, however, contains the drawings of Nos. 2 and 3 (*figs.* 6 and 7), as well as of the common balance, which we have fully described under our article CHRONOMETER, to which the reader is respectfully referred, and which was known to the workmen by the name of the Z balance, by way of distinction from the S balance. Besides the above-described constructions of the compensation balance, Arnold, we are assured, contrived various others which never came into use, one of which had the expansion pieces parallel to the verge of the balance, and borne by it; and others had platina in the expansion pieces, instead of steel; but we conceive it to be unnecessary to pursue the subject of his inventions further, than merely to observe, that to regular a succession of different balances actually made and used, where so many were constructed, and where each was evidently meant to be an improvement on the last preceding, may be taken, if not as a positive, at least as a presumptive proof, that the imputation of plagiarism, unless otherwise fairly made out against him, is in contradiction to the facts we have here adduced; which are all facts open to still further investigation.

For the description of the compensation-balance as made by the Brookbanks and Earnshaw, the reader is desired to turn to the article CHRONOMETER, where this part of our present article has been anticipated. The description of Earnshaw's balance and escapement, however, which we have quoted as the production of this chronometer-maker, it may be proper to state, was not his, but the production of Mr. Firminger, the late assistant of Dr. Maskelyne at the Royal Observatory, as we have been assured by the author himself, since the publication of the pamphlet in which it appeared ostensibly as Mr. Earnshaw's own account. And now that we are on the subject of Mr. Earnshaw's balance and escapement, we beg leave to add further here, an acknowledgment of our misinformation respecting the patent, which we were credibly informed, and said, was never taken out; but which we now find, on more minute examination, was actually taken out and registered. How far his pretensions to originality of invention are warranted by his construction, is not the object of our present enquiry.

A Compensation balance by F. Berthoud.

Berthoud informs us, "Hist. de la Mesure, &c." p. 104 tom. ii., that he had proposed a means of compensation by the balance itself, so long ago as in the year 1754; but that it was not until 1787 that he effected his purpose. The

reader is led to suppose, that he was not indebted to P. le Roy, or any other maker, for the contrivance, but that it was the result of his own inventive genius; and that the contrivance was his own is rendered somewhat probable from this consideration, that in his "Traité des Horloges Marines," two balls only were proposed to be used with two compound bars; but after a calculation of the effect to be produced, contained in page 195 of the Supplement, four balls were found to be necessary with as many compensating bars. The proposed arrangement is shewn in *fig.* 9. of plate XXIX, and is certainly original; A, A, A, and A are four radial bars of metal attached to the verge collet of the balance by two screws, as seen in the figure; the slender bars, a, a, a, and a, attached respectively to the exterior ends of the four radial bars by screws and fixing pieces, are four compound bars of steel and brass, the exterior laminae being of brass; and each of those compound bars has at its free end a stem formed into a screw, upon each of which a ball, B, with a long socket, screws towards or from the verge, to adjust the momentum to the maintaining power, and regulating spring, and also to effect the equilibrium, when the machine is brought to time. From what we have repeatedly said of the flexure of a compound bar, it is easy to see, that the brass portions being exterior, will cause the balls to approach the centre of motion in hot weather, and the reverse in cold; which effect constitutes the compensation. The author acknowledges that the exact effect to be produced depends on the relative length and thickness of each compound bar, and that many trials are necessary to come at the due proportion; consequently, the want of an adjustment for temperature, after the balance is tried, is in this construction a fundamental objection to its general adoption; otherwise we see no reason to doubt its accuracy of performance.

This balance was used in No. 8. of Berthoud's marine pieces.

Another Compensation-balance by F. Berthoud.

The compensation-balance which we have just described being found liable to objection, the same author contrived and used, in his No. 63, a different arrangement of the compensation bars, which he again reduced to two, and introduced two additional screws for adjustment of mean time, placed at right angles to the former; the contrivance is shewn in perspective in *fig.* 10. of Plate XXIX., where all the essential parts may be viewed at once: A A is the balance, made light and of the best brass, having four crosses; B and B are the two compensation bars fixed to the rim of the balance at one end, and bearing the screws or weights of temperature, C and C, at the other respectively; and D and D are the screws or weights of adjustment for mean time, borne by two of the opposite crosses, as shewn distinctly in the figure. The balance as usual is attached to the verge collet by a couple of small screws; the exterior laminae of the two compound bars, B and B, are of brass, and the interior ones of steel, so that a high temperature brings them towards the centre of motion, as the balance itself enlarges, and as its spring elongates and becomes weaker. The adjustment for temperature may be made in two ways; either by altering the relative sizes of the screws of temperature and screws of mean time; or otherwise, which is more readily done, by screwing one pair in and the other out, so as to produce a similar effect without taking either of the pairs entirely out; it is hardly necessary to explain that, in all the constructions, when the momentum of the balance consists more of the moving weights of temperature, than of the moving weights of mean time, the effect of the compensation

compensation bars will be the greater in the same proportion, and the contrary; still, however, the quantity of flexure of the compound bars in the present balance remains unaltered, and consequently the velocity of their inward and outward motions is not capable of adjustment in any other way, than by altering the ratio of their length to their thickness respectively, which may be called an alteration rather than an adjustment.

Compensation balance by J. J. Emery.

We have said, under our article CHRONOMETER, that Emery's balance is one of the varieties previously constructed by the senior Arnold, (see his N^o 3.) and the reader will now judge for himself how far our assertion was founded in fact. We take our drawing from Berthoud's figure of Emery's balance, which Sarron took over into France, and which was much admired for the accuracy and permanency of its regulation. Fig. 11 of Plate XXXIX, presents the plane of Emery's balance to the eye placed over it; A A is the balance made with four crosses, the rim of which is brass; B B is a steel flat ring screwed to two of the crosses; C and C are the two compensation bars, each bent twice over into the shape of a long narrow S; D and D are the weights for mean time, formed into adjusting screws to suit the female screws of the protuberances made on the plane of the balance; the screws, E and E, are the adjustable weights for temperature, but are tapped only at the parts nearest their heads; the points being fast to the exterior ends of the compound bars, and the intermediate pins being without threads and moving steadily in the two sockets respectively fixed to the rims, or rather formed out of them in the solid; the S pieces have the brass laminae as usual on the exterior sides, so that at the middle of the S of each compound bar, the position begins to be reversed, in order that the condition may be fulfilled; the interior end of each compound bar presses against the circumference of the steel ring B B, which we have said is fast to two of the crosses; consequently, whenever a change takes place in the temperature of the parts, the whole motion takes place at the foot of the screw of temperature, at each opposite side of the balance. The small interior circle F is the upper end of the cylindrical spring of the balance, together with the pin that holds one end of it, and the part that forms the banking, which have nothing to do with the compensation. In this balance, as in Berthoud's latter one, the adjustment for temperature must necessarily be made, by altering the relative momenta of the screws of mean time, and of the screws of temperature.

Mr. W. Hardy's Compensation-balance.

Among the most recent improvements in chronometry, may justly be reckoned the new compensation-balance of Mr. W. Hardy of Clerkenwell, communicated to the Society of Arts in the Adelphi, in March 1805, and remunerated with thirty guineas. The balance in common use, that brings the weights of temperature alternately towards and from the verge, by simple flexure of the compound rim-pieces, is objectionable, in the opinion of Mr. Hardy and others, on account of these considerations: 1st, The two metals of the compound pieces of the rim, when united by fusion of the brass, are liable to partial separations, which affect the permanency of the adjustment for temperature; 2^{dly}, The variation of the centrifugal force of the weights of temperature in large and small arcs of vibration overpowers the elasticity of the expansion pieces, and affects the momentum of the balance, as adjusted for mean arcs of vi-

bration; the weights being thrown from the centre more in the long arcs than in the short ones; and, 3^{dly}, The adjustments for rate and temperature, however carefully made, will affect the equilibrium of the balance, and the rate of the machine placed in different positions, without subsequent rectifications; to remove these objections, Mr. Hardy has availed himself of the direct expansion of two different metals, where their difference of expansion produces a mechanical action on the loads of temperature, such as bids fair for general introduction in practice.

Fig. 3, of Plate XXX. of *Horology*, exhibits a lateral view of the balance before us, and fig. 4, the balance inverted; A A is the balance arbor or verge of the ordinary construction; B B is a steel diametrical bar, borne by the collet of the verge, 1.6 in. long, 0.232 broad, and 0.033 thick; this steel bar is made uniformly except at the two extremities, which are made narrow, and in each of which a notch is cut in the inferior surface, so far, that the remaining thin metal constitutes a spring above each notch; beyond these springs, which we have laid form a part of each end of the diametrical bar of the balance, are attached two stems at right angles, so as to be parallel to the verge when the small springs are not acted on by any force; the upper parts of the stems, in the original drawing, are formed into screws with threads adapted to the tapped holes of the two balls C, C, which they support, and which are weights of adjustment for temperature, but in our more recent drawing, the weights slide and are fixed by side screws; D, D, are two similar screws for rate which screw respectively into the inferior or thicker parts of the stems, so as to be capable of increasing or diminishing the effective momentum of the balance according to circumstances; and E, E, are screws of adjustment for equilibrium; each end of the steel diametrical bar has, moreover, a stud or shoulder, pointing downwards under the stem just described, which stud cannot be seen in the figure in a separate state; underneath the steel bar, and exactly parallel to it and to each other, are placed two bars of brass, shorter but broader than the steel bar; the length of each is 1.47 in, the breadth 0.078, and the thickness 0.032, like that of the steel; each of the two brass bars has one of its ends secured to one of the studs described, and pressing with its opposite end against the other, but in such a way, that their positions are reversed with respect to the fixing of the ends; the fixed end of the one being contiguous to the free end of the other reciprocally; a second view is given of these bars in fig. 4, where they are represented in an inverted state. The action of the mechanism it is not difficult to understand, though the author has rendered his account somewhat confused by his mention of short levers, which the reader does not see in the figure. When the balance is exposed to heat, the steel bar elongates a little both ways from the verge in the centre, but the two brass bars separately elongate more, and consequently each detached end, having liberty to move a quantity equal to the difference of the two expansions, pushes against the stud or shoulder that is contiguous, and forces it outwards; the slender spring-parts, above the notches of the steel bars, now yield to the forces impressed respectively on the studs, and the parts of the two springs which yield most may be considered as centres of motion of a pair of levers; the distance from the yielding point of each spring to the point urged by the detached end of its brass bar, may be called the length of the short end of each lever, and the distance from the said point of each spring to the centre of the load carried by the nearest stem, may be taken as the length of the long end of the lever, which two ends suppose as 1 to 20 respectively; then if the difference

of the expansions of the steel and one of the brass bars be called *r* outwards, the quantity of inward motion in the same denomination will be *2r*; consequently, the same heat which elongates the steel bar, and carries the balls from the centre of motion, will, at the same time, by the excess of expansibility of the brass bars, bring the same balls inwards towards the same centre, and the two contrary actions may be adjusted, by moving the loads up or down their proper stems, till the opposite effects exactly balance one another; for as those distances that have been denominated the short ends of the levers are variable in length, or very nearly so, varying the longer end only, viz. the distances of the balls from the yielding points of the springs, considered as centres of motion, will alter the ratios, which may be done in the requisite proportion, till the compensation is found in the tentative adjustments to be perfect. When once the exact compensation is effected, it is obvious, that the law by which it is preserved is uniform and constant, as that according to which the grid-iron pendulum is constructed, which experience has proved to be permanently useful in practice. When the balance has its momentum properly adjusted for rate, with a given maintaining power, escapement, and balance-spring, and when the balance is put into an exact state of equilibrium, the stems being at all times either exactly parallel to the verge, or, if inclined a little by the extremes of temperature, alike inclined, it is self-evident, that, under these restrictions, the adjustment of the loads up or down for temperature will not destroy the adjustments of rate, and of equilibrium for the positions, previously made, provided the two loads be of equal weight, and placed in similar positions on their respective stems; and even if one happen to be left a little higher on the stem than the other, no sensible bad effect will be produced thereby, which circumstance is one of the greatest recommendations of the present balance. The effects produced by variations of temperature, are said to be produced not by jerks, but regularly, notwithstanding the united structure of the parts is sufficiently firm; and, lastly, the construction is so simple, that a common workman may succeed in making and putting together the constituent parts of this balance without difficulty.

Compensation on the Balance and also at the Spring.

Double Compensation by Berthoud.—F. Berthoud having experienced much inconvenience, and lost much time in making the adjustments of his balances for rate, temperature, and position, at length determined to avail himself of the curb, as a supplemental aid, in addition to the compensation carried by the balance itself; the union of the two modes of effecting the due compensation, is represented in fig. 5 of Plate XXX. of *Horology*, in such a way that all the acting parts may be seen and understood: A is the balance-rim of brass, and bears four crosses, besides two projecting bars, B, B; these bars carry each a compound or compensation bar, C, of the usual construction, the free ends of which are perforated and attached to the screws or loads of temperature, D and D, or, more properly speaking, to the sliding sockets on which those loads screw in and out, in making the adjustment; E and E are the screws or loads of adjustment for mean time; FF is the cock, and G a small cock, bearing a jewel mounted on it, to take the pivot of the balance. The action of the compensation bars, C and C, needs no explanation, after what we have said about the effect of such pieces borne by other balances: I, is the compensation bar of the curb for the spiral spring, shewn in the figure, and acts on the bent steel bar, K, which

holds the curbing pins, and which has its centre of motion under the cock, at a short distance from the balance-verge; the quantity of action of I on K is regulated by the holding piece, *a*, sliding in a dove-tailed groove, between the parallel bars, *b* and *b*, screwed to the piece N, which piece, N, is movable round a pin under it, near the part, *a*, in such a way as to admit of a little circular motion, together with the compound bar, I, to regulate for mean time without altering the length of I; and a slow motion may be given to the piece, N, by the graduated piece, M, which is moveable on the pivots of its arbor, in the plate and small cock, L, while the tooth, or rounded part, lies in a concave part at the end of N, and impels it almost imperceptibly as the end, M, moves; the graduations of the piece, M, are seen through a hole made in the interior case of the watch; and the adjustment for rate may be made there without trouble, and without deranging the previous adjustments of the balance itself; but then, if there is an isochronism point in the acting length of the spiral spring, the adjustment made by means of the curb will derange its isochronism, which will become sensible as the arc of vibration varies in use; otherwise the adjustment for temperature might be completed by varying the length of the compound bar, I, after this adjustment has been nearly effected on the balance itself, and after the balance has been brought into a state of equilibrium for the positions; but whether the effect produced by the joint agency of two causes, will be uniform in all degrees of temperature, has not been said by the author.

Compensation for the Spring's want of Isochronism.

That property of a balance's regulating spring which makes the balance perform all its vibrations, long, short, and intermediate, precisely in the same time, is called its *isochronal* or *isochronous* property, from the two Greek words *isos*, equal, and *chronos*, time: it has been asserted that there is a certain proportion between the length and thickness, or between the length and the breadth and thickness taken conjointly, which only ascertains the isochronism in any uniform spring, of whatever shape; this doctrine has been maintained by Dr. Hooke and Peter le Roy separately, and has been subscribed to by Arnold the senior, Berthoud, and others, though Pennington of Camberwell says there are different points in the same spring equally isochronal; now allowing that there is only one point in the length of every spring that determines its isochronism, and that consequently all other lengths of the uniform spring regulate the balance uniformly, only while the arcs of vibration remain unchanged, to determine the isochronal effective length of such spring would be to render all compensations, for want of isochronism, unnecessary; and this point may in most springs be ascertained by repeated trials with long and short arcs successively, and by marking down the respective results; for it is found from experiments, that if shortening the regulating spring makes the long arcs of vibration to be performed in less time than the short ones, and *vice versa*, the spring under trial is capable of having its total length reduced gradually till the isochronal length is determined, but, generally speaking, not otherwise. Another method of managing the spring, which may be said to be effecting a species of compensation for want of isochronism, in the total length of an uniform spring, is tapering it from the outer to the inner end, till, with a given length, the long and short arcs are performed in equal times; this method was strongly recommended by Cumming in his Essay towards the improvement of watch-work, and after him, Earnshaw has laid much stress on this particular, so much indeed, that he considers his skill in the adjustment

of the isochronism, by a tapering spring, as constituting one of his chief claims to public encouragement; nay, he professes to manage the business so nicely, that he can make such a slight deviation from perfect isochronism as will compensate the *latitude* also, in the intensity of his springs in use!

The first notice that we have of a regular compensation, for want of perfect isochronism in a regulating spring, is Harrison's, when he proposed to introduce the cycloid-pin which we have already confessed we do not understand, from the want of shading in the drawing of it, as attached to his compensation curb, in the publication by the Board of Longitude; we may, however, state, that Harrison, not knowing, probably, that there is naturally an isochronal length in most uniform springs, concluded, that the long arcs are naturally performed in less time than the short ones, reasoning from the circumstance of one of his pieces having been observed to go faster in a horizontal position, than in a vertical one, though the arc of vibration was shorter in the latter than in the former position; he therefore applied his cycloid-pin, as Mudge did after him, as may be seen in the drawing of his escapement, in such a way that the short vibrations were accelerated by its push more than the long ones, that were not so long acted on by auxiliary means; but the fact is, the use of such a contrivance would necessarily have an effect just opposite to the intended one, if the balance-spring happened to be pinned to the stud at the contrary side of the isochronal point; that is, if the long vibrations were slower than the short ones, the cycloidal contrivance would make the difference still more sensible.

Berthoud's Compensation for want of Isochronism.

Berthoud has given an ingenious method of compensating the want of isochronism in a balance-spring in his "Supplément au Traité des Horloges Marines," which contrivance he calls an *isochronal compensator*. (Compensateur Isochrone.) The contrivance is represented in *fig. 6. of Plate XXX.* where A represents the balance with three radii; B an eccentric collet of polished steel, placed on the balance-veerge, and pressing against the large roller C, which is carried by and pivoted into a small frame at the end of the slender spring D, attached to the cock, E, on the plate of the watch frame, whenever the long vibrations are found by trial to be performed in a longer time than the short ones, the position of B and C are respectively as in the drawing, at the time when the balance-spring is quietest; for then the pressure of the eccentric piece, B, against the roller urged by the spring, is greater in the smaller arcs than in the long ones; but when the long arcs are performed in the least time, the position of B must be at *b*, and then C will be found by the force of its spring at *c*, where it is evident, that the pressure will be less in the short arcs than in the long ones comparatively; and the quantity of eccentricity of B must depend on the greatest difference of the two extreme vibrations. The principal reason why Berthoud adopted this isochronal compensator in five clocks, and in his portable watch for the longitude, was, that whenever the cock was dismounted the isochronism of his spring, however well adjusted, was generally found to be deranged when re-mounted. The eccentric collet was of course capable of being put to any given eccentricity as well as into any given position for accelerating long or short arcs at pleasure. The English watch-makers have not, that we know of, ever used this contrivance, but depend on their own patience and skill, in ascertaining the best length and

most desirable shape of their regulating springs for effecting their own purpose.

Mr. W. Hardy's Compensation for want of Isochronism.

Mr. W. Hardy published a short account of a new method of making the balance of a chronometer perform its long and short vibration, in the same time, in Mr. Nicholson's Journal for September, of the year 1806, (Supplement of vol. xiv. 8vo. Series) which account, we propose, to copy with some slight verbal deviations, that are more adapted to our figures, as drawn in perspective. The spring *a, b, fig. 8 of Plate XXX.* is screwed to the inferior side of the cock *A, fig. 7.* and lies over the upper part of the regulating-spring, proceeding in a right line to the axis of the balance *B,* and having a bend to clear the verge, from which it passes on to the end of the spring which it holds. This straight spring is made of such a small strength, that it comes into action before the regulating spring. The other piece *c, fig. 8,* is attached to the cock, in a line with the slender one, but on the opposite face of the cock: the part of the piece, *c,* which is bent down, is divided into a fork and admits the part, *b,* of the slender spring, to pass and play between its prongs; at each side of the prongs is a lateral screw, presenting its point to the spring, in such a way, that the play between the prongs, or rather between the points of the two equidistant screws, may be limited according to circumstances, provided they are not farther asunder than the quantity of the escapement angle. The other end of the cylindrical regulating spring, as usual, is attached to a piece of metal carried by the verge of the balance. The effect produced by the compensating spring, *a, b,* is thus, when the balance is first moved from its place of rest, the slender spring, *a, b,* moves first, till it meets with the point of one of the two screws of the fork, then the cylindrical-spring begins to be acted on, as in the chronometers in general; this motion of the stud, at the end of the slender spring, retards the motion of the balance, which begins to be accelerated only, when the stud is at rest; consequently the contrivance before us supposes that the short arcs are in general performed in less time than the long ones; and require on that account, to be checked in their velocity at starting; and the quantity of play in the fork limits the quantum of retardation; but as we have seen the long arcs may be, and often are, performed in less time than the short ones, with springs not adjusted for isochronism; we conceive, therefore, that, like Harrison's cycloid pin, which owed its origin to a contrary supposition, the application of the invention we are describing may happen to be productive of an effect, just opposite to that which it is meant to produce; for it can be used as a compensation for want of isochronism, only in the particular case, when the short arcs of vibration are performed in less time than the long ones, which we have seen is just the opposite application of that adopted by Harrison, and founded, as we have said, on an opposite supposition: whereas the fact is, that sometimes one of the two contrivances may prove to be necessary, and sometimes the other, with a limited length of spring, accordingly as the long, or the short arcs of vibration, may turn out on trial to be performed in the less time; and the trial necessary for ascertaining, whether the spring is too long or too short, will afford the means of ascertaining very nearly, if not quite, the exact isochronal length, such as shall require no compensation at all; to attain which object, though with some additional trouble, we are disposed to think the preferable practice.

COMPENSATION-Pendulum, is a superior kind of pendulum in which the natural effects of two actions are fo opposed to each other, as to counteract or compensate each other's influence on the motion of the going pendulum. We have already described the grid-iron pendulum invented by J. Harrison, and also, Troughton's new arrangement of the metallic bars, under our article **CLOCK**, to which we must here refer; and for the other various constructions of a compensation-pendulum the reader is desired to consult the word **PENDULUM**, where he will find the subject treated at considerable length.

COMPERTORIUM, in the *Civil Law*, denotes a judicial inquest made by delegates, or commissioners, to find out, and relate the truth of a cause.

COMPETENCE, or **COMPETENCY**, in *Law*, the authority, or right of a judge, for taking cognizance of any matter. See **JURISDICTION**.

COMPETENCI Militaire, Fr. military jurisdiction. In France, the officer of the troops took cognizance of and possessed the right of directing the process or proceedings in regard to every thing that concerned military affairs and offences, those excepted, that were punishable by the provost marshal, and to judge of all crimes and offences committed by an officer against an officer, or by a soldier against a soldier, provided a civil individual had no concern or interest in it. And if the civil judges were obliged to cause military persons to be arrested, the commandants could demand them, and in case of refusal complain to the sovereign through the minister.

COMPETENT Witnesses. See **WITNESS**.

COMPETENTES, in *Church History*, an appellation given to the catechumens, when being religiously instructed in the Christian religion they required baptism.

COMPEYRE, in *Geography*, a town of France, in the department of Aveyron, and district of Milhaud; one league N. of Milhaud.

COMPHEDA, a town of Arabia Felix on the Red Sea, S. E. of Mecca, garrisoned by the Turks.

COMPIANO, a town of Italy, in the duchy of Parma; 12 miles from Pontremoli.

COMPIATA, *Ital.* **COMPLICS**, *Fr.* The last prayer or hymn sung in full chorus, at the end of the service of the Romish church.

COMPIEGNE (in Latin, *Compendium*,) a handsome town of France, the chief place of a district in the department of Oise, situated on that river at the distance of two kilometres from the confluence of the Oise with the Aisne and 76 kilometres from Paris. N. lat. 49° 25'. E. long. 3° 12'. A very extensive forest stretches from this town to the department of the North and that of the Lys. Before the revolution of 1789 the kings of France resided occasionally at the palace of Compiègne to take the diversion of hunting. This palace was built by Charles the Bald, repaired by several of his successors, and reconstructed on a grand scale in 1755 by Louis XV. There is also a beautiful bridge over the Oise which formerly was adorned with the arms of France elegantly carved in stone by Coustou; but this fine monument was mutilated in 1793 by a revolutionary stone-cutter, who put a cap in its place. Compiègne has a sub-prefect, two courts of justice, and 6359 inhabitants. The district contains a population of 88,043 individuals, distributed in 165 communes. Its principal trade is in wood, corn, and wool. Its wine is much esteemed. There are but a few manufactures of worsted caps and stockings.

COMPITALIA, or **COMPITALITAS**, feasts held among the ancients in honour of the *lares*.

The word comes from *compitum*, a *cross-way*; because the feast was held in the meeting of several roads.

The *compitalia* are more ancient than the building of Rome. Dionysius Halicarnassus, and Pliny, indeed, say that they were instituted by Servius Tullius; but this only signifies, that they were then introduced into Rome.

Notwithstanding what Di n relates, that the *compitalia* were celebrated a little after the Saturnalia, and that the Roman calendar fixes them on the twelfth of January, it appears that they had not fixed any day, at least not till the time of Varro, as is observed by Casaubon.

The feast being then movable, the day whereon it was to be observed, was proclaimed every year. It was ordinarily held on the fourth of the nones of February, *i. e.* on the second of that month. Macrobius observes that they were held not only in honour of the *lares*, but also of *mania*, madnes. The priests who officiated at them were slaves and liberti; and the sacrifice was a fow. They were re-established, after a long neglect, by Tarquin the Proud, on occasion of an answer of the oracle, "That they should sacrifice heads for heads," *i. e.* that for the health and prosperity of each family, children were to be sacrificed: but, Brutus, after expelling the kings, in lieu of those barbarous victims, substituted the heads of garlic and poppy; thus satisfying the oracle, which had enjoined *capita, heads*, at an easy rate.

During the celebration of this feast, each family placed at the door of their house, the statue of the goddess *Mania*: they also hung up at their doors figures of wool, representing men and women; accompanying them with supplications that the *Lares* and *Mania* would be contented with those figures, and spare the people of the house.

As for slaves, in lieu of the figures of men, they offered balls or fleeces of wool. Servius Tullius ordered, that the slaves who assisted at the *compitalia*, should be free during the whole time of the feast. Augustus ordered the statues of the *Lares*, placed in the cross ways, to be adorned with flowers twice a year.

COMPLACENCY, in *Pathology* and *Ethics*, denotes full and continued satisfaction, connected with a considerable degree of approbation. It has intrinsic value, or some species of worth for its object. Some mental excellencies, or advantages accruing from them; some sentiment, disposition, acquirement, conduct, performance, either of ourselves or of others with whom we are immediately connected, which, upon close examination, we deem deserving of esteem or applause. Complacency may be enjoyed as the reward of our own conduct, or of the purity and benevolence of our motives; and it may also relate to the approved conduct, sentiments, attainments, and dispositions of others, for whom we are deeply concerned. The satisfaction produced by complacency indicates, that we have, in some respect or other, a personal interest in the object of it; and the approbation implied in it conveys the idea of some kind of excellency. In strict propriety of language, complacency is alone applicable to that species of good which originates from some mental or moral excellence; where there is an indication of propriety, ingenuity, wisdom, address, or dignity, in sentiment, design, execution, or of rectitude and benevolence in the motive, this affection will possess different degrees of strength, according to the various kinds and degrees of excellence discernible in the exciting cause; and high complacency is the most grateful of all the affections. It possesses an elevation and a suavity peculiar to itself. It is permanent satisfaction, enjoying the full approbation of reason; and consequently it suffers no alloy from the struggle of contending passions, or opposite desires. When it is in-

fixed

spired by our own conduct, it is accompanied by self-approbation, or the testimony of an applauding conscience, enlivened perhaps by the voice of gratitude, and enriched by the esteem of the worthy. If it proceed from the conduct of others, it augments the pleasures of affection, friendship, and gratitude. This affection, however, has its counterfeit; and an erroneous opinion of ourselves may change the nature of this sublime affection, and render it the parent of vice and folly. Thus false conceptions of our own talents, acquirements, and conduct, may inspire pride, vanity, haughtiness, and arrogance. Cozan on the Passions, p. 71.

COMPLAINANT, in *Law*, a plaintiff, or one who prefers a complaint against another, to be relieved by justice or equity.

COMPLEMENT, in a general sense, denotes what is wanting, or necessary to complete some certain quantity or thing.

COMPLEMENT, *Arithmetical*. See **ARITHMETICAL**.

COMPLEMENT, in *Astronomy*, is used for the distance of a star from the zenith; or the arch comprehended between the place of a star above the horizon, and the zenith. It is the same as the complement of the altitude, or co-altitude; or zenith distance.

COMPLEMENT of the course, in *Navigation*, is the number of points the course wants of 90 degrees, or eight points; viz. of a quarter of the compass.

COMPLEMENTS of the curtain, in *Fortification*, are those parts of the side of the interior polygon, which form the demi-gorges of the two bastions adjoining the curtain.

COMPLEMENT of the line of defence. See **LINE of defence**.

COMPLEMENT, in *Geometry*, is what remains of a quadrant of a circle, or of ninety degrees, after any certain arch has been retrenched from it. Thus, if an arch or angle be 30 degrees, we say its complement is 60 degrees, since $60 + 30 = 90$.

The sine of the complement of an arch is called the *co-sine*; of a tangent, the *co-tangent*; &c.

We sometimes also say the *complement of an angle*; meaning so much as it wants of a right angle, or of 90 degrees.

COMPLEMENT, in *Heraldry*, a term used to signify the full moon, for example, azure, the moon in her complement, argent.

COMPLEMENTS of a parallelogram, are the two lesser parallelograms, made by drawing two right lines parallel to each side of a parallelogram, through a given point in the diagonal.

Such are the parallelograms C and M (*Plate III. Geometry, fig. 50*). It is demonstrated, that in every parallelogram, the complements C and M are equal: for $Z + C + o = R + M + x$; as making up on each side the great triangles, made equal by the diagonal; of which, $Z = R$, and $o = x$ (because the diagonal makes them so); wherefore the remaining parallelogram $C = M$.

COMPLEMENT of life, in the *Doctrine of Life annuities*, denotes the difference, according to M. De Moivre's hypothesis, between the age of any given life, and 86 years; thus, at the age of 30 the complement is 56—at the age of 37 it is 49—at the age of 50 it is 36, and so on. In this hypothesis the probabilities of life through every period of existence, are supposed to decrease in an arithmetical progression, so that out of 86 persons just born, one is supposed to die every year, till at the end of 86 years, which is considered as the utmost limit of human life, the last survivor becomes extinct. M. De Moivre, who formed this hypothesis with the view of facilitating the computations of life-annuities, derived it from Dr. Halley's "Table of Observa-

tions," at Breslaw, which, being the only table of the kind at that time, and making the decrements in the middle stages of life nearly equal, so far supported the truth of the hypothesis, and justified M. De Moivre in adopting it. But in the earlier and later periods of life the decrements are so irregular as by no means to accord with this hypothesis; and since subsequent tables, more accurately formed, and deduced from more extensive observations, have been published by Dr. Price, Messrs. Wargentin, Sufmilch, and other writers on the subject; and the values also of single and joint lives for all ages have been computed from them; this hypothesis is rendered unnecessary, even in cases where it is most correct: in other cases, which involve two or three lives in the question, especially if those lives be very young or very old, it gives solutions so inaccurate as to be altogether unfit for use.

By supposing an uniform decrement in the probabilities of life from infancy to extreme old age, the number of years which a person has an equal chance of surviving is made to be the same with the *expectation* which M. De Moivre by his hypothesis finds to be equal to half the complement of life; so that if the age be four, the expectation will be $\frac{82}{2} = 41$; if the age be 82, the expectation will be $\frac{2}{2} = 1$, while the chance that a child aged 4 survives 41 years is $\frac{4}{82}$, and the chance that a person aged 82 survives 2 years is $\frac{2}{82}$. Now since each of these fractions is $= \frac{1}{2}$, it follows, agreeable to what has been observed above, that the one has an equal chance of living 41, and the other of living 2 years, or such a number as shall be expressed by their respective expectations. But by the Breslaw table the expectations of those lives are severally $40\frac{2}{3}$ and $3\frac{1}{2}$ years, while the chance of the younger living $40\frac{2}{3}$ years is .464, and the chance of the elder living $3\frac{1}{2}$ years is .53; that is, in the first instance, the chance is less, and in the second greater, than an even one, that the person lives such a number of years as shall be equal to his expectation. This is true in all other tables deduced from real observations, and proves that even in the simplest case the hypothesis is incorrect.

Mr. Thomas Simpson, instead of supposing the complement to be the difference between 86 and the age of the given life, assumed this complement to be equal to twice the expectation when computed from a table of the real probabilities of life, and by this means lessened the inaccuracies of those rules which depended entirely on Mr. De Moivre's hypothesis. But had this excellent mathematician been possessed of the present tables of observation, there is no doubt but that he would have adopted a more genuine method of solution. As far as relates to the computation of the probabilities of survivorship between any given number of lives, M. De Moivre's hypothesis in many cases appears to give approximations which are sufficiently near the truth; but as the mere determination of such probabilities is of no use in computing the values of contingent reversions, inasmuch as the discount of money must be blended in each separate year with the chance of survivorship in that year, the investigation of them is a matter of no consequence, and therefore the hypothesis of an equal decrement, which often leads to great errors in the doctrine of life annuities, may be wholly laid aside without injury or inconvenience in any case. (See *Phil. Transactions*, vol. 78.)

COMPLEMENT of a Chord, in *Music*, the note or notes wanting in any chord, to complete its harmony.

COMPLEMENT of an Interval, is the minute quantity it wants in particular temperaments.

COMPLEMENT, is the difference or remainder between an octave or eighth, and any given interval, called also the inversion of that interval, (see **INVERSION**); thus, a

fifth is the complement or inversion of a fourth, and a fourth of a fifth; a minor third is the complement or inversion of a major fifth, and *vice versa*. See THIRD, FOURTH, FIFTH, &c.

COMPLETE, in French *complet*, in *Military Language*, a regiment, troop, or company is said to be complete when it has its full complement of officers, non-commissioned officers, and privates, agreeably to the regulations for the time being.

COMPLETUS. *flor*, in *Botany*, a complete flower, furnished with both calyx and corolla; *incompletus* being used when the latter is deficient, and *nudus* when the former.

COMPLEX, a term ordinarily used as synonymous with *compound*; though, strictly speaking, there is some difference between them.

COMPLEX *object*. See OBJECT.

COMPLEX *opposition*. See OPPOSITION.

COMPLEX *term*, or *idea*, is a term or idea compounded of several simple or incomplete ones.

Thus, in the proposition, *A just God cannot leave crimes unpunished*; the subject of this proposition, *viz. a just God*, is a *complex term*, or stands for a *complex idea*, composed of two simple, or *incomplete* ones, *viz. God* and *Just*. Mr. Locke observes, that though the mind be perfectly passive in the formation of simple ideas, yet it exerts several actions of its own about them, when once formed: and that by this means it is, that they become the materials and foundations out of which all our knowledge is framed.

These acts are chiefly three, *viz.* 1. The combining of several simple ideas into one compound one: and thus it is that all complex ideas are made.

2. The bringing two ideas, whether simple or complex, together; setting them by each other, and so viewing them, without uniting them into one; by which it gets its ideas of relation.

3. The separating several ideas from all other ideas that accompany them in their real existence: and thus all its general ideas are formed.

As simple ideas are observed to exist in several combinations united together: so the mind may consider them as united, not only as they are really united in external objects, but as itself has joined them: ideas thus made up of several simple ones put together, we call *complex*; as man, beauty, army, greatness, &c.

Complex ideas, however compounded and decomposed, though their number be infinite, and their variety endless, may be all reduced under these three heads, *viz. modes, substances, and relations*; which see under their proper heads, MODE, SUBSTANCE, and RELATION. Complex ideas are often considered as single and distinct beings, though made up of several simple ideas; as body, spirit, &c. See COMPOSITION of *ideas*.

COMPLEX *proposition*, in *Logic*, is that in which the subject, or predicate, or both, are made up of *complex terms*: and if the term added to the subject be essential or necessary to it, then it is called *explicative*; otherwise it is *determinative*, the adjoined term limiting the subject to a particular part of its extension. Some logical writers ascribe the complexion of a proposition, in some cases, to the copula, as in modal propositions; but this rather pertains to the predicate. See *Compound* and *Modal Proposition*.

COMPLEX *sylogism*, is that in which the middle term is not connected with the whole subject, or the whole predicate in two distinct propositions, but is intermingled and compared with them by parts: *e. g.* The sun is a senseless being, the Persians worshipped the sun, therefore the Persians worshipped a senseless being.

COMPLEXI *Pars*, in *Anatomy*, a name given by Rio-

lanus, and others, to a muscle called by Albinus *liventer cervicis*, and by some the *complexus*.

COMPLEXIO, COMPLEXION, in *Metaphysics*, the union, or coalition of several things different from each other; either really, or only in our conception. See COMPLEX.

COMPLEXIO, in *Logic*, is sometimes applied to the second operation of the mind, *viz.* the judgment; considered as it affirms or denies any thing; such affirmation, &c. necessarily importing a combination of several things.

Complexio is sometimes also used by logicians in the sense of dilemma.

COMPLEXIO, in *Rhetoric*, &c. is a figure including a repetition, and a conversation at the same time; the sentence both beginning, and ending, with the same word.

Thus Tully: "Quis legem tulit?" Rullus. "Quis majorem partem populi iustitiam privavit?" Rullus. "Quis comitibus profuit?" Rullus.

COMPLEXION, in *Physic*, is used for the temperature, habitude, or natural disposition of the body.

Some philosophers distinguish four general and principal complexions in man, *viz.* the *sanguine complexion*, which, according to them, answers to the air; having the qualities thereof, as being hot and moist. It takes its name from *sanguis*; because the blood is there supposed to be predominant.

The *phlegmatic complexion* takes its name from the pithuita, or phlegm, in which it abounds; and corresponds to water; being cold and moist.

The *bilious*, or *choleric complexion*, takes its name from the bile, or choler; it is supposed of the nature of fire, hot and dry.

Lastly, the *melancholic complexion* partakes of the nature of earth, being cold and dry; but this sort of reasoning is now not much regarded.

Under this article we may introduce a subject that has occasioned much discussion, and considerable difference of opinion among physiologists. It relates to the variety of complexion or of colour that has subsisted amongst the inhabitants of different nations. Some persons, dissatisfied with the several hypotheses that have been suggested for explaining this phenomenon, have been led to conceive that there is a specific difference in the human race, and that the variations of colour are owing to their not having sprung from one common original. But this hypothesis contradicts the most ancient and authentic history extant, which represents Adam and Eve as the progenitors of all mankind; and it is also liable to various other objections which we shall take occasion distinctly to specify in the course of this work. Dr. Hunter, who has published a thesis on this subject, has investigated it with peculiar attention; and he gives it as his decided opinion, that there is no specific difference among mankind. In order to guard against the confusion which has arisen from the use of the term "species," he begins with defining it, and he comprehends under the same species all those animals which produce issue capable of propagating others resembling the original stock, from which they sprung. According to this sense of the term, he considers the whole human race as belonging to the same species. But, as in the vegetable creation, one species of plants includes several varieties depending upon climate, soil, culture, and similar circumstances that are incidental, the case is the same with respect to the human race; the varieties that occur pertain to the same species, and are produced by the operation of natural causes. Of the different colours that subsist among mankind, he enumerates the following, *viz.*

Black,

COMPLEXION.

<p><i>Black</i>, comprehending { Africans under the Line. Inhabitants of New Guinea. Inhabitants of New Holland.</p> <p><i>Copper-coloured</i>, as the East Indians.</p> <p><i>Brown-coloured</i>, to which class belong { Tartars. Persians. Arabs.</p> <p><i>Brownish</i>, including { The inhabitants of the southern parts of Europe; as, Sicilians, Abyssinians, Spaniards, Turks, and also the Samoiedes and Laplanders.</p> <p><i>White</i>, to which belong { Most of the European nations; as, Swedes, Danes, English, Germans, Poles, &c. Kabardiski, Georgians, and Inhabitants of the islands in the Pacific Ocean.</p>	<p><i>Swarthy</i>, including { The Moors in the northern parts of Africa.</p> <p><i>Red coloured</i>, as the Americans.</p> <p><i>Brown coloured</i>, comprehending { Africans on the coast of the Mediterranean. Chinese.</p>
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In tracing the causes of these differences of colour, he sets out with observing that its seat is unquestionably in the skin; that it is confined to the cuticle, consisting of the epidermis and reticulum; and that it chiefly occupies the latter of these. The cuticle, he observes, is much thicker and harder in black than in white people; the reticulum in the latter being a thin mucus, in the former a thick membrane. The seat of colour in whites he conceives to be transparent, and either totally deprived of vessels, or furnished with a very small number; as the yellow colour appearing in the jaundice vanishes when the cause of the disease is removed, which is not the case with stains in the cuticle from gun-powder, or similar causes. He then mentions three causes which contribute to destroy the pellucidity of the cuticle, to give it a brown colour, and to thicken it; *viz.* access of air, nastiness, and the heat of the sun; the effect of these he illustrates by examples; but he apprehends the last to be the most powerful. Admitting such influence of these causes, he supposes that it is sufficient to account for all the diversities of colour, that are observable among mankind. He proceeds to observe, that all the inhabitants of the torrid zone incline more or less to a black colour; and the difference that is perceivable among them may be owing, not to mere heat, but to the other causes also; and if we consider that even in the torrid zone there is a considerable difference of temperature, the existence of a white nation in this climate would not destroy the argument. He is farther of opinion, that the existence of a brown colour, and of considerable varieties from white, in the northern and coldest parts of Europe, may be very easily explained, by adverting to the manner of life of the inhabitants, who of course are either exposed to the inclemency of the air, or to the constant nastiness of smoky houses. If, to this reasoning, it should be objected, that infants are subject to these differences even when they are born, and previously to the influence of the causes above-mentioned, Dr. Hunter replies, that many peculiarities acquired by parents are transmitted to their posterity; in proof of which, he refers to hereditary diseases, which will continue to affect families for many generations. Thus, a parent exposed to causes that destroy the natural whiteness of his complexion, will beget swarthy children; and the same causes continuing to operate upon the son, the blackness will be increased. In this manner, all the different shades may have been at first induced, and afterwards continued. To this objection, however, it might be answered, that the fact is not admissible; as it is now generally allowed, that the children of the blackest negroes are born white.

Mr. Clarkson, in a dissertation introduced in his "Essay

on the Commerce and Slavery of the Human Species," has considered and well illustrated the subject of complexion. In the investigation of this subject, the first question that occurs relates to the precise seat of the colour. As the old anatomists commonly divided the skin into two parts or laminæ, *viz.* the cuticle and cutis or true skin, they must have supposed, that as the latter is the same in all the varieties of mankind, however different their external hue, the seat of colour must have existed in the cuticle or upper surface. Malpighi, however, discovered that the skin is divided into three laminæ; *viz.* the cuticle, the true skin, and a kind of coagulated substance situated between both, which he denominated the "rete mucosum." Accordingly, this discovery served to ascertain the point in question; for it afterwards appeared, that the cuticle, separated from the other laminæ, was semi-transparent; and that the cuticle of the blackest negro was of the same transparency and colour with that of the purest white; and as the true skins of both were invariably the same, the rete mucosum must be the seat of colour. That this is the fact has been also determined by a variety of anatomical experiments and physiological observations. The causes, therefore, that operate in producing difference of colour, must effect it by acting on the rete mucosum, which, from the numberless perforations of the cuticle, is no less accessible than the cuticle itself. These causes are probably those various qualities of things, which, combined with the influence of the sun, contribute to form what is called "climate." Moreover, it is a farther confirmation of this hypothesis, that the mucous substance before-mentioned is subject to variation, according to the difference of climates from the equator to the poles. Thus, the inhabitants of many kingdoms and islands of Asia are found to have their rete mucosum black; those of Africa, situated near the line, are of the same colour; those of the maritime parts of the same continent, are of a dusky brown, nearly approaching to it; and the colour becomes lighter or darker, in proportion as the distance from the equator is either greater or less. The Europeans are the fairest inhabitants of the world: those situated in the most southern regions of Europe, have in their rete mucosum a tinge of the dark hue of their African neighbours. Admitting these facts, we are led to conclude, that climate has a very considerable influence in occasioning a difference of colour. It has, however, been objected to this reasoning, that people of the same climate, geographically considered, or under the same parallels, are not exactly of the same colour. But to this objection it has been replied, that climate, physically considered, depends upon a variety of accidental circumstances. See CLIMATE. It should also be considered, that, although the inhabitants

of the same parallel are not exactly of the same hue, yet they differ only by certain shades of the same colour; and, therefore, if climate has really an influence on the mucous substance of the body, we must expect to find not only a gradation of colour in the inhabitants from the equator to the poles, but also different shades of the same colour in the inhabitants of the same parallel. We might also add another argument of great weight, *viz.* that when the black inhabitants of Africa are transplanted to colder, or the white inhabitants of Europe to hotter climates, their children, born there respectively, are of a different colour from themselves, that is, lighter in the first, and darker in the second case. To this purpose the abbé Raynal observes, that the children, which the Africans procreate in America, are not so black as their parents were; and that after each generation, the difference becomes more palpable. It is possible, he adds, that after a numerous succession of generations, the men come from Africa would not be distinguished from those of the country into which they have been transplanted. If we admit the fact above stated, that climate has an influence on the mucous substance, we may reasonably imagine that this variation of the colour of children from that of their parents must take place; for being born white, and not being subject to the influence of causes equally powerful in colder climates, with those to which their parents were subject in the hotter climates from which they were removed, it must follow that the same effect cannot possibly be produced.

On the other hand, we may here allege an important fact, stated by Dr. Mitchell (Phil. Trans. N^o 476. § 4.). "The Spaniards," he says, "who have inhabited America, under the torrid zone for any time, are become as dark-coloured as our native Indians of Virginia, of which I myself have been a witness; and were they not to intermarry with Europeans, but lead the same rude and barbarous lives with the Indians, it is very probable that, in a procession of many generations, they would become as dark in complexion." Another writer, describing the European settlements on the African coast, observes, that "there are several other small Portuguese settlements, and one of some note at Mitomba, a river in Sierra Leone; the people here called "Portuguese" are principally persons bred from a mixture of the first Portuguese discoverers with the natives, and now become, in their complexion and woolly quality of their hair, perfect negroes, retaining, however, a smattering of the Portuguese language."

Another circumstance might also be mentioned by way of corroborating the argument before us; and this is, that the members of the same family, separated from each other, and migrating into different countries, have not only changed their family complexion, but have assumed as many different colours as the different regions of the globe in which they have settled. The Jews furnish a remarkable instance to this purpose. These people, though scattered over the face of the earth, preserve themselves a distinct people, and never intermarry with any out of their own body, so as to have any mixture of blood in their veins, by which they should differ from each other; and yet it is an undoubted fact, that the English Jew is white, the Portuguese swarthy, the Armenian olive, and the Arabian copper-coloured; and there appear to be as many different species of Jews as countries in which they reside. It appears further from the testimony of the most ancient historians, that the darkest black complexion has actually changed in a succession of years into the purest white. Herodotus informs us, that the Colchi were black and that they had crisped hair. These people were a detachment of the Ethiopian army under Sesostris, who fol-

lowed him in his expedition, and settled in that part of the world where Colchis is said to have been situated. Their descendants probably remained in the same country. If this be the case, they must have totally changed their complexion; or the black inhabitants of Colchis must have acquired the hue of the fair Circassian. If indeed they migrated in any one direction from Colchis and to any distance within 1000 miles of Colchis, still they must have changed their colour; for if they had gone in an eastern or western direction, their colour must have been the same as that of the Circassians; if to the north, whiter; if to the south, of a copper colour. Within the above assigned distance of Colchis, there are no black people.

Professor Zimmermann of Brunswick, in his work entitled "The Geographical History of Man, &c," has satisfactorily proved, that the complexion of the human species uniformly corresponds to the degree of heat or cold to which they are habitually exposed. In establishing this position, he distinguishes between climate, considered geographically and physically, and thus furnishes an answer to the erroneous reasoning of Lord Kames on this subject. At Senegal, and in places adjacent, the thermometer is often at 112 or 117 degrees in the shade; and here we find the inhabitants jet-black with woolly hair. The heat is equally great in Congo and Loango, and these countries are inhabited by negroes only; whereas in Morocco to the north of these regions, and at the Cape of Good Hope, to the south, the heat is not so intense, nor are the inhabitants of so deep a hue. Lord Kames asks, why are not the Abyssinians and the inhabitants of Zaara of as dark a complexion as the Moors on the coast of Guinea; Zimmermann replies that these countries are much cooler. The desert is not only further from the equator, but the winds blowing over the Atlas mountains, which, like the Alps, are covered with snow, and the westerly wind coming from the sea, very much mitigate the heat. Nor is Abyssinia so warm, as either Monomotapa or Guinea. The N.E. winds from the side of Persia and Arabia are cooled by their passage over the Red sea; the northern winds of Egypt lose much of their heat on the chain of mountains that is extended between the countries; the winds from the south and the west are sea winds. Thus the only quarter from which they can derive excessive heat is from the west, as the air on this side must pass over tracts of heated lands. For a similar reason negroes are not found either in Asia or South America, under the equator. These countries, as M. Zimmermann observes, being exposed, from their situation, to sea breezes and cooling winds from the continent. He also observes, in confirmation of this hypothesis, that the mountaineers in warm climates, as in Barbary and Ceylon, are much fairer than the inhabitants of the vallies; that the Saracens and Moors, who conquered the N.E. part of Africa in 1700, from being brown, are become like the negroes near the equator; that the Portuguese, who settled at Senegal in 1480, became black; and it is asserted by Tudela the Jew, that his countrymen in Abyssinia acquired the dark complexion of the conquered nations.

Upon the whole it may be observed, that colour is a kind of habit of the body, which is gradually acquired, and after a succession of ages, fixed and rendered permanent. Thus, the sanguine countenance will be perpetual in the highest latitudes of the temperate zone, and, as we descend to the south, we shall find the swarthy, the olive, the tawny, and the black. The uniformity of the effect in the same climate, and on men in a similar state of society, proves the efficacy and the certainty of the cause. As mankind are for ever changing their habitations by conquest or commerce,

merce, we find that, in all climates, they cannot endure the change, but are to acclimated by time, that we cannot say with certainty, whose ancestor was the native of the clime, and whose progenitor was the intruding foreigner. For a further illustration and confirmation of the general arguments comprehended in this article, we refer to an "Essay on the Causes of the Variety of Complexion and Figure in the Human Species" by Dr. Smith, professor of moral philosophy in the college of New Jersey. See *NIGROE*.

COMPLEXUS MUSCULUS, in *Anatomy*, derives its name from the intermixture of tendon with its muscular fibres, which gives to its surface a confused appearance. It arises from the transverse processes of five, six, or seven of the upper dorsal vertebrae, by so many distinct slips; from the transverse process of the last cervical vertebra; and from the oblique or articulating processes of the sixth, fifth, and fourth vertebrae of the neck. The fasciculi of fibres from these numerous points of origin meet together to form a broad, flat, and strong muscle, which is implanted into the occipital bone, occupying the hollow in front of the external transverse ridge of the bone. It sometimes receives a small fleshy portion from the spinous processes of one or two of the upper dorsal vertebrae; and is generally connected in some degree with the *longissimus dorsi sacrolumbalis* and *transversalis colli*. That portion of the muscle, which is towards the spines of the vertebrae, is divided into two fleshy portions by an intermediate tendon, and is separate from the rest at its origin; this is described by Albinus, Soemmerring, and others, as a distinct muscle, by the name of *biventer cervicis*: we follow Cowper, Douglas, and Winslow, in considering this as a part of the complexus, since it is always connected to the rest of the muscle, for two or three inches before its insertion.

The action of the complexus consists in carrying the head backwards upon the atlas; and in restoring it to the erect position, when it has been bent forwards. Its longest fibres will also have the same effect on the neck, *viz.* that of frightening and carrying it backwards.

COMPLEXUS, Minor, is a name given by Winslow, to the trachelo-mastoideus muscle, which see.

COMPLICATION of *diseases*, a mixture, or combination of several diseases; especially where they have any affinity to one another; as the dropsy, asthma, and jaundice, happening together.

What much perplexes the physicians is, when with a fever there is a complication of some other disorder.

COMPLINE, in *Ecclesiastical Antiquity*, denotes that even-song, which completed the whole service of the day in religious houses, and began at nine of the clock at night.

COMPLUTENSIAN BIBLE. See *GREEK BIBLES*, and *POLYGLOTT*. The Complutensian edition of the Bible, which the reader will find described and particularly noticed, under the articles to which we have referred, has been highly extolled by Mill and Goetze, and as much depreciated by Wettstein and Semler. Michaelis, in the second edition of his "Introduction," &c. endeavoured to steer a middle course between the opposite opinions of Mill and Wettstein; though he believed, on the authority of the latter, that the editors, actuated by religious zeal, had materially altered the Greek text from the Vulgate. But Goetze, he says, in his "Defence of the Complutensian Bible," printed at Hanburgh, in 1765, has enabled him to form a proper judgment of that work; and he acknowledges, that he had too closely adhered to the opinion of Wettstein, after the perusal of the following publications by the same author, *viz.* "Complete Defence of the Complutensian Greek Testa-

ment, with a Collection of the principal Differences between the Greek Text, and the Latin Text of that Edition," printed in 1766, and the "Continuation of the Defence of the Complutensian Greek Testament, &c." published in 1769. Michaelis, having since had access to the Complutensian bible in the university library of Gottingen, has been enabled to speak of it with greater certainty. He has particularly used it in the Greek version of Genesis, the Proverbs of Solomon, and the first book of the Maccabees; and in these books he has found its reading as pure, and as little altered from the Latin, as Goetze had described them. It has been questioned what were the MSS. from which this edition was prepared, and whether the editors had any besides those which were sent to them from Rome; the silence of the editors is no proof of the contrary, for they make no mention of the Codex Rhodiensis, which had been presented to Cardinal Ximenes, though Stunica, in his controversy with Erasmus, frequently applies to it, as a MS. used in the Complutensian edition; and the Codex Bezae Cantabrigiae, which was used in the Septuagint, had been presented to him, by the senate of Venice. Moreover, as the New Testament was begun in 1502, it is wholly incredible that they should have had no other MSS. than those sent from Rome, because Leo X. who communicated these MSS. was not pope before the year 1513, and the subscription at the end of the Revelation bears date January 10, 1514. If, therefore, the MSS. were sent by Leo X., they must have arrived when at least three parts of the Greek Testament were already printed, and yet the editors, at least in the preface, mention no other MSS. One mode, says Marsh, in his notes on Michaelis's translation, of solving this difficulty is, to suppose that MSS. were sent from Rome by Julius II. the predecessor of Leo X., and that the writer of the preface to the Complutensian Greek Testament, who knew that the latter was at that time pope, but, perhaps, was ignorant how long he had reigned, committed an anachronism in ascribing to Leo X. what had been done by Julius II. Or, perhaps, he knew that they were sent by Julius II.; but meant to flatter the vanity of the reigning pope, by attributing to him the act of his predecessor. Or, Leo X. might, before he was pope, have been instrumental in procuring them from the Vatican, and be therefore entitled to the compliment. However this be, it seems probable, that the editors, besides the Codex Rhodiensis, had other MSS. of the Greek Testament, which had been procured by the cardinal. But whether they were ancient or modern, of great or little value, it is difficult to determine, as the editors have given no account of them. Wettstein thinks they were modern, because the readings of the Complutensian bible have a remarkable agreement with those of the MSS. written in the 14th, 15th, and 16th centuries; and this opinion is confirmed by the shape of the types, for they are such as we find in the most modern MSS.; and it is probable that the editors had their types cast in imitation of the MSS., which they employed on the occasion. Michaelis, however, in this account of the types, is not quite accurate; for of all the specimens of Greek hand-writing, which Montfaucou has given in his "Palaeographia Graeca," from the first introduction of the small letters down to the 15th century, none resemble the types of the Complutensian edition more than that which is found in MSS. of the 9th century. On the other hand, letters not very unlike the Complutensian are found in MSS. of the 11th, 12th, and even 13th centuries. Moreover, as no MS. written in such letters, as are used for the Complutensian edition, is without accents, and the editors appeal not to the MSS. which they actually used

but to the poems of Callimachus, and the Sibylline prophecies, there is reason to suspect, that their MSS. had accents, and consequently were modern. Accents, however, if it be allowed that the Complutensian edition had them, though it has been generally said (not justly) that it is printed without them, afford no proof that a MS. is modern; for they are found in several very ancient MSS. written even with uncial letters, as the Vaticanus, Claromontanus, &c. &c. and perhaps, says Mr. Marsh, there are as many ancient MSS. with uncial letters, which have accents as those which have not.

With regard to the main question, whether the MSS. used by the Complutensian editors were ancient and valuable, Mr. Marsh candidly acknowledges that he is too little acquainted with the Complutensian bible to be able to form any judgment: and he therefore contents himself with observing, that Griesbach accedes to the opinion of Wetstein and Semler, and says, in the preface to the second volume of his Greek Testament (p. 16); "Complutenfes non habuerunt codices Græcos, nisi paucos, recentes, exigui fere, si ad lectissimum bonitatem spectes, pretiū."

It has been suggested, that the Complutensian editors, in consequence of a too high opinion of the Vulgate, and a mistaken zeal for the Christian religion, have sometimes introduced into the Greek text readings of the Vulgate, which they did not find in the Greek MSS.

The Greek text of the disputed passage, 1 John, v. 7., in the Complutensian edition, seems to have been a mere translation of one of the editors; because the passage is found in not a single ancient, and in only two modern MSS. the Montfortianus and the Ravianus, the latter of which is only a copy of this edition; and in the former, the text is very different from that in the Complutensian edition. It cannot, therefore, as in the third edition of Erasmus, have been taken from this MS.: though, on the other hand, it is not impossible that they found it in some modern MS., in which the passage, as in the codex Montfortianus, had been already translated. The question can never be decided, because the MSS. which they used are either destroyed, or are at least unknown. For an account of the fate of these MSS., see the article ALCALA. Michaelis candidly explains the conduct of the Complutensian editors so as to remove the charge of dishonesty. They might believe, he says, that this passage was really genuine, and, on account of its supposed importance, take no notice of its alteration from the Greek MSS.; in the same manner as the verse has been inserted by later editors in Luther's version. Or, they might have made some remarks on it, which were afterwards erased by the censors of this edition; for, contrary to their usual custom, they have a marginal note on 1 John, v. 7., which is in itself unimportant, and almost implies that something originally preceded. If they have taken the passage from a modern MS., they have only acted like Erasmus, who has inserted it on the authority of a very modern MS. which he had never seen. In short, many of the best editors have been guided in this passage by a mistaken zeal for the Christian religion, and have acted on principles which they have never admitted in other places. It was the principal object of Goeze to support the authenticity of this passage, and as it occurs in the Complutensian bible, he defended the antiquity and value of the Greek MS. from which he supposed that passage had been taken. On the other hand, Semler's object was to shew the spuriousness of this passage, and at the same time to support the opinion of Wetstein, that the text of the Complutensian Greek Testament, in general, is of little value. The genuineness of this passage is now generally exploded by the most approved biblical critics.

The Complutensian edition is extremely scarce, because only 600 impressions were taken off, and is become too expensive for a private library. That which is now at Göttingen cost 480 Rorins, and the late Münchhausen gave an order to his commissary near as far as 500; and the price of it, says Michaelis, will still increase, in proportion as its great excellence, especially in the Septuagint, shall be better known. Mr. Dangelius, and Wetstein, have collated this edition as a MS with great diligence; but their extracts are by no means complete. Goeze has also given extracts from it, in his "Complete Defence of the Complutensian edition," (p. 277), which, in the proper sense of the word, may be called critical, and which no future editor of the Greek Testament ought to leave unnoticed. Michaelis thinks, that a real service would be rendered to those who are engaged in sacred criticism, if a new edition both of the Greek and Latin Testament was published, that was an exact copy of the Complutensian. From the Greek text of the Complutensian edition were printed the following, viz. seven at Antwerp in 1564, 1573, 1574, 1590, 1591, 1601, 1602; five Geneva editions in 1609, 1619, 1623, 1628, 1632; and, lastly, that of Mayntz, in 1753. These are all described in Le Long Bibl. Sacra, ed. Mafsch. P. i. p. 191—195. See POLYGLOTT.

COMPLUTICA, in *Ancient Geography*, a town of Spain in the Tarragonensis, plac'd by Ptolemy in the country of the Callaici, and thought to be the present village of Complud, in Galicia. It is marked in the chart of M. d'Anville on the right of the Durus, to the south-west of Pallantia.

COMPLUTUM, a town of Spain, in the Tarragonensis, plac'd by Ptolemy in the country of the Carpetani, and marked in the chart of M. d'Anville in Hispania circior, N.E. of Mantua; now *Acuala de Henares*, which see.

COMPOLI, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Lavora; 4 miles E. of Sora.

COMPONE', or *Gobony*, in *Heraldry*, is composed of two colours in equal divisions in a border, or any other ordinary; if it consists of two ranges it is called counter-compony, and if of three, it is then termed chequé, and is generally used in a border to denote illegitimacy.

COMPOS *Mentis*. See NON-COMPOS.

COMPOSED *Balloon*. See BASTION.

COMPOSER of *Music*, a person who invents a melody, and cloaths it with harmony, according to the established rules of the art. Under the word *composition* we shall detail the qualifications requisite to support this character. Yet these are insufficient to form a complete composer, whose productions will be felt and admired whenever they are heard. All the science possible, without the inspirations of genius, is unable to command attention, and interest an audience, at all times, and in all places. They are only gifted men that possess such powers. What is meant here by genius, is not a whimsical and capricious imagination, that quits a flowery road to ramble in thickets, through briars and brambles; that to render harmony piquant, loads it with discord; and instead of grace and elegance, is labouring to surprise by extraneous modulation, and to divide the whole scale into half notes; true genius is that latent fire which inflames the composer, irresistibly forces him to write, and necessarily supplies him with new melodies; always agreeable, expressive, and natural, accompanied by a harmony pure, touching, and majestic, which embellishes melody, without overpowering it. "This was the guide" says the Citizen of Geneva, "that led Corelli, Vinci, Perez, Jomelli,

melli, and Durante. to the sanctuary of harmony; and Leo, Pergolesi, Haffé and Buranello, to that of good taste." We have to add to these, Handel, whose sublime works were never heard by Rousseau; the elder Stamitz, Piccini, Sacchini, Cimarosa, and Pacifello, with Haydn and Mozart, who have gone somewhat further in vocal music, and many leagues in instrumental.

The knowledge of harmony is doubtless the foundation of composition. To fill the chords, prepare and resolve discords, find the fundamental base, and know all the other little elementary rules, is necessary; but with the rules of harmony alone, we are not nearer being composers, than being orators by knowing the rules of grammar. Padre Martini says, that no one can be a good composer without singing in good taste, and playing well upon the organ. His rules are for a real *maestro di capella*, an ecclesiastical composer; but for secular music he would have said it was necessary to sing and play well on the harpsichord or piano forte. In setting words for the stage, he ought to know what passages are difficult, and what easy to execute; what style suits the singer, and what the character he has to represent; he is to know the compass of voices and instruments, and their peculiar genius and powers; how to produce effects, and when to apply them; to feel the character of different measures; to know all the difficulties and pendency of the art: imitations, fugues, canons, double counterpoint, and how to write for double, triple, and quadruple choirs. To these add the mysterious laws of modulation; and all this is no more than preparatory to composition. But he must inherently possess a fund of beautiful melodies, sublime harmony, and grand designs.

Besides correct harmony, correct expression, in lyric compositions, is required. The spirit of three several kinds of composition must be called up in writing for the church, the stage, and the chamber. In the first, solemnity and harmony must be invoked; in the second, a distinct style for each character, strongly marked by the poet; ingenious and spirited symphonies, picturesque accompaniments, a judicious mixture of instruments, and their peculiar powers, occasionally called forth; and for the third species of composition, pieces that require but few hands and few voices; free from all tremendous difficulties, in want of no wind instruments; and, unless catches and glees are in question, no provision need be made for more than one or two voices, and a quartet band. *La musica di camera*, chamber music, requires ease, grace, and elegance, more than force, energy, and feats of execution.

Among the various styles of composition for which an accomplished master should be prepared, is the military, in which wind instruments and drums are chiefly employed. To know the compass, scale, genius, and defects, of the trumpet, horn, clarinet, hautbois and bassoon, both in the orchestra and the field, will require some study, counsel and experience.

Rousseau seems sometimes to regard musicians as mere instruments, incapable of reflexion; and that it is the business of philosophers to think for them; so imagine M. Suard, and all speculative musicians; but in the following advice to a composer, Jean Jaques seems to require more meditation and reflexion than the demon of composition, by which a man of genius is possessed, will allow; who, absorbed in his own ideas, or impelled by the ideas of others, flies to his pen or his instrument, without metaphysical reasoning, or analytical inquiry into the foundation of his art. But Rousseau sums up the article *Compositeur* (*Composer*), in his Dictionary, with the following instruction. "In composing, the author has to consider the physical production

of sound, and that its sole use is to delight the ear; or if he moves it up to imitative music, he has to move the passions by moral effects. In the first instance, he has to seek the most pleasing series of sound, and agreeable harmony; but in the second, he ought to consider music with respect to its similarity with the inflexions of the human voice in speech, and the possible conformity between the harmonical combinations of sound and imitable objects." This is all very fine and profound: but we apprehend, that the most happy effusions of genius have been generated without speculative assistance.

For the mechanical rules by which a composer is to steer, we shall refer our readers to the article COUNTERPOINT; where, though its principal rules are dispersed through the work, we shall collect and form them into a synopsis, and illustrate precepts by examples.

In this musical grammar, we shall perplex the student with no mathematical calculations, no ratios, harmonics, or speculations on the philosophy of sound; but adhere closely to practical knowledge of immediate use in the first stages of study. We shall not even attempt to give new melodies, or harmonical combinations; but endeavour to indicate the foundation on which the best models of composition have hitherto been built. See COUNTERPOINT, CONCORDS, DISCORDS, HARMONY, and MODULATION.

COMPOSITÆ, or COMPOSITI, in *Botany*, the twenty-first natural order in the *Philosophia Botanica* of Linnæus; and the forty-ninth in the *Prælectiones*, published after his death by Giske. The plants with compound flowers are kept distinct by most authors, with only a little difference as to the proper limits and most convenient divisions of the order. But Linnæus observes, that, though it is perfectly natural, its essential character is not easily determined. A compound flower, from the obvious meaning of the term, implies the union of several flowers, or florets, as in this case they are usually called, by some common bond. But this character is not peculiar to the composite plants, nor does it extend to all their genera. For *Cephalanthus*, *dipsacus*, *scabiosa*, &c. have several florets included in a common calyx, but belong to a different family; and *seriphium*, *corymbium*, and *trumpalia*, have only one flower in each calyx, and yet cannot be separated from those which are truly compound. Nor will the united anthers, which Linnæus has taken for the distinguishing character of his artificial class *syngenesia*, exactly apply to this natural order; *jassone*, *viola*, *impatiens*, &c. have such anthers, but cannot properly be arranged with the compositæ.

In the *Philosophia Botanica* the order stands thus:

I. *Scnifistoculofis*, prenanthes, lactuca, cliondrilla, hieracium, crepis, andryala, hypochaeris, picris, yoseris, leontodon, scorzonera, tragopogon, scolymus, foncehus, lapsana, cichorium, catananche, elephantopus. II. *Capitata*, echinops, sphaeranthus, gundelia, arctium, ferratula, onopordum, carduus, cynara, carthamus, carlina, cynicus, atrachylis, centaurea, corymbium. III. *Corymbifera*, roeie, fantolia, chrysofocoma, tanacetum, klema, toechina, xeranthemum, gnaphalium, carpesium, conyza, tarachonanthus, baccharis, erigeron, tussilago, doronicum, solidago, fenecio, inula, aster, gerbera, othonna, chrysanthemum, matricaria, bupththalmum, anacyclus, cotula, anthemis, achilla, eriocephalus, helenium, arctotis, bellis, tagetes. IV. *Helianthus*, rudbeckia, coreopsis, bidens, verbena, figebeckia, milleria, silphium, eupatorium, ageratum, oilcolprium, calendula? chrysoygonum? melampodium? tridax? tetragonotheca?

All these are retained in the *Prælectiones*, except *gerbera*, which has been abolished, and its species referred to *arnica*. Several of them are also placed in different divisions.

The following is the arrangement in the synoptic table annexed to the Praelæfions. Those printed in Italics were added by Linnæus himself; and those marked with asterisks are additions by Giseke.

I. *Capitatae*, gundelia, echinops, sphaeranthus, arctium, ferratula, carduus, ciccus, onopordum, cynara, carina, *gorænia*, atractylis, carthamus, centaurea, *zoega*, elephantopus, removed from semibifolii, *burnadesia*, *veronica, Schreb. *natrix, *Gart.* II. *Semififoliosæ*, feolymus, cichorium, catananche, lapiana, hypochæris, *feriola*, *krigia, Schreb., hyoferis, *rothia, Schreb., andryala, crepis, hieracium, leontodon, prenanthes, chondrilla, lactuca, fonchus, *apargia, *Scop.*, picris, scorzonera, tragopogon, *geropogon*. III. *Difcoideæ*, gnaphalium, xeranthemum, stœchelinum, tanacetum, matricaria, carpeſium, chryfanthemum, *pteronia*, baccharis, *ofmites*, conyza, inula, erigeron, *cineraria*, tuſſilago, doronicum, *arnica*, fenecio, ſolidago, chryſocoma, after, *leſyera*, fantolina, anthemis, anacyclus, cotula, *athanafius*, achillea, *cacalia*, *perdicium*, bellis, age-atum, removed from oppoſitifolii, eupatorium, removed from oppoſitifolii, *ethulia*, *kubnia*, bellium, *unxia*, *mutifia*, *lavenia, *Soland. Sw.* *kleinia *Jacq.* Giseke obſerves, that it is not eaſy to determine why Linnæus has given the name of difcoideæ to this order, which nearly correſponds with his former corymbiferi; ſince the greater part of them are not difcoid, in the uſual ſenſe of the word, but furniſhed with a ray. IV. *Not named by Linnæus*. Corymbium, removed from ſemibifolii, helenium, othonna, and arctotis, removed from corymbifera, calendula, and oſteopermum, removed from oppoſitifolii, *feleroſcarpus, *Jacq.* V. *Oppoſitifoliae*, ſpilanthus, bidens, ver-

befina, ſyſchebeckia, coreopsis, filphium, tetragonotheca, *polymyria*, *trixis, *Swarz.*, helianthus, rudbeckia, milleria, buphthalmum, removed from corymbiferi, chryſogonum, melampodium, tridax, *pedis*, tagetes, removed from corymbiferi, *zinnia*, *calce*, *amelus*, *eclyſia*, *ballimora*, hippia, *cedera*, *clibadium*, *jurgia*, *relhania, *L'Herit.*, *boltonia, *L'Herit.*, *meyera, Schreb., *phaëtula, *Gart.*, *galardia, *Lam.*, *berckheya, *Erb.*, *cralpedia, *Forſt.*, *didelta, *L'Herit.*, *tetranthus, *Swarz.*, *rolanda, *Rottb.*, *shawia, *Forſt.* VI. *Nucumetacea*. ſtoebe, and tarchonanthus, removed from corymbifera, *artemiſia*, *ſcripbium*, eriocephalus, removed from corymbifera. *ſilago*, *microſus*, *iva*, *parthenium*, *ambroſia*, *xanthium*, *ſtrumphia*.

None of the plants of this order are poiſonous, except tagetes, doronicum, and arnica. Moſt of them are bitter and unpleaſant to the taſte, but poſſeſſed of ſtrengthening qualities as a medicine. Some, however, are leſs bitter and aculent; and ſeveral others are rendered fo by cultivation and blanching.

Vaillant, Juſſieu, and Ventenat have divided this order into three: *elictoracea*, *cinarocephala*, and *corymbifera*.

COMPOSITE NUMBERS, in *Ariſmetick*, are ſuch as can be exactly divided by ſome ſmaller number or numbers, without leaving any remainder; ſuch as do not admit of this even diviſion, are called *PRIME numbers*, which ſee. The following table of compoſite and prime numbers under 100, ſhewing all their prime diviſors, will be found uſeful in a great variety of calculations.

Units	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
1	2.5	11	2.3	13	2.7	3.5	2 ⁴	17	2.3 ²
2	2 ² .5	3.7	2.11	23	2 ³ .3	5 ²	2.13	3 ³	2 ² .7
3	2.3.5	31	2 ⁵	3.11	2.17	5.7	2 ² .3 ²	37	2.19
4	2 ³ .5	41	2.3.7	43	2 ² .11	3 ² .5	2.23	47	2 ⁴ .3
5	2.5 ²	3.17	2 ² .13	53	2.3 ³	5.11	2 ³ .7	3.19	2.29
6	2 ² .3.5	61	2.31	3 ² .7	2 ⁶	5.13	2.3.11	67	2 ² .17
7	2.5.7	71	2 ³ .3 ²	73	2.3.7	3.5 ²	2 ² .19	7.11	2.3.13
8	2 ⁴ .5	3 ⁴	2.41	83	2 ² .3.7	5.17	2.43	3.29	2 ² .11
9	2.3 ² .5	7.13	2 ² .23	3.31	2.47	5.19	2 ⁵ .3	97	2.7 ²

In the above table, any number is to be ſought for in the angle of meeting of its *teus*, in the front column, and its *units* in the top line; thus, 23 will be found in the line with 2 at its beginning, and under three at the top. The prime numbers are diſtinguiſhed by larger figures, and the compoſite numbers have their component primes ſtewn, ſeparated by dots to expreſs, in this caſe, the ſign of multiplication, as is frequently done by the writers on ſeries; thus 24 is compoſed of the ſquare of 2 or 2², multiplied by 3 and by 7; 72 is compoſed of the cube of 2 into the ſquare of 3. Matter of curious reflection will be furniſhed by this table to ſuch as ſtudy the properties of numbers, by tracing the parallel lines in which each prime occurs; thus, in

one diagonal of the above table, the whole of the multiples of 11 will be found, while 3² (or 9) will be found in the compoſition of every number in the other diagonal line; parallel to which, in every alternate line, the other multiples of 3 will be found. The fives and the twos will all be found to occur throughout every vertical column in which they occur at top; and under 0, they both occur in every line. This uſeful and curious table we found in M. Overend's manuſcripts, in the library of the Royal Inſtitution, where the moſt copious tables of compoſite and prime numbers may be ſeen, by thoſe who are curious in theſe matters.

COMPOSITE Numbers, in *Muſical Calculations*, are ſuch as are

are composed by the multiplication of the prime integers, 2, 3, and 5; all primes larger than these, or composite numbers into which such enter, are not musical numbers, but are irrational or furd in a musical sense. See **MUSICAL NUMBERS**.

COMPOSITE, or *Roman Order*, in *Architecture*. This name is used to denote a kind of column whose capital is compounded of the Ionic and Corinthian forms; the vase or tambour of the capital being like that of the Corinthian order, and ornamented in the same manner, with two tiers of leaves, and with a similar abacus; but to these are added Ionic volutes which supply the place of the caulicoli and ferules, proper to the Corinthian capital. See the plates of capitals. In other respects, in the shaft base and entablature, there is no uniform and assignable difference between the Composite and Corinthian, and we shall, in a subsequent portion of this article, examine what claims this composite has to be considered as a distinct order.

The principal remains of antiquity in which the composite capital is found, are the following; the arch of Titus, the arch of Septimius Severus, and the arch of the goldsmiths, the building commonly called the Temple of Bacchus, without the gate of Sta. Agnes at Rome, the baths of Diocletian, the Baptiterium of Constantine, which is ornamented with porphyry columns of the most exquisite workmanship, removed from some more ancient edifice; the arch at Verona, and the chapel or basilica at Nismes.

This capital was therefore very popular among the Roman architects, but it does not by any means appear that they admitted a distinct composite order. A passage of Vitruvius will throw some light upon this point; this author, after describing the capitals of the Doric, Ionic, and Corinthian orders, proceeds to observe, that "there are also other kinds of capitals called by various names, which are disposed on the same columns, and which have no proper symmetry or relation to any separate order of columns, but they are all derived and transferred from the Corinthian, Pulvinate (Ionic) or Doric orders, from whose symmetries they only differ in the little novelties of the sculpture." In fact, the remains of Roman antiquity furnish a vast variety of capitals, many of which are more remarkable and remote from the usual orders, as well as more beautiful than the composite capital, and yet no architect has ever thought of erecting any of these into distinct orders. The capitals of the Temple of Concord at Rome, a very entire and considerable remain, are composite, being a mélange of the Ionic and Doric; but no one has claimed the honours of an order for this strange production.

The difference between the pretended Composite order and the Corinthian, exists merely in the capital; for neither in the remains of antiquity, nor in the works of modern artists, is there any decided, uniform, and characteristic difference in any other particular. But the capital, though an important member, is not of itself sufficient to form an order, otherwise we should reckon not five but hundreds; and a composition which has no appropriate proportions, no exclusive character, can only be regarded as a variety of that order with which it is perpetually liable to be confounded. The equivocal nature of this production has caused great embarrassment to the system-mongers of architecture; for while its later origin would lead them to place it last in their systems, and highest in their buildings, its heaviness of appearance, in comparison with the Corinthian order, seems to indicate a contrary arrangement. It is unnecessary; for the three Grecian orders supply all the expressions which architecture is capable of giving with distinctness. The Doric is strong, the Ionic elegant, and the Corinthian rich;

while they admit all the modifications of these qualities that can be required; but as to the Composite, what is it but an exaggeration of the Corinthian, in which the attempt at superior richness has only produced a degree of heaviness.

It has been before observed, that the Romans affected no particular entablature to the composite capital. In the temple of Bacchus the cornice is entirely plain, with a swelled frieze. The arch of Septimius Severus has a cornice enriched with dentils extremely similar to the Ionic of the temple of Fortuna Virilis, and the theatre of Marcellus; while the cornices of the arch of Titus, and the arch at Verona have both dentils and modillions, and the whole profile of the entablature is precisely in the style of the generality of Corinthian examples. Among the moderns, Palladio has imitated the frontispiece of Nero in his cornice and architrave; but he has omitted its beautiful frieze, and substituted a swelled one. Scamozzi's entablature being only one-fifth of the column, and much divided, has rather a trifling appearance, though the details are upon the whole well designed. Vignola's composite has nothing in it remarkable; the architrave differs but little from that of the frontispiece of Nero, and the cornice is nearly the same with that of his Ionic order. Serlio's entablature is extravagantly absurd, being taken from the fourth order of the coliseum, a composition well enough adapted for the termination of that gigantic edifice, but wholly disproportionate to a single order.

COMPOSITE STALK. See **STALK**.

COMPOSITIO MENSURARUM, the title of an ancient ordinance for measures, not printed; it is mentioned in the statute of 23 Hen. VIII. cap. 4.

COMPOSITION, in a general sense, is the uniting or joining of several different things, so as to form one whole, called a *compound*.

The schoolmen distinguish two kinds of composition; the one *entitative*, which is between things of the same nature, *e. g.* two or more drops of water: the other *essential*, when things of different kinds are joined, and thus constitute new things, or essences, different from any of the parts: and thus, say they, from the matter and the form of wood, arises wood; whose essence is very different from either of those ingredients taken separately.

COMPOSITION OF BODIES, in *Chemistry*. See **COMBINATION** and **AFFINITY**.

COMPOSITION, in *Commerce*, a contract between an insolvent debtor and his creditors; whereby the latter agree to accept a part of the debt, in compensation for the whole, and give a general acquittance accordingly.

COMPOSITION FOR TREES, in *Gardening*, a substance discovered, prepared, and applied by Mr. Forsyth, for the purpose of removing diseases, defects, and injuries in fruit and forest-trees. It is directed to be composed in the following manner, in his "Treatise on the Management of Trees."

"Take one bushel of fresh cow-dung, half a bushel of lime-rubbish of old buildings (that from the ceilings of rooms is preferable), half a bushel of wood-ashes, and a sixteenth part of a bushel of pit or river-sand; the three last articles are to be sifted fine before they are mixed; then work them well together with a spade, and afterwards with a wooden beater, until the stuff is very smooth, like fine plaster used for the ceilings of rooms."

It is advised that the trees should be prepared for its application "by cutting away all the dead, decayed, and injured parts, down to the fresh sound wood; leaving the surface of the wood very smooth, and rounding off the edges of the bark with a draw-knife, or other instrument, perfectly

fully smooth, which must be particularly attended to; then lay on the plaster about one eighth of an inch thick all over the part where the wood or bark has been so cut away, finishing off the edges as thin as possible; then take a quantity of dry powder of wood ashes mixed with a sixth part of the same quantity of the ashes of burnt bones, put it into a tin box with holes in the top, and shake the powder on the surface of the plaster, till the whole is covered over with it, letting it remain for half an hour to absorb the moisture; then apply more powder, rubbing it on gently with the hand, and repeating the application of the powder till the whole plaster becomes a dry smooth surface."

And he adds the following directions.

"All trees cut down near the ground should have the surface made quite smooth, rounding it off in a small degree as before-mentioned; and the dry powder directed to be used afterwards, should have an equal quantity of powder of alabaster mixed with it, in order the better to resist the dripping of trees and heavy rains."

Such parts or portions of the composition as may be left for a future use "should be kept in a tub or other vessel, and urine of any kind poured on them, so as to cover the surface; otherwise the atmosphere will greatly hurt the efficacy of the application."

And "where lime-rubbish of old buildings cannot be easily got, take pounded chalk, or common lime, after having been flaked a month at least."

It is further remarked by the author, that "as the growth of the tree will gradually affect the plaster, by raising up its edges next the bark, care should be taken, when that happens, to rub it over with the finger when occasion may require (which is best done when moistened by rain), that the plaster may be kept whole, to prevent the air and wet from penetrating into the wood."

But "as the best way of using the composition is found, by experience, to be in a liquid state," Mr. Forlyth advises that it should "be reduced to the consistence of pretty thick paint, by mixing it up with a sufficient quantity of urine and soapuds, and be laid on with a painter's brush. The powder of wood-ashes and burnt bones is to be applied as before directed, patting it down with the hand."

It is also further advised, that "when trees are become hollow, to scoop out all the rotten, loose, and dead parts of the trunk to the solid wood, leaving the surface smooth; then to cover the hollow, and every part where the canker has been cut out, or branches lopped off, with the composition; and as the edges grow, to take care not to let the new wood come in contact with the dead, part of which it may be sometimes necessary to leave; but to cut out the old dead wood as the new advances, keeping a hollow between them, to allow the new wood room to extend itself, and thereby fill up the cavity, which it will do in time, so as to make it as it were a new tree."

And if the cavity be large, to cut away as much at one operation as will be sufficient for three years. But in this to "be guided by the size of the wound, and other circumstances. When the new wood, advancing from both sides of the wound, has almost met, to cut off the bark from both the edges, that the solid wood may join, which, if properly managed, it will do, leaving only a slight seam in the bark. If the tree be very much decayed, not to cut away all the dead wood at once, which would weaken the tree too much, if a standard, and endanger its being blown down by the wind. It will consequently be necessary to leave part of the dead wood at first, to strengthen the tree, and to cut it out by degrees as the new wood is formed. If there be any canker, or gum oozing out, the infected parts must be pared

off, or cut out with a proper instrument. When the stem is very much decayed and hollow, it will be necessary to open the ground and examine the roots." See DRESSING of Trees.

Various interesting facts and observations on the advantage and utility of this composition in the removal of the diseases of different sorts of trees, may be seen below, as taken from Mr. Forlyth's valuable "Treatise on the Culture and Management of Fruit and Forest Trees."

It is stated by Mr. Forlyth as being "the received opinion and common practice of most professional men, to prune or lop their trees, from the month of October, when the juices have been exhausted by the summer foliage, autumnal fruit, and general nourishment of the body of the tree, until the month of March, when the sap or juices, re-invigorated by nature during the winter's repose, begin to re-ascend and perform the annual function of clothing it with fresh foliage, blossoms, and fruit. The reason of this practice is, he says, that the sap being fallen at that season of the year, it has been considered as the most proper period to lop off all superfluous growths, and the efforts of nature to heal the wounds thus necessarily given (before the rising of the sap in the following spring), have been judged best for the safety and health of the tree. The danger of performing this service when the juices are in a more vigorous flow, as in the months of May, June, and July, has been dreaded, from a fear of its occasioning a waste of the nutritive juices, discharging themselves through the wound, to the impoverishment and injury, if not the ruin of the tree." And it is added, that "the pruning of fruit-trees, and the lopping off large branches from forest-trees during the winter season, has also been frequently attended with great hurt and impediment to their health and vegetation; the wounds being exposed to all the rigours of an inclement season, and thereby contracting those diseases which contain the principles of decay. Hence it is, that such numbers of forest-trees are continually injured in their value for public uses, either by unskillful management, or purposeful depredation, or by the violence of boisterous winds, when their limbs and branches being torn off, the trees are left in that unprotected state to imbibe the seeds of decay and rottenness, which will in time pervade their very heart, and render them unfit for any of those valuable purposes for which nature, by their frame and texture, appears to have designed them." And "it may also be observed, that where branches have been cut off from the body of the tree, even at the distance of two or more feet from the trunk, with a view to prevent injury to the timber, even that method has not been found effectual to save the tree from very material detriment; as the remaining stem of the branch so cut away, dying soon after, becomes a ready conduit for conveying pernicious moisture and disease to that part of the tree with which it is connected; and so on, in time, to the whole."

But he supposes "the practice of others in lopping their trees close to the trunk, and dressing the part smooth and even, has less objections than the former; nevertheless, even according to this method, the tree is liable to injury. The effort of nature to heal the wounds thus given, discovers itself by encircling the wound with a kind of callus or lip, which increasing in size, and swelling out from the annual flow of the juices, forms a hollow or cavity of the central part, where the rain or snow is very apt to lodge; and penetrating between the bark and wood, dried and cracked by a hard frost, or a warm sun, promotes that fermentation with the natural juices, which is the certain source of disease and decay." It is suggested that "young, healthful, and vigorous

gorous trees, when they have been injured by being wantonly cut through the bark, or from other causes, will sometimes recover themselves, and, to all outward appearance, be restored to their original soundness; but when cut into planks and boards, internal blemishes and faults are discovered in them, which appear to have been occasioned by the early injuries which the tree had received; the texture of the wood not uniting where the wound was originally given; though, from the youthful vigour of nature, the bark has closed, and an external cure been evidently performed on such trees.

The composition is a most efficacious remedy to prevent these evils with all their destructive consequences, and to restore sound timber where the symptoms of decay are already apparent, which being applied in the manner directed, "to the wound or injured part, will infallibly prevent the bleeding of trees, or the oozing of juices through the wounds of limbs or branches that have been cut off in the middle of summer, when they are in their highest vigour, and most rapid flow of vegetation; by which means, any wretched discharge of the juices is prevented, and they are duly confined to their natural operations of giving nourishment, growth, and fertility, to their respective bodies. By employing this remedy, trees of all kinds, whether in gardens or orchards, in parks or forests, may, he says, with greater safety and advantage be pruned or lopped in the spring, or early in the summer, than in the winter season; as the composition, when properly applied, repels the flow of the juices through the wound, causes a more active vegetation, and assists nature more powerfully in healing the wound at the time the sap is in full vigour, than when it is on the decline, as in autumn and winter seasons."

The writer considers it also necessary to remark, further, "that both fruit and forest-trees (particularly those which grow in the shade) are very liable to be affected with disorders proceeding from the growth of liverwort, and various kinds of moss, that adhere to the outer bark of the tree, and frequently gain a considerable thickness, that not only prevents the natural flow of the juices, but causes a stagnation in the circulation and brings on decay; which, after destroying the outer bark, penetrates by degrees deeper into the wood. Where this circumstance is observed, care should be taken to clear the whole bark of the tree from these growths; and where it is infected, to scrape or pare it away. When the body of the tree is thus cleansed from infection, the composition may be applied to the parts so cleansed, to close the pores of the wood; when the tree will soon acquire a fresh bark, and improved health and vegetation."

The author is "confirmed in these opinions by the many experiments and various trials that he has made, to ascertain, by the most positive proofs, the properties of this composition, before he ventured to offer it to the public attention." "Indeed, every year's experience has increased his conviction of its general utility, when properly applied to the purposes for which it is recommended." In order to give a more complete illustration of its virtues, and to place the advantages arising from it in a stronger light, he states a few of the very numerous experiments that he has made on the forest trees in his majesty's gardens at Kensington, where the salutary effects of it are extremely evident.

It is remarked that "the first trials of its efficacy were made on some very large and ancient elms, many of which were in a most decayed state, having all their upper parts broken, by high winds, from their trunks, which were withal so hollow and decayed, that a small portion alone of the bark remained alive and sound. Of these trees he

cut away at first a part only of the rotten stuff from the hollow of the tree, and then applied the plaster to the place where the operation had been performed, by way of an internal coat. In a short time, however, the efforts of nature, with a renovated flow of the juices, were clearly discernible in their formation of new wood, uniting with and swelling as it were from the old, till it became a strong support to that part of the tree where the composition had been applied. He then cut away more of the rotten wood from the inside, applying the plaster in the same manner, with the same good effects, and continued to use the knife in proportion to the acquisition of new wood; so that from the tops of the decayed and naked trunks, stems have, he says, actually grown of about thirty feet in height, in the course of six or seven years from the first application of the composition; an incontrovertible proof of its good effects in restoring decayed vegetation in such cases."

And he adds, that "many other elm trees, which had received hurts from bruises and other causes, and where decay and decay were already evident, after cutting away all the infected part, and duly applying the plaster, were so completely healed, that the outline of the wound is scarcely discernible on the bark, and the new wood is as perfectly united to the old, as if it had been originally formed with the tree."

It is stated that "of oak trees also, which had received very considerable damage from various accidents, as blows, bruises, and cutting of deep letter, the rubbing off of the bark by the ends of rollers, or wheels of carts, and mutilated branches, a perfect cure has been made, and sound timber produced. The acidity, or corrosive quality of the juice of oak-trees, when obstructed in their circulation from any of the causes already mentioned, and fermenting with the wet and moisture imbibed by the wounds from the atmosphere, will bring on disease, and promote decay; for, notwithstanding the hard texture of the oak, when once the principles of decay begin to operate, the acrimonious juices feed the disease, and accelerate its progress, as much, perhaps, as in trees of a softer quality and texture, but when the diseased or injured part is entirely cut away to the fresh sound wood, and the composition properly laid on, as perfect a cure has been made as he has already related in the recovery of elm trees."

The writer likewise further states, that "various experiments have also been made on other forest trees, as ash, limes, chestnuts, and sycamores, that had received the several injuries to which they are exposed; as well as many of the resinous kinds, such as the cedar of Lebanon, and others of the pine tribe: in all of which he has experienced a degree of success that exceeded his most sanguine expectations. And as he feels a strong solicitude to render his experiments of the most extensive advantage to the community, and in particular to the proprietors of landed estates throughout the kingdom, he begs leave to recommend to their particular attention, that all forest trees, whether felled with a saw or an axe, may be cut near to the ground; at the same time carefully preserving the stump and roots from any further injury. The surface may then be made quite smooth, and the composition be spread over the whole, according to directions already given. But in these cases the composition should have an equal quantity of the powder of stibacter mixed with the dry powder generally directed to be used after it is laid on, in order to render the surface harder, and of course better able to resist the bad effects of the dripping of trees, of rain, frost, and snow; an addition which is by no means necessary in the usual application to the sides of trees." He concludes that, "in consequence of this pro-

ers, the vigour of the roots will operate so powerfully in the course of the succeeding spring, that a considerable number of buds or branches will shoot forth round the stump, which, with proper care and attention, may be trained to many valuable purposes, either straight or crooked, for knee timber, or other uses; and, by retaining only so many of these shoots as are designed to grow for any particular intention, more than one half will be saved, in point of time, according to the proportions of common growth; for, if a young tree be planted in a soil equal in quality to the state of the old stump, the roots growing from the latter will, in eight or ten years, attain to a size which the single plant will hardly acquire in twice that period. There are also many useful purposes of husbandry, as hop-poles and other poles used on various occasions, for which a number of shoots may be trained from one stump, whose fertile juices will shortly rear a healthy and numerous offspring around it. Very particular attention, however, should, he says, be paid to regulate the number, according to the size and vigour of the stump. It would certainly be proper to leave more of them at first than are intended to be reserved for final use, in order to draw up the sap; if too few are left, they will be liable to burst, from the superabundant flow of the juices from the old stock; to prevent which inconvenience they should be cut away by degrees, always applying the composition as they are cut, and leaving the stump to produce the new tree, and will, in time, cover the old stump, and leave nothing but a faint kind of cicatrix at the junction of the old and new part of the tree."

He thinks it "needless for him to insist on the great advantages which land proprietors and farmers will derive from this method of managing their woods and coppice-grounds, wherever they may be. In many counties of England, coppice, or underwood is an article in very great demand for charcoal, common fuel, or the purposes of particular manufactures, as well as to furnish a variety of articles for husbandry and domestic conveniences." And its advantages in a national as well as ornamental point of view, are still more obvious. See CANKER.

COMPOSITION, in *Grammar*, denotes the joining of two words together; or prefixing a particle to another word, to augment, diminish, or change its signification. See WORD, &c.

COMPOSITION, in *Law*, an agreement or contract made between the owner of lands and the parson or vicar, with the consent of the ordinary and the patron, that such lands shall for the future be discharged from payment of tithes, by reason of some land or other real recompence, given to the parson, in lieu and satisfaction thereof. Land may be exempted from the payment of tithes, where compositions have been made; and real compositions for tithes are to be made by the concurrent consent of the parson, patron, and ordinary. Real compositions are distinguished from personal contracts; for a composition called a personal contract is only an agreement between the parson and the parishioners, to pay so much instead of tithes; and though such agreement is confirmed by the ordinary, yet (if the parson be not a party) that doth not make it a real composition, because he ought to be a party to the deed of composition. (Marsh's Rep. 87.) This kind of composition was permitted by law, because it was supposed that the clergy would be no losers by such composition; since the consent of the ordinary, whose duty it is to take care of the church in general, and of the patron, whose interest it is to protect that particular church, were both made necessary to render the composition effectual; and hence have arisen all such compositions as exist at this day by force of common

law. But, experience shewing that even this caution was ineffectual, and the possessions of the church being, by this and other means, every day diminished, the disabling statute 13 Eliz. c. 10, was made, which prevents, among other spiritual persons, all parsons and vicars from making any conveyances of the estates of their churches, other than for three lives or twenty-one years. So that now, by virtue of this statute, no real composition made since the 13th Eliz. is good for any longer term than three lives, or twenty-one years, though made by consent of the patron and ordinary; which has, indeed, effectually demolished this kind of traffic; such compositions being now rarely heard of, unless by authority of parliament. See MODUS.

Composition is sometimes used for "decisio litis." Accordingly compositions were anciently allowed for crimes and offences, even for murder. By this expedient it was proposed to refrain the violence of private revenge. The custom may be traced back to the ancient Germans (see Tacit. de Mor. German. c. 21.) and prevailed in other uncivilized nations. The nature of crimes and offences was estimated by the magistrate, and the sum due to the person offended was ascertained with a minute, and often after a whimsical, accuracy. Rotharis, the legislator of the Lombards, who reigned about the middle of the 7th century, discovers his intention both in ascertaining the composition to be paid by the offender, and in increasing its value: it is, says he, that the enmity may be extinguished, the persecution may cease, and peace may be restored. About the beginning of the 9th century, Charlemagne struck at the root of the evil, and enacted, "that when any person had been guilty of a crime, or had committed an outrage, he should immediately submit to the penance which the church imposed, and offer to pay the composition which the law preferred, and if the injured person or his kindred should refuse to accept of this, and presume to avenge themselves by force of arms, their lands and properties should be forfeited." Tavernier relates, that in Persia, a murderer is still delivered to the relations of the person whom he has slain, who put him to death with their own hands; and if they refuse a sum of money as a compensation, the sovereign cannot pardon the murderer. Monteq. Sp. of Laws, vol. ii. p. 382. Robertson's Hist. of Ch. V. vol. i. p. 334, &c.

COMPOSITION, in *Logic*, is a method of reasoning, wherein we proceed from some general self-evident truth, to other particular and singular ones.

The method of composition, call'd also *synthesis*, is just the reverse of that of resolution, or *analysis*.

Resolution is the method whereby we ordinarily search after truth: composition, that whereby a truth found, is discovered and demonstrated to others; resolution is the method of investigation; composition, of demonstration.

The method of composition is that used by Euclid, and other geometers; resolution, that used by algebraists and philosophers. The two methods differ, just as the methods of searching a genealogy; which are either by descending from the ancestors to the posterity, or by ascending from the posterity to their ancestors: each have this in common, that their progression is from a thing known, to another unknown.

The method of composition is best observed by the mathematicians: the rules which are, 1. To offer nothing but what is couched in clear and express terms; and to that end, to begin with definition. 2. To build only on evident and clear principles; to that end, to proceed from axioms or maxims. 3. To prove demonstratively all the conclusions that are drawn hence; and to this purpose, to make use of no arguments or proofs, but definitions already laid down,

axioms

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axioms already granted, and propositions already proved; which serve as principles to things that follow.

COMPOSITION of ideas, is an operation of the mind, whereby it combines several of its simple ideas into complex ones.

Under the same operation may likewise be reckoned that of enlarging; whereby we put several ideas together of the same kind, as several units to make a dozen.

In this, as in others, brutes come far short of men; for though they take in and retain several combinations of simple ideas; as possibly, a dog does the shape, smell, and voice of his master; yet these are rather for many distinct marks whereby he knows him, than one complex idea, made out of those simple ones.

An ingenious writer has suggested the impropriety of the phrase "composition of ideas," adopted by Mr. Locke, alleging it is merely a contrivance of language, and that the only composition is in the terms; and that it is as improper to speak of a complex idea, as it would be to call a constellation a complex star. He further adds, that they are not ideas, but merely terms, which are general and abstract. Whatever, he says, the immortal author of the "Essay on Understanding," has justly concluded in his reasoning on this subject will hold equally true and clear, if we substitute the composition, &c. of terms, wherever he has supposed a composition, &c. of ideas. If upon strict examination this should appear to be the case, we shall need no other argument against the composition of ideas; it being exactly similar to that unanswerable one which Mr. Locke himself declares to be sufficient against their being innate. For the supposition is unnecessary: every purpose for which the composition of ideas was imagined being more easily and naturally answered by the composition of terms; whilst at the same time it likewise clears up many difficulties, in which the supposed composition of ideas necessarily involves us. This writer further adds, that it is an easy matter, upon Mr. Locke's own principles, and a physical consideration of the senses and the mind, to prove the impossibility of the composition of ideas. Tooke's Diversions of Purley, pt. i. p. 37, &c.

COMPOSITION, in *Mathematics*, is the taking of a given number of quantities, out of as many equal rows of different quantities, one out of every row; and combining them together. Here no regard is had to their places; and it differs from combination, in which there is but one row of things.

1. "The number of compositions of n things taken out of n rows, each row consisting of m things, is m^n , or the n^{th} power of m ."

Let there be any number of rows, such as a, b, c, d , those annexed. It is plain the number of single things as a, b, c, d , is m or m^1 .

Then the number of combinations of every 2 is had by joining each quantity in the second row to all the quantities in the first, which will make as many times m as there are things in the second row, or m times m , that is m^2 , for all the two's. Again, taking in the third row; there will be as many times m^2 , as there are things in the third row, that is, m times mm , or m^3 , for the composition of three things.

After the same manner, if a fourth row was taken in; all the combinations of every four would be m^4 , and so on; and, therefore, universally, when n rows are taken in, the number of combinations will be m^n , which is the number of compositions. Hence it follows, 1. That the number of compositions of

all the one's, two's, three's, &c. to n , is $\frac{m^n - 1}{m - 1} m$. For

$\frac{m^n - 1}{m - 1} = m^n + m^{n-1} + m^{n-2} + \dots + m + 1$. And $\frac{m^n - 1}{m - 1} m = m^n + m^{n-1} + m^{n-2} + \dots + m^2 + m$, as will appear by division, or, in general, $\frac{m^n - 1}{m - 1} m = m^n + m^{n-1}$, &c. to $m =$ compositions of all the one's, two's, three's, &c. to n .

2. Hence may be found the composition of n things out of m , as follows: Involve m to the n^{th} power for the answer.

E. G. 1. How many compositions may be had, of 3 letters out of 20?

Ans. $20^3 = 8000$. In this case there should be three different alphabets.

E. G. 2. How many changes are there on throwing four dice?

Ans. $6^4 = 1296$.

II. "If there be m rows of quantities given, having the same quantities, and the same number of them, as a, b, c, d , &c. to find the number of compositions of m things taken out of the m rows; for any given form of these quantities, as $a^1 b^0 c^0 d^0$, &c.

Rule. Put $V =$ variations of the things $a^1 b^0 c^0 d^0$; and $A =$ variations or alternations of the indexes, $1, v, w, x$. (SEE CHANGES AND PERMUTATION.) Then will $\Delta V =$ the number of compositions required.

For let the different rows in the last proposition be made all alike, or the first row a, b, c, d , m times repeated, as here. And let the number of things proposed be $a^1 b^1 c^1$, and first let the index 3 be fixed to a and 2 to b , &c. Now, since a^3 may be taken out of any three rows, and b^2 out of any two remaining rows; a, b, c, d , and c out of the last remaining row; therefore, there will be so many ways of taking these letters, as each of them can be placed in different rows, that is, in different places or situations; for the varying of the rows is the same thing as the varying of the places of the letters; and, consequently, the different ways of taking them out of the several rows is equal to the number of variations or permutations of these letters; which number is V . And this will hold as long as the indexes are fixed to these particular letters, and to none else. But since, in any one form, as $a^1 b^1 c^1$, that form will comprehend as many cases as there can be variations in shifting the indexes from one letter to another; therefore, there will be so many times V , as is the number of these variations, or alternations, of the indexes, 3, 2, 1; or, in general, of $1, v, w, x$; then ΔV will be the whole number of compositions, which that particular form will admit of.

Hence, 1. In any $a^1 b^0 c^0 d^0$, where the indexes are fixed invariably to their particular letters; the number of compositions V will be $= \frac{1 \times 2 \times 3 \times 4 \dots \text{to } m}{1 \cdot 2 \cdot 3 \dots 1 \times 1 \cdot 2 \cdot 3 \dots \text{to } v \times \&c.}$

2. If $n =$ the number of different letters in any form, $a^1 b^0 c^0 d^0$, &c.; then the whole number of compositions for that form will be $= \frac{1 \cdot 2 \cdot 3 \dots \text{to } n}{R \cdot S, \&c.} \times$

$\frac{1 \cdot 2 \cdot 3 \dots \text{to } m}{1 \cdot 2 \dots 1 \times 1 \cdot 2 \dots v \times \&c.}$ where $R = 1 \cdot 2$, or $1 \cdot 2 \cdot 3$, &c. according as any index is twice or thrice, &c. repeated; and the like for S , and so on.

E. G. 1. How many compositions are in the form $a^1 b^1 c^1$? Here $n = 3$, $m = 6$, $1 = 3$, $v = 2$, $w = 1$; and in this case there is no repetition of indexes.

$$\text{Ans. } 1 \cdot 2 \cdot 3 \times \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3 \times 1 \cdot 2} = 6 \times 60 = 360.$$

E. G. 2. How many compositions are in the form $a^2 b^2 c^2$? Here $n = 3$, $m = 5$, $l = 2$, $v = 2$, $w = 1$. The index 2 is twice repeated.

$$\text{Ans. } \frac{1 \cdot 2 \cdot 3}{1 \cdot 2} \times \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5}{1 \cdot 2 \times 1 \cdot 2} = 3 \times 30 = 90.$$

E. G. 3. To find the compositions in the form $a^3 b^3$. Here $n = 2$, $m = 6$, $l = 3$, $v = 3$, $w = 0$. The index 3 is twice repeated; and the letters a, b thrice.

$$\text{Ans. } \frac{1 \cdot 2}{1 \cdot 2} \times \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3 \times 1 \cdot 2 \cdot 3} = 1 \times 20 = 20.$$

E. G. 4. To find the number of compositions of the form $a^3 b^3 c^3 d^3$. Here $n = 4$, $m = 10$, $l = 3$, $v = 3$, $w = 2$. The index 3 is twice repeated, and also the index 2. The letters a, b are thrice repeated; and c, d twice.

$$\text{Ans. } \frac{1 \cdot 2 \cdot 3 \cdot 4}{1 \cdot 2 \times 1 \cdot 2} \times \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10}{1 \cdot 2 \cdot 3 \times 1 \cdot 2 \cdot 3 \times 1 \cdot 2 \times 1 \cdot 2} = 6 \times 25200 = 151200.$$

E. G. 5. How many compositions in the form $a^4 b^3 c^2 d^2 e^2 f^2$? Here $n = 6$, $m = 14$, $l = 5$, $v = 3$, $w = 1$. The index 3 is twice repeated, and the index 1 thrice: the letter a five times repeated; and b and c thrice.

$$\text{Ans. } \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3 \times 1 \cdot 2} \times \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10 \cdot 11 \cdot 12 \cdot 13 \cdot 14}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \times 1 \cdot 2 \cdot 3 \times 1 \cdot 2 \cdot 3} = 60 \times 20180160 = 1210809600.$$

So prodigiously do the numbers increase in these operations. See COMBINATION and COMPOSITE numbers.

COMPOSITION of motion, in *Mechanics*, is an assemblage of several directions of motion, resulting from powers acting in different, though not opposite lines.

If a point move or slow according to one and the same direction, whether that motion be equable or not, yet it will still keep the same right line; the celerity alone being changed, *i. e.* increased, or diminished, according to the forces with which it is impelled. If the directions be opposite, as one, *e. gr.* directly downward, the other upward, &c. yet still the line of motion will be the same.

But if the compounding motions be not according to the same line of direction, the compound motion will not be according to the line of direction of any of them, but in a different one from them all; and this either straight or crooked, according as the direction or celerities shall require.

If two compounding motions be each of them equable, the line of the compound motion will still be a straight line; and this, though the motions be neither at right angles one to another, nor equally swift, nor (each to itself) equable; provided that they be but similar; that is, both accelerated and retarded alike.

Thus, if the point a (*Pl. XV. Mechanics. fig. 1.*) be impelled equally with two forces; *viz.* upwards, towards b , and forwards, towards d ; it is plain, that when it is gone forwards as far as ac , it must of necessity be gone upwards as far as ce ; so that were the motions both equable, it would always go on in the diagonal ace .

Nay, suppose the motions unequal as to celerity, *v. gr.* as that the body move twice as fast upwards as forwards, &c. yet still it must go on in the diagonal ac ; because the triangles acc , acc , &c. and acd will still be similar, being as the motions are: and it will have described the diagonal in the same time which it would have required to describe either of the sides singly.

But, if the motions be dissimilar, then the compound motion must be a curve.

And, if a body, as b (*fig. 2.*) be impelled or drawn by

three different forces, in the three different directions $ba, bc,$ and bd . so that it yields to none of them, but continues in *equilibrium*; then will those three powers or forces be to one another, as three right lines drawn parallel to those lines, expressing the three different directions, and terminated by their mutual concourse.

Let bc represent the force by which the body b is impelled from b to c ; then will the same right line bc represent also the contrary equal force, by which it is impelled from b to e : but by what hath been said before, the force bc is resolvable into the two forces acting according to the two directions bd and bc , to which the other impelling from b to e , is as bc to bd , and bc or de , respectively.

So likewise two forces, acting without the directions bd, bc , and being equipollent to the force acting without the direction bc , from b to e ; will be to the force acting according to the direction bc , from b to e , as bd, bc , to bc ; and therefore, the forces acting in the directions bd, bc , and equipollent to the force acting in the direction bc , are to the force acting in the direction bc , as bd, bc , or de , to bc : that is, if a body be urged by three different equipollent powers in the directions ba, bd , and bc ; these three forces shall be to one another as bc, bd , and de , respectively.

This theorem, with its corollaries, Dr. Keill observes, is the foundation of all the new mechanics of M. Varignon: by help of which may the force of the muscles be computed, and most of the mechanic theorems in Borelli, *De Motu Animalium*, be immediately deduced. See MOTION.

COMPOSITION of proportion.—If there be two ratios, wherein the antecedent of the first is to its consequent, as the antecedent of the other is to its consequent; then, by composition of proportion, as the sum of the antecedent and consequent of the first ratio, is to the antecedent, or the consequent, of the first; so is the sum of the antecedent and consequent of the second ratio, to the antecedent, or the consequent, of the second.

E. gr. If $A : B :: C : D$; then by composition, $A + B : A$ or $(B) : C + D$ or (D) . See PROPORTION.

COMPOSITION of ratios, in *Arithmetic* and *Algebra*, is performed by multiplying the quantities or exponents of two or more ratios together; the product is then said to be compounded of the ratios whose components were multiplied. Thus, if the quantities or exponents of the ratios a to b , c to d , e to f , be multiplied, we shall have

$$\frac{a}{b} \times \frac{c}{d} \times \frac{e}{f} = \frac{ace}{bdf}. \text{ And the ratio } ace \text{ to } bdf, \text{ is then said to be compounded of the several ratios } a \text{ to } b, c \text{ to } d, e \text{ to } f, \text{ \&c. Thus also the ratio of } 10 \text{ to } 12, \text{ is compounded of the ratio } 2 \text{ to } 3, \text{ and of } 5 \text{ to } 4; \text{ for } \frac{2}{3} \times \frac{5}{4} = \frac{10}{12}.$$

This operation is by some called *addition* of ratios. See RATIO.

COMPOSITION, in *Musick*, implies harmony, music in different parts, according with each other; and by the mixture of concords and discords embellishing melody, and communicating at once, to a well organized ear, the double delight arising from the union of the two great constituent ingredients in music, MELODY and HARMONY. To be able to write down or dictate a melody or single part, does not exalt its author to the rank of composer; though many have assumed that title, who have not been possessed of science sufficient to make a base to a ballad or minuet.

As the term *composition* implies the union of various ingredients we shall endeavour in the important article COUNTERPOINT,

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TERPOINT, from our own knowledge, and from the precepts and practice of the greatest masters of the art, to describe these ingredients, and point out their legitimate use. See **COUNTERPOINT**, which is so nearly synonymous with *Composition*, that we know not how to separate them.

We take it for granted, before a musical student is inflamed with the ambition of becoming a *composer*, that he is perfectly acquainted with the elements of the art; that he has read, or at least heard, the principal productions of great masters; that he knows intervals, and their relation to the key note and distance from every other sound of the scale. See **SCALE** and **INTERVAL**. That he knows the different measures or kinds of time in music, nor is unacquainted with rhythm, nor where the accents of each bar should be placed. See **TIME**, **ACCENT**, and **MEASURE**. That he knows and feels the difference between concords and discords; is offended with false intonation, and instruments out of tune; feels something wrong in the regular succession of two sharp 3ds or 6ths; two 5ths or two common chords rising or falling one degree; that he knows the compass and genius of the voice or instrument for which he writes. But we must not take too much for granted, or, in order to save ourselves trouble, tease our readers with too many references to articles connected with *composition*; we shall therefore refer our readers to the article *Counterpoint*, (which we have laboured with great zeal) for the mechanical rules of composition; first reminding the young student, that the scale of eight notes ascending and descending, which represents the whole system in a major key, consists of 5 tones and 2 semitones, the 8th note being a recurrence of the same letter, and nearly the same sound, is included in the same harmony as the key note or principal base.

Keys are denominated major or minor, sharp or flat, from the situation of the semitones. Let C ♯ represent all major keys, and A ♯ the minor. In the major keys, the two semitones lie from the 3d to the 4th, and 7th to the 8th; and in minor keys, from the 2d to the 3d, and 5th to the 6th, ascending in the major, and to avoid accidental sharps, ascending in the minor, thus:

Major key. Ascending.

Minor key. Descending.

A sharp or flat at the clef, or an accidental sharp or flat in the middle of a melody, changes the place of the first semitone; and two sharps or two flats change the place of both,

Of these eight notes, some are termed *concords*, and some *discords*. Of the concords, some are *perfect*, and cannot be changed by an accidental sharp or flat, without becoming discords. These are the 4th, 5th, and 8th, which furnish, when used in the lower part of the scale, a base to the regular ascent in the treble. See **SCALE**, **FUNDAMENTAL BASE**, and **COMPOSER**.

COMPOSITION, in *Oratory*, the order and coherence of the parts of a discourse.

As a part of general *elocution*, (which see) it regards the turn and harmony of the periods: and therefore to *composition* be-

long, both the artful joining of the words, whereof the style is formed, and whereby it is rendered soft and smooth, gentle and flowing, full and sonorous; or the contrary: and the order, which requires things first in nature and dignity, to be put before those of inferior consideration.

Composition consists of four parts: which rhetoricians call **PERIOD**, **ORDER**, **JUNCTURE**, and **NUMBER**, which see respectively. Ward's *Oratory*, vol. i. p. 340.

COMPOSITION, in *Painting*, is that great and important requisite, the knowledge of which enables the artist to dispose all the various objects in his picture, as required by the subject, and furnished by the imagination or invention, in such a manner as to render them, individually and collectively, most conducive to the beauty, the effect, and the expression of the whole work. The objects furnished by the imagination or invention, may be considered as so many unmanufactured materials, which the science of composition teaches us to work up and display, as the peculiar circumstances of each case may require. Composition, in its general sense, may, therefore, be styled the ground-work of painting, upon which the superstructure, expression, design, chiaro-scuro, and colouring, in a greater or less degree depend; and the science of it opens a wide field for our consideration, as it supposes not only the knowledge of all the various combinations or contracts of lines and forms, which are calculated to produce agreeable or striking effects in general, but likewise, that judicious choice in their selection which may be most applicable to the distinguishing character and expression of each subject or work in particular. Composition, thus contemplated, is no longer confined to the artificial pyramid or the forced contrast, but embraces every possible diversity of arrangement and distribution, from the artist's simplicity of Giotto and Masaccio, to the most studied and complex grouping of Buonarroti and Rubens.

In treating this subject we shall follow the same method which we pursued in our inquiries respecting *clair-obscur* and colouring. We shall commence by taking a cursory view of the style of the first restorers of painting, then trace the principles and systems of composition at different periods introduced by their successors, and conclude by recommending such examples, and such precepts, as we conceive may be most calculated to insure the student's improvement.

The efforts of the early artists, Cimabue, Giotto, and their school, were entirely directed to one great point, the appropriate expression of the story to be represented; every kind of artifice was to them unknown, and their pictures may be compared to the simple unembellished diction of the rude but faithful historian, or to the wild but uncouth strains of the untutored muse. These old painters, in their scriptural or ecclesiastical representations in the churches of Italy, seem to have considered the art in no other light than as a means by which to conduce to the devotion of the people, and as they really believed the truth of those stories which they endeavoured to represent, (upon which perhaps a great deal depends), so they described every incident exactly as they supposed, or had been taught by tradition to believe, it had taken place. In their pictures of the Madonna, styled in the Roman church, the Mother of God, and in their attempts to give the image of that eternal being which man never saw, the effect was rendered more awful and impressive by the introduction of choirs of angels and saints, in regular order, disposed on each side and behind the throne; a more picturesque distribution of figures may be found, it is true, in the large altar pictures of the more modern painters, Carlo Maratti, Luca Giordano, and others; but then

solemnity and dignity are sacrificed, where the Virgin Mary, with the saints and angels, her attendants, seem huddled together with as little decorum, as if a group of beggar children, at play in the street, had been the subject to be represented.

In all those pictures of the old painters, which may be more particularly styled devotional, we perceive an attempt to elevate the mind of the spectator to the contemplation of celestial enjoyments; in the pictures of the moderns, beginning from the death of the divine Raffaele, artifice is too apparent, and the subject seems too frequently to have been made subservient to the desire of the painter to display his own academic acquirements. Nature alone seems to have been the preceptress of the old painters in composition, and hence that variety, and at the same time that simplicity in their works which we so much admire; but as they were extremely deficient in many necessary parts of the art, and particularly in the: three, drawing, perspective, and chiaro-obscuro, it is not surprising if, in the eyes of curious observers, their pictures have alone to boast the merit of antiquity, and that interest which is necessarily attached to the early efforts of man in every branch of study.

Instances, however, may be found, even in the works of the oldest painters, of compositions uniting at once propriety of expression, with beauty of disposition: amongst the numerous frescoes of Cimabue still remaining in the church of St Francis, at Assisi, there is in particular one, representing a dead Christ with the Marys and other figures, where, the subject naturally allowing of it, the artist has given such an agreeable form to the groups, by introducing around the recumbent figure of our Lord, the varied attitudes of figures kneeling and standing, as to leave little to be desired, save a greater perfection in the executive and mechanical parts of the art.

The works of Giotto, the scholar of Cimabue, may be studied with abundant advantage as to invention and composition. The church of Assisi, above-mentioned, possesses an extensive series of the frescoes of this extraordinary child of nature, representing stories of the life and miracles of St. Francis; here the compositions, though ever subservient to the expression of their subjects, are in some instances so beautifully grouped, as to leave it almost doubtful whether, in this respect, they ever were surpassed even by the best artists of later periods. One of these represents the story of a nobleman of dissolute character, who having heard of the fame of St. Francis, invited him and his companion, another friar, one day to his table. The holy conversation of the saint had such influence on the nobleman, that he made to him a full and contrite confession of his sins, when, after receiving absolution, he instantly fell down and expired. Giotto has seized this moment. The women, relatives of the deceased, the attendants, all flock, with varied expressions of grief, astonishment, and terror, to the corner of the picture where he lies; an elderly man, (thereby forming the connection between this group and the other) is represented imploring the interposition of St. Francis, who, rising from his seat, seems to pity their sorrow, at the same time that he endeavours to alluage it by the consolatory assurance that the sins of their master are forgiven, and that his spirit is in peace. The friar alone, accustomed to behold miracles, sits unmoved.

In another of these frescoes, Giotto has represented the moment, when, after the death of St. Francis, his body was carried, in the way to the place of burial, to the convent of Sta. Clara. The bearers of the body, surrounded by a concourse of people, have rested the bier on the ground: Sta. Clara is taking a last look at the face of him, who, in her youth, she so much loved, one of the nuns is

kissing the feet of the departed saint, a second bathes his hand with her tears, whilst others, with a gracefulness and tenderness of expression not to be surpassed, are advancing from the three doors of the church to pay these last duties to the object of their affection and veneration. The church itself, beautifully enriched with alto-relievs, gives the most agreeable termination to the group.

We shall mention one more of this series of pictures, which, though not in point of beauty equal to the two first described, is applicable to our present purpose as it strongly exemplifies how much a proper disposition of the groups in a picture contributes to the expression of the subject. The story represented is a miracle which took place some time after the death of St. Francis.

A woman from some cause or other died without making a full confession; she had, however, upon the whole been a good catholic, and especially devoted to St. Francis; the saint therefore made intercession for her, and when the priest with his attendants were upon the point of carrying the body to the grave; she, to the great astonishment of all present, sat up, called a confessor who was present by name, revealed to him her hidden sins, and then once more died and was buried. In the middle of the picture is represented the woman sitting up on her bed, in the act of confessing to a friar, who at once unites in his countenance the strongest expression of terror with the most earnest attention; some women, the friends of the deceased, and a child, form a group on the right; the priest and his attendants are on the left; both these groups are kept at a distance from the two principal figures, in the centre, by which the idea of secret confession, a leading point in the story, is more decidedly given, than could have been accomplished by any other manner of placing the figures. The intercession of St. Francis to our Saviour is represented in the sky; and a little below, the effect of that intercession is unequivocally described, by the introduction of a celestial agent, who is driving before him the infernal spirit, by which the woman is supposed to have been possessed.

Amongst the principal scholars of Giotto we may enumerate, Taddeo Gaddi, and Puccio Capanna: of the former many admirable frescoes are still existing in the church and sacristy of Sta. Croce, and in the cortile of Sta. Maria Novella at Florence, and of the latter, great part of the roof or vault, besides two excellent compositions of the taking down from the cross and the burial of Christ, on the side wall of the lower church of St. Francis at Assisi.

However, the school of painting founded by Cimabue and Giotto, continued with but little variation or advancement, till about 1430, when Masaccio distinguished himself by a correctness and perfection of imitation, hitherto unknown. He began to shew a just notion of perspective, and first succeeded in fore-shortening the feet of his figures, so as to give them the true appearance of standing on an horizontal plane; a difficulty never surmounted by his predecessors, whose figures, except when in profile, beamed generally, as if standing on tip-toe. He gave a greater breadth of light and shadow to his groups, and was an excellent colourist; and the heads of his figures are so finely drawn, so full of nature, and finished with such a delicacy and at the same time such a mellowness of pencil, as to be scarcely surpassed by the finest portraits of Raffaele, Titian, or Del Sarto. In all the executive parts of the art, Masaccio eminently excelled; but we cannot join in the opinion of those who consider him as having equally contributed to the advancement of composition: his aim was to make the most correct possible transcript of the model before him; hence

hence his frescoes, in the celebrated chapel at the Carmine, abound with admirable representations of his friends and contemporaries, portraits that seem almost alive, but they are not always alive to the subject, nor do they express by their actions or gestures, those feelings which the act of which they are represented as spectators, should naturally awaken in them; in the miracle of the boy restored to life by St. Peter, and in the martyrdom of the same saint, the surrounding figures seem no more afflicted than so many indifferent persons met together in the market place, to talk over the ordinary news of the day. However this work of Masaccio greatly contributed to hasten the great era of painting which followed, by exhibiting to contemporary and succeeding artists, a model much more perfect, at least as to the executive parts of the art, than they had hitherto been accustomed to contemplate. Much has been said as to the plagiarisms of Raffaele from this work. The Adam and Eve driven out of paradise in the Loggia of the Vatican, is certainly an improved transcript of that of Masaccio, and the Saint Paul preaching at Athens in the cartoon, bears some resemblance, it must be allowed, to the figure of the same saint visiting St. Peter in prison in Masaccio's chapel; but if Masaccio furnished the body of the saint, it was necessary that the great Raffaele should animate it with the energy of his own soul, ere it could convey the idea of that irresistible torrent of eloquence, by which the apostle combated and overthrew the sophisms and superstitions of his audience at the Atrypagus.

The immediate followers of Masaccio were blind to his greatest excellence, and instead of that mellowness and breadth which we find in his works, adopted a style of execution more crude and unharmonious, than even that of the more early painters; design, however, made a rapid advancement, which, added to a competent knowledge of perspective, now become general, gave to Luca Signorelli, and others of genius, the means of embodying those bold conceptions, which as yet no one had hoped to transmit to the canvass.

The chapel which Signorelli painted in the cathedral church of Orvieto with stories of the End of the World, the Last Judgment, Paradise, Hell, &c. is fraught with the most novel and daring fore-shortenings, energetic expressions and finely contralled groups, inasmuch that the great Michelangelo, is said to have derived benefit from the study of this work, previous to his painting the celebrated Last Judgment in the papal chapel at Rome.

In this work, however, the composition, though fine in its separate parts or groups, is not always judicious in the whole; that essential part of theory, which teaches the artist the policy or necessity of making many small parts of his picture subordinate to the principal figure or chief group, yet remained to be known, nor was it for a long time sufficiently understood, that the great distinguishing prerogative of painting, and that from which arises its decided advantage over every other artificial mode of representation, is its power to give upon a limited plane the appearance of boundless space. Thus, in those two compartments in particular, in which the artist has represented Paradise and Hell; much effect is lost by the figures and groups being ranged as it were in one line parallel to the plane of the picture; and this seems the more surprizing, as in one or two of the other compartments, and especially in that describing the End of the World, and the Destruction of the Wicked by Fire from Heaven, a most happy and striking distribution of the figures into different groups, and on different planes and distances, is to be observed.

Of Domenico Ghislandajo, the master of Michelan-

gelo in his youth, it may be well to note, that although he merited, in the opinion of many, the reputation of being the best painter of his time, yet the style of composition adopted by him in his great work in the tribuna of the church of Sta. Maria Novella at Florence, is by no means such as to rank him amongst those artists whose performances may be studied with profit, as to the branch of art we are now treating of; unless, indeed, that the contemplation of their manifold faults in this particular, may tend to deter the student from pursuing a similar line of conduct. The subject is here made subservient to the rage of the painter for displaying his talents in portrait; these frescoes containing striking resemblances of almost every lord, lady, or literary character of distinction of his time; and as the figures are throughout dressed in the dresses of the time, so this work is valuable, as giving perhaps the best idea of the costume of Florence towards the end of the fifteenth century, of any in existence; add to this, that the whole is admirably executed; but the spectator may long dwell on the various beauties of this work ere he discovers that it is intended to represent the principal stories of the New Testament!

The happy era was, however, fast approaching, when the profound Lionardo, the great Michelangelo, and the divine Raffaele, were destined, not only to unite all the various excellencies of the old painters, but likewise, by an unparalleled and happy exertion of comprehensive and elevated genius, at once to carry all those parts of the art, which most ennoble it, to a height of perfection beyond which the efforts of succeeding artists have never enabled them to reach; if indeed they have ever approached it in the four great points of invention, composition, expression, and design.

It was about the year 1503 that the Florentines formed the idea of decorating their great hall of council with productions of the pencil. Upon this occasion Lionardo da Vinci executed in a cartoon the astonishing Group of Horsemen fighting for the Standard, so well known by the fine print of Edcluk; a composition replete, but not crowded, and which exhibits the utmost energy of action, without extravagance, and the most striking and beautiful variety of contrast, without affectation: this was Raffaele's model for the intricate groups in his "Battle of Constantine," and is the great prototype of all those battles and huntings so daringly executed by the bold pencil of Rubens. That Da Vinci at the age of fifty should have so far surpassed the efforts of preceding painters is, however, less a matter of surprize, than that the youthful Buonarroti, who entered the lists with him, should, as agreed by contemporary writers, have borne away the palm.

The subject chosen by Michelangelo for his cartoon, related to the war between the Florentines and Pisane: the moment taken was an imaginary one, when some of the Florentine soldiers, who had been bathing in the Arno, are hastening out of the river upon the signal of attack, buckling on their armour, and rushing to the assistance of their countrymen, who had already commenced the combat in the distance. This subject naturally embraced a very great variety of character, action, and expression, and was certainly most happily calculated for displaying academic acquirements, and especially that knowledge of the human figure which Michelangelo is universally allowed to have possessed in a greater degree than any other artist of modern times, and which, amongst the Florentine painters, was considered as at least paramount to all the other parts of the art put together. It is perhaps to this last circumstance that we must attribute the very decided pre-eminence given

given to the "Cartoon of Pifa" (as it was called) over that of Lionardo, and which soon after occasioned his quitting his native city in disgust.

Considering these two celebrated works in every other respect, it would be a difficult task to determine to which belonged the preference. The figures in Da Vinci's group, it is true, were somewhat disguised by the introduction of capricious ornaments on their armour; but, on the other hand, the Cartoon of Buonaroti wanted that breadth of chiaro-scuro which that of his rival possessed. Each, however, in its way, is a masterpiece for invention, composition, design, and expression; and each, in its kind, perhaps still remains unrivalled. We refer the reader to a very animated description of the "Cartoon of Pifa" in the third Lecture delivered by Mr. Fuseli to the students of the Royal Academy.

The subjects which Lionardo and Michelangelo had selected for the display of their talents, afforded in their nature the most ample scope for the intricacies of grouping, and the novel charms of contrast: but it was not sufficiently understood by many of the young artists, who flocked to study these works, that that which they so much admired, and which in reality powerfully contributed to expression in the Cartoons before them, might be inadmissible, or at best should be sparingly used, in subjects of a different character. This censure applies not to Fra. Bartolommeo, Andrea del Sarto, and two or three others, rather cotemporaries than followers of Michelangelo; but it is certain, that the indiscriminate introduction of contrasts, fore-shortenings, and naked figures, without regard to propriety or expression, soon became a predominant characteristic of the Florentine school.

In the subsequent productions of Michelangelo's pencil, we almost ever find the happiest concordance of style with subject, nor can he be accused of having at any time sacrificed the invention or expression of his picture, to an ostentatious display of his powers in the executive parts of the art.

The general design of his sublime works, the "Vault of the Sistine Chapel," and the "Last Judgment," will be the subject of our consideration, when we come to treat of invention and expression in painting; we shall, for the present, content ourselves with observing, that there is no part of them which affords not a valuable lesson in composition. The beautiful angels, attendant on the Creator of the sun and moon, give dignity to the subject at the same time that they enrich the composition. The angelic troop, supporting the figure of the Almighty, in the Creation of Man, by furnishing a number of small parts opposed to one large one, produces a delightful effect; whilst the broad dark mantle which surrounds the whole, at once simplifies, whilst it throws out the group; this rich group is again finely contrasted by the simple unembellished figure of Adam. In the compartment where Adam and Eve are represented eating the forbidden fruit, Michelangelo has laid himself open to the accusation of having been guilty of an anachronism, as he has introduced in the same picture their subsequent expulsion from Paradise; but, ere we condemn his conduct, it will be well to consider whether the fault, if it is one, in the case before us, is not amply made amends for by the additional interest and the awful lesson it furnishes—here is at once the cause, and the effect; and the transgression and the punishment. This group of the "Transgression of Man" is particularly deserving our notice, as it furnishes an example in composition different from any other in the chapel; the Eve is sitting in a beautiful posture on the ground, and nearly in front; she

extends her left arm to receive the apple presented to her by the tempter, who is represented, like the Scylla of the ancients, under the form of a female terminating in a serpent: Adam is standing immediately behind the figure of Eve; he extends both his arms to pluck the fruit off the tree, and thus discovers a back view of his figure from the loins upwards, thereby making a most beautiful contrast to the Eve, at the same time that it affords, by its union or connection with the serpent and the tree, in forming a sort of arch over the figure of Eve, which produces a most agreeable and novel effect. In that tremendous group of the "Offending Israelites tormented by Serpents," the low point of sight increases the terror of the scene, at the same time that, by causing the figures to be fore-shortened, it permits the introduction of a greater number of them, and of a larger size than could have been the case, had the horizontal line been supposed higher. The "Prophets" and "Sybils" might each in their turn furnish a lecture; but it would far exceed our limits to attempt to point out the various smaller pieces of composition with which the Sistine Chapel abounds. Each compartment or group contains some principle or essence more or less distinguishing it from every other, and peculiarly adapted to the expression of the subject it represents.

The "Last Judgment" was executed many years after the Vault of the Sistine Chapel. With respect to the composition of this celebrated work, as a whole, there have been various opinions; some highly approving the uniform arrangement of the groups into distinct subdivisions, as contributing to that awful majesty required by the subject; whilst others have regretted the absence of that perspective, that depth, that *sfumato*, employed with so striking and picturesque an effect in the great works of Titoretto, Paolo Veronese, and Rubens. The matchless perfection of the distinct groups has however remained undisputed, and we can therefore with safety recommend the prints from them by Georgio Mantuanus, or those recently published by Mr. Metz, as sources from which the student will best acquire the principles of grand composition, at the same time that he imbibes the antidote to poverty of style, and to every thing trivial or common-place.

We have before observed that the older painters considered a certain degree of uniformity of disposition as indispensable in those representations, which were more especially intended as objects of devotion or religious awe. Michelangelo, though in most other respects he departed from the system of his predecessors, seems to have considered this principle as sacred; accordingly, in his designs of Madonnas, Holy Families, and Pietas, we ever find this uniformity; sometimes effected by the manner of placing the figures, and balancing equally, as it were, one side of the composition with the other; sometimes by the regularity of the architectural decoration. His "Chiril with the Samaritan Woman at the Well" is an instance of this kind, so is the "Flagellation at S. Pietro Montorio," and, more particularly so, his "Representation of the Crucifixion," where the two angels in the clouds and the two figures of the Madonna and St. John, are introduced absolutely at measured distances on each side of the cross.

Fra. Bartolommeo di San Marco has practised a similar uniformity of composition in his great altar pictures, and so has not unfrequently Raffaele, although in many of his numerous small pictures of the Holy Family he seems to have aimed at the expression of domestic felicity or maternal endearment, rather than to elevate the mind to the contemplation of the mysteries of redemption by a sublime image of the Virgin Mother with the Infant God.

If the works of Michelangelo excel in sublime imagery, or in the personification of supernatural agency, those of Raffaele, on the other hand, have ever been considered the most perfect models of that species of painting which is properly termed historical or dramatic. "We stand with awe," says Mr. Fuseli, "before M. Angelo, and tremble at the height to which he elevates us. We embrace Raffaele, and follow him wherever he leads us." The works of Raffaele never fail to exhibit the happy union of a composition every way adapted to the expression of the subject, joined to an inexhaustible variety of well-arranged and beautifully contrasted groups; and yet every part seems to naturally grow out of the story, and comes so home to our feelings, that the spectator is often almost tempted to exclaim, with the countryman when he saw Garrick, "Why I should have done it so myself!"

The productions of Raffaele furnish nothing like a recipe for composition. He well knew there was none, and hence those forcible and distinct impressions which each of his pictures makes on the mind, and leaves indelible on the memory.

If Raffaele can be said to have regulated his compositions by any particular rule or maxim, it was that of making each as unlike the other as possible, consistent with propriety of expression. Thus, in the Cartoon of "Christ giving the keys to Peter," the apostles, all crowding together to be witnesses of the action, occupy the principal part of the picture, and form a group as it were in profile, the Saviour, although in the corner of the picture, being nevertheless rendered evidently the principal figure, by the insulated situation given to him, as well as by the actions of the apostles, who all press forwards towards him, as to the centre of attraction. This Cartoon is finely contrasted by that representing the death of Ananias, where the figures of the apostles form a group in the centre, and are all seen in front. The admirable description of this composition by Mr. Fuseli cannot but prove acceptable to the reader. "In the Cartoon of 'Ananias,' at the first glance, and even before we are made acquainted with the particulars of the subject, we become partakers of the scene. The disposition is amphitheatric, the scenery is a spacious hall, the heart of the action is the centre, the wings assist, elucidate, connect it with the ends. The apocalyptic figure before us is evidently the victim of a supernatural power inspiring the apocalyptic figure, who, on the raised platform, with threatening arm pronounced, and with the word enforced his doom. The terror occasioned by the sudden stroke, is best expressed by the features of youth and middle age on each side of the sufferer; it is instantaneous, because its shock has not yet spread beyond them, and this is done not to interrupt the dignity due to the sacred scene, and to stamp the character of devout attention of the assembly; what preceded and what followed is equally implied in their occupation, and the figure of a matron, entering, and absorbed in counting money, whilst the approaches the fatal centre, and whom we may suppose to be Sapphira, the accomplice and the wife of Ananias, and the devoted partner of his fate. In this composition of near thirty figures, none can be pointed out as a figure of common place or mere convenience; they are linked to each other, and to the centre, by one chain; all act, and all have room to act, repose alternates with energy." The Cartoon of "Peter and John healing the Cripple at the Beautiful Gate of the Temple," is again strikingly different from either of the others, Raffaele having there, with a boldness of which any but a sublime genius would have been incapable, interjected his composition by the columns of the portico. But though divided, it is true, into separate, and

almost equal parts, neither the unity of action, nor the expression of the picture, is impaired, whilst the effect produced is at once novel and beautiful. In the Cartoon of "Paul preaching at Athens," the elevated situation, and energetic action of the apostle, instantly denote him the hero of the piece, whilst the attentive but astonished circle gathered round him, receive, as it were, light from him, their centre, and unequivocally declare him the restless organ of divine truth.

The Series of "Scripture Histories," painted by Raffaele in the Loggia of the Vatican, and his other works, do not less evince the desire of obtaining, as far as consistent with propriety of expression, this diversity in his compositions; but an attentive examination of the prints from them, will better elucidate this point, and indeed every thing relative to composition, than a volume of prolix and laboured description. In short, the works of Raffaele display the most becoming union of natural with acquired talents; strength of conception, and inexhaustible invention, with propriety of disposition in the whole, and careful variety in the component parts.

After the death of this great master in 1520, the art rapidly declined, nor has any one since him trod with equal success the dignified and instructive path of history-painting.

The great reputation of Raffaele, however, even for some time after his death, checked the ascendancy of mistaken principles, at least in Rome, where the great works in the Hall of Constantine, and other rooms of the Vatican, were still continued by Giulio Romano and Raffaele's other scholars, after their master's designs.

Of Polidoro da Caravaggio, one of the most eminent, it might be said that the soul of a Greek animated his pencil, so replete with Attic purity and grandeur of style are his numerous friezes on the facades of the palaces of Rome, now however best known by their prints by Gozzius, Cherubino, Alberti, and Bartoli.

It was not till after the noted sackage of Rome in 1527, when the arts and artists were forced to seek an asylum in distant parts of Italy, that painting was doomed to suffer degradation; Polidoro flew to Messina, Pierino del Vaga to Genoa, and Giulio Romano to Mantua, where, in the palace of the T, he explored the regions of poetry, gave new force to the instructive lessons of fable, or decked the playful charms of allegoric fiction; still however firm to the principles of his great instructor, nor ever sacrificing the true end of his art, the expression of the subject, to a too ostentatious display of his prowess in the means.

We have before observed that Michelangelo's celebrated Cartoon of "Pisa," contributed not a little by its influence to determine the future character of the Florentine school. Blind to its more sublime excellencies, the vigour of its conception, the energy and variety of its parts, and its unity of action as a whole, the young students of Florence ignorantly imagined that a similar introduction of naked and foreshortened figures into their compositions, without any reference to the subject of their picture, would at all times insure them the applause of the artists of their own country, and the envy of those of neighbouring states; nor had Michelangelo the good nature or the good sense to point out their error.

An army of expert mannerists, for the most part joining to a miserable sterility of conception the most audacious rapidity of execution, but proud of possessing what they thought the true secret of the *Grand Gyslo*, now sallied forth; nor can it be a matter of surprize that the palaces, the churches, and the halls of Rome, Florence, and most

of the other cities of lower Italy, were so soon deluged with the common-place productions of mediocrity, since the unrelenting pencils of Giorgio Vasari and Federigo Zuccaro alone, covered more square yards of wall or canvases than had been effected by the honest diligence of perhaps any ten of their predecessors.

The due expression of the subject of a picture was now the last consideration. Provided two or three well drawn academy-figures, however unmeaning, occupied the foreground on the one side, and some women sporting with their children, on the other, whilst the centre displayed a pyramidal group, all was well; the employer was delighted, and the painter applauded. Thus a stranger may pass and repass through the Sala Regia in the Vatican without being struck by, or discovering the meaning of one of those frescoes which occupy its spacious walls, or without being afterwards enabled to call to mind the smallest feature distinguishing one from the other. This subversion of art, this silly fondness for what was erroneously considered picturesque composition, for near a century afterwards degraded the school's of Rome and Florence; we shall therefore leave them, and turn the reader's attention to those of Lombardy and Venice.

If the anatomic studies of the old Florentine artists had rendered them almost exclusively the masters of correct design, the painters of Lombardy could boast a more complete insight into the doctrine of perspective, and were certainly the first who applied it with real effect in large works.

Melozzo da Forlì, in the middle of the fifteenth century, in his fresco in the vault in the tribuna of the church of St. Apollini at Rome, first discovered what the Italians call the knowledge of the *Setto in Sù*, that is, the method of foreshortening figures, so as to give them the due appearance of rotundity and projection when seen from below; and upon the same principle, Andrea Mantegna, in several of his great works, and particularly in a chapel at Padua, where the storied compartments are entirely above the eye, adopted, with equal boldness and effect, an ideal point of sight upon a line with the eye of the spectator, that is beneath the very bottom of the picture.

From sources like these, Antonio Allegri da Coreggio, the splendid meteor of the Lombard school, imbibed the first principles of his art. With a spirit every way conformable to his name, he pictured the "Joyful Assumption of the Madonna amidst Myriads of the Angelic Host," in the cupola of the duomo of Parma, and the "Ascension of Christ," in the church of S. Giovanni in the same city; works which may be justly styled the never-equalled models for that species of composition. In the execution of these, and probably of his other chief works, he was however greatly assisted by his friend Antonio Begarelli, a celebrated Modenese sculptor, who modelled for him in clay all the figures, so that Coreggio, by placing and grouping them together as they were to be represented, was enabled to delineate, with the greatest correctness, every foreshortening, and at the same time to acquire a truth and boldness of light and shade unattainable by any other means. And here it may be well to observe, that the trouble of preparing such models in the first instance, is amply repaid by the great facility, or rather certainty, which it gives the artist in the execution of his work. Moreover, the painter having his modelled figures before him, and being enabled, by varying the situation of his eye, to view them in every direction, will frequently discover beautiful combinations which he never dreamed of, at the same time that he is rendered less liable to the error of too often repeating the

fame view of a figure, or the same action, and is taught to avoid a common-place mode of composition.

Primaticcio, a native of Bologna, in his commerce with Giulio Romano, whom he assisted in his works at Mantua, acquired an admirable talent for treating poetical subjects. Master of perspective, and the *Setto in Sù*, his beautiful fictions on the ceilings, and other compartments, in the palace of Fontainebleau, alike charmed by the fire with which they were conceived, the elegance of their composition, the prodigious boldness and truth of their effect, and the easy grace with which they were executed.

The grandeur and striking appearance of projection and depth, for which the works of Primaticcio were so remarkable, judging as well by their prints as by the writings of those who witnessed them prior to their destruction, was in a great measure occasioned by his having universally chosen, what is called in perspective a *short point of distance*; by which mode of conduct the figures in his near-ground appeared proportionally large, as those behind diminished in a more rapid gradation. This mode of conduct in Primaticcio is the more worthy of remark, as it is the reverse of what we generally find adopted in the works of the great Roman and Florentine painters, his predecessors. It became, however, a favourite doctrine of the Venetian school, particularly of Tintoretto and Paulo Veronese, and was one of the leading principles of the Caracci in the formation of their style.

The composition of Giorgione, Titian, and the older Venetian painters, is simple and dignified, suggested by the subject alone, and of course liable to none of those objections which apply to the works of their followers, Tintoretto, Paulo Veronese, Palma, and a multitude of others, who, like the Florentines, valuing themselves chiefly upon the possession of only a part of the art, sacrificed to their favourite darling all the remainder. No longer expression, but colouring and glitter of effect became their object, and hence, with all their prodigious talents, they soon turned the art into a splendid toy.

The works of these great masters (for great they were in spite of all their faults) may nevertheless be studied with benefit, even as to composition, as they at all times possess a boldness and variety of disposition, which rank them far above the insipid and mannered performances of their contemporaries of Florence and Rome.

About the end of the 16th century, the Caracci of Bologna attempted, by an union of the scattered excellencies of the various schools beforementioned, to establish a perfect system of art: but though they indeed so far succeeded as to form a style in which no particular fault seemed to predominate, still in no one point did they fully reach the purpose of their emulation. Their works present neither the dignified composition, the just and striking expression, the beautiful variety of character, which distinguishes those of Raffaele; the sublime conception, or the learned and grand design of Buonaroti; the grace and enchanting effect of Coreggio, nor the truth and richness of Venetian colour; but seem rather the result of a system founded on the basis of a compromise between the eye and the understanding, the mechanic and the ideal of the art; in forming which compact, however, the former have been evidently allowed the preponderance. This remark is, perhaps, less applicable to the productions of Ludovico Caracci; but with respect to the chief works of Annibale, and particularly his Farnese gallery, we cannot withhold our assent to the critiques of Mr. Fuseli, and the severe but just remarks of Mr. Webb.

Having said thus much, it cannot be expected that we should

should hold forth the Caracci as models for imitation; there is nevertheless a breadth, a concordance of the various mechanical parts of the art, and an ease in their style which render it highly deserving our regard, and would have justly entitled the Caracci to a reputation even greater than that which they have so long enjoyed, had their prodigious powers been made the vehicle of more elevated conception.

With respect to the scholars of the Caracci, and other artists of reputation, who immediately succeeded this epoch, it is only to our present purpose to observe, that grace and beauty rather than grandeur or sublimity, seem to have been their objects, and that whatever eminence they sometimes attained in their Holy Families and devotional subjects, still the dignity of historical painting was evidently on the decline.

Niccolo Poussin alone seems to have considered the art as a language addressed to the mind through the organs of vision. Possessed of a refined and scrutinizing mind, he at all times collected, and, with the greatest ingenuity, inserted in his pictures all those collateral circumstances, probable or possible, which his subject could furnish; and hence his works, more addressed to the imagination than the eye, at once invite and are sure to reward investigation. The greatest defect, however, of his compositions, seems to be that these explanatory or accessorial groups generally appear too principal, and thereby not unfrequently counteract their object, by distracting the attention from the principal figure or group, destroying the unity of action, and weakening that expression which they were intended to augment. Were we to draw a comparison between Poussin and Raffaele, we should liken the former to the cool but subtle reasoner, who by slow degrees brings us to grant his position; Raffaele to the heaven-taught genius who at once darts the ray of truth upon our minds.

The works of Poussin, though esteemed even in his lifetime, had little influence in correcting the corrupt and meretricious taste which was every day gaining ground in Italy. The proper end of the art had been long forgotten or habitually sacrificed, and that bane of painting, pictureque, or artificial composition, which, however varying in its mode, was ever the same in its effect, became every day more deeply rooted.

Poverty of conception, or rather no conception at all, common-place or unmeaning attitude, contrast so often repeated as entirely to lose its effect, and, above all, empty bustle, were now become the elements of what was still called historical composition: if to this we add a brilliant rapidity of execution, joined to gay colouring and tolerable light and shade, with occasionally a madonna's or an angel's head, rather pretty and seductive than devout, we have the sum total of the merits of the most eminent artists who succeeded this period, and the genuine characteristics of the admired Pietro da Cortona, the facile Luca Giordano, and the insipid Carlo Maratti.

It would swell this article beyond our prescribed limits, without throwing much additional light on our subject, were we to attempt to trace the different changes of style which at various periods took place in the schools of painting of Germany, Flanders, Holland, or France. The succession of young students, who at all times considered a visit to Italy as an indispensable part of their education; naturally imbibed in a greater or less degree the principles of those to whom they had been taught to look up as models for their imitation: hence the style of the Florantine and Roman mannerists of the 16th century, unjustly denominated the followers of Michelangelo, was caricatured in the preposterous works of Martin Heemskerck, Van Man-

der, Spranger, and Goltzius; that of Tintoretto feebly imitated in those of his scholars, de Vos and Rottenhamer. Rubens, however, who, though long in Italy, became no wife infected by that poverty of style which then prevailed, broke the fetters of corrupt system, and rescued his countrymen from the effects of such baneful influence. His comprehensive genius, cultured by reading, enlightened by travel, and blest above all, with that envied quality, a just appreciation of its own powers, could not but obtain its object, that object being once clearly defined and steadily pursued. What that object was, the decided character of his works sufficiently determines: it was unquestionably the union of magnificent and expressive composition, with the most splendid colouring and the greatest breadth of chiaro-scuro; for, however enchanted by the spells of colour, Rubens never forgot that painting is mute poetry, and its first great prerogative, the converse, which, through the medium of the eyes, it is permitted to hold with the understanding. It cannot, therefore, be said of Rubens, as of the Venetian painters we have censured, that he sacrificed the ideal to the mechanical part of his art. With the exception of his smaller works, or such as he was sometimes necessitated to undertake, in compliance with the will of his employers, we generally find in his productions the most judicious application, the most happy combination of his powers.—Subjects allowing full scope to the exuberance of his invention, compositions furnishing an ample field for the magic blaze of his tints, and the broad expanse of his masses.

It was the good fortune of Rubens that the burines of the most eminent engravers were employed under his own inspection, to make prints from all his chief works; and indeed so admirably is the character of the originals preserved in those of Bolswort, Vosterman, Pontius, and others, that when the pictures shall be no more, they alone will be sufficient to eternize the claims of this great master of the Flemish school. As an inventor and composer, the "Battle of the Amazons," the numerous "Huntings of Wild Beasts," the "Raising of the Cross," the "Michael combating the Devil and his Angels," and the two tremendous representations of the "Fall of the Wicked," are alone sufficient to place Rubens in the first rank; to say nothing of his celebrated "Garden of Love," and the truly poetic allegories in the "Luxemburgh gallery."

Of Rembrandt, the great head of the Dutch school, it has been justly remarked by Mr. Fuseli, that he was "a genius of the first class, in whatever relates not to form." We have in another place spoken of his chiaro scuro, (see *CLAIR Obscure*.) and we can, with equal propriety, upon the present occasion, recommend the study of his works to all those who feel with us, that the telling of the story, and the appropriate expression of the subject are the true ends of composition; nor will we omit to add, that the works of many of the other Dutch painters, particularly Ostade and Drawers, however the humble representations of low and vulgar nature be their object, abound in admirable examples of composition, and may be studied with advantage, even by such as make the more noble path of historical or epic painting the course of their pursuit.

In the retrospect we have taken of the styles of composition at different periods, adopted by the schools of Italy, it has been our care to point out to the student such examples as are best calculated by their influence to promote his advancement towards the legitimate end of our art; at the same time, that we have cautioned him against that corrupt but specious system of grouping, which, for distinction's sake, we have called pictureque.

COMPOSITION.

The art of painting is a language addressed, through the medium of the eyes, to the understanding; like that addressed to our minds through the ears, it must have some ideas, some truths to communicate; and the perfection of painting, as well as of writing, consists in conveying those truths to the mind in the most clear, the most forcible, and most beautiful manner. A judicious distribution of the arguments in a discourse is of importance, inasmuch as it gives additional force, and sheds increased lustre on the evidence contained; but in a picture this propriety of distribution is itself the argument and the evidence, and is therefore indispensable.

Those who are conversant with the first sketches and drawings of great masters, know that a few simple rude lines are frequently found sufficient to impress the mind with a decisive and immediate idea of the story meant to be represented, and that, in many cases, even the expressions as well as the actions of the chief figures seem evident, although no features of the countenances be delineated.

We may, therefore, safely affirm, that any rule, any mode of composition, except such as is dictated by the subject of a picture, is wrong, and that, were this doctrine sufficiently understood, we should not so frequently pass unmoved by graphic representations, or remain ignorant of the subjects they were intended to express.

To attempt, therefore, to prescribe any general method of distribution would be to insult the understanding of our readers and to degrade the art. The painter, warmed by his subject, must form the ideal picture in his imagination, and from thence transfer it to the canvass: it is only as to the relative economy of the parts of the work that some hints may be suggested: these are the result of observation and experience, and bear the strictest analogy to the precepts we have inculcated respecting clair-obscur and colouring, and, perhaps, to every other part of the art.

As there should be in a picture one principal mass of light, which, however connected with others, should still predominate; so one group or one figure should strike the eye with the same superiority over the secondary groups or figures of the composition; as in clair-obscur there is no rule by which we are obliged to place the principal light in any one given part of the picture; so are we at liberty to give to the chief group or figure of the composition that situation which we judge most appropriate. As in clair-obscur, an inequality of parts, a subordination of several small masses to one large one, never fails to produce richness and beauty of effect; so in composition a similar richness and beauty are the result of an opposition of several small bodies or parts, to one large and simple; as we have before illustrated by the sublime group of the Almighty, supported by a multitude of angels, in the "Creation of Adam," by Michelangelo.

As by the addition of smaller masses of light, connected with the principal mass, that mass acquires at once greater breadth and influence; so the unity of action in a composition is in most cases powerfully augmented by a repetition of nearly the same action in two or three of the accessory figures arranged together, one nevertheless being principal: this was the frequent custom of Raffaele, has its foundation in nature, where similar sentiments must frequently excite similar outward demonstrations, and never fails, if judiciously managed, to produce its effect.

Every thing that has been said relative to contrast of clair-obscur, or relieving dark or light masses immediately by their opposites, equally applies to composition, where strong contrasts of line, of back to front figures, &c. pro-

duce similarly striking and beautiful effects, and must to insure those effects be used with similar discretion and parsimony. The too frequent introduction of contrasts of lights and shadows or of colours, produces a spry and confused effect; the inordinate use of contrasts in composition produces similar confusion, and defeats their end. The moderate introduction of them in both cases gives a zest to the picture. It is like the border or other well-disposed ornament on a piece of drapery; but when indiscriminately used, the work resembles the rich gothic medley of an embroidered petticoat, where the beautiful folds of the stuff are wholly obscured by tinsel and gewgaw.

Having observed thus much, we must refer the reader, who is desirous of obtaining a more complete insight into the subject of this inquiry, to the works of the great masters above-mentioned, or to the numerous prints which have been made from them, by the most eminent engravers of the last three centuries. One hour spent in the study of the Cartoons of Raffaele, or the Last Judgment of Michelangelo, will perhaps teach more than could be inculcated by words in the compass of this volume.

What we have said of historical composition may equally apply to landscape; each work should possess a decided character, distinguishing it from its neighbour, and calculated to incite a train of kindred reflections. This we sometimes find in the simple views of the Flemish and Dutch painters, who painted nature as they found her, and did not think it necessary that every picture should possess a given proportion of fore ground, middle ground, distance and extreme distance, a winding road, a meandering stream, a water mill, a church steeple, a hanging wood, and a mountain.

The works of the two Poussins, some of those of Salvator Rosa, Dominichino, and the Caracci, and the admirable etchings from the drawings of Titian, abound in the finest examples of sublime and characteristic landscape, and are indeed so perfect in their way, that they can never be sufficiently contemplated by the artist who would attain eminence in this delightful branch of art.

Plates illustrative of composition.
No. 1. "The Battle of the Standard," by Lionardo da Vinci.

2. "The Cartoon of Pisa" (or according to Vasari, its chief group) by Michelangelo Buonaroti.

3. "The Creation of Man," the "Transgression at the Tree of Knowledge," and "The Expulsion from Paradise;" frescoes of Michelangelo in the Sistine chapel.

4. "Groups of the Last Judgment," by the same author in the same chapel.

5. "Paul preaching at Athens" from the Cartoon, by Raffaele, at Hampton Court.

6. "The Group of the Assumption of the Madonna," in the cupola of the Duomo at Parma. Coreggio.

COMPOSITION, in *Pharmacy*, the art, or act, of mixing divers ingredients together into a medicine; so that they may assist each other's virtues, supply each other's defects, or correct any ill qualities thereof.

COMPOSITION, in *Printing*, ordinarily called *composing*, is the arranging of several types or letters in the composing-stick, in order to form a line; and of several lines ranged in order in the galley, to make a page; and of several of those to make a form.

The composing-stick is made of iron generally, sometimes brass or wood; of greater or less length or depth, according to the page to be composed, or the compositor's fancy: it hath two sliding pieces, to be fastened by means of a nut and screw, which are slipped forwards or backwards, at the pleasure of the compositor, and according to the space

COMPOSITION.

space which the lines, notes, &c. are to take up. See *Plate Miscellany, Fig. 5.*

The composing-stick ordinarily contains seven or eight lines of a middle-sized letter; these, when set, are taken out, by help of a thin slip of brass, termed a rule, and disposed in the galley; and others composed, till a page be formed. The page being composed, is tied up, and set by; and the rest of the pages of the sheet prepared in the same manner: when done, they are carried to the imposing or correcting-stone; there ranged in order, and disposed in a chase, or iron-frame, fitted with wooden furniture; then, the quoin being struck in, it is carried to the press to be printed.

COMPOSITION, in *Sculpture*, from *Composizioni*, Italian, the art of placing figures or other objects together, whether by entwining them in groups, or forming them into masses more nearly or distantly apposed. The word bears the same meaning in the arts of design as in literature, from which it was most probably received, with many other terms, by the Italian artists at the revival of learning. Although in its most simple sense it is only synthesis, or joining together; yet, in its extended acceptation, it comprehends the production, order, and fitness of all the parts contained in the whole. The first elements, therefore, are invention and sentiment; the invention should be new and copious, affording an abundant choice of beautiful parts according to the subject, whether there be many figures or one only; the sentiment must be just and striking; according to the rule "feel yourself if you would make others feel;" this must pervade every part of the character of the figures; their action or passion expressed to the points of their fingers and toes as well as in the very folds of their drapery.

The order of composition contains the divine, heroic, and historic. The divine contains all sublime and terrific subjects of divinities, angels, departed souls, and infernal ministers. The heroic, according to the ancients, consists of those mortals, said to have one mortal and one immortal parent. The historic class contains the whole series of human life, in which however the most exalted persons and circumstances are always to be preferred.

The arrangement must be dramatic, representing an action; because sentiment only affects the countenance of the figure prior to action, and words cannot be expressed by mute figures; therefore the sentiments and passions must be demonstrated by the action, in which the figures partake. The principal person must have the most distinguished place, whilst the inferiors occupy subordinate gradations; thus in "Prometheus chained;" Prometheus occupies the first interest and place, whilst Force, Strength, and Vulcan are gradually inferior, although linked in the same group. If the hero or heroine of the subject be not entwined in the same group with other figures, he or she will still be distinguished by a preferable situation to those in which the inferior persons are placed; this rule is observed in all the best pictures of the *Herculeanum* collection. In the antique basso-reliefs and painted vases, and in the best works of antiquity, we scarcely ever see more figures introduced than such as are sufficient to tell the story, and for this reason that the expression may be the stronger, being less divided.

Outline. The general outlines of a composition, whether it consist of one or more groups, should be agreeable to the eye, which is produced by a succession of curves of different segments alternately reversed; or, in other words, a succession of S. lines of different curvatures and dimensions. These will be more gentle in tender and graceful subjects, such as the Triumphs of Nymphs, Naiads, and Sea Divinities, the Judgment of Paris, &c. In the antique basso-reliefs,

these curves become more violent with a mixture of angles in subjects of great exertion, such as the War of the Giants, the Battles of the Lapithæ and Centaurs, the Athenians and Persians. See Stuart's *Athens*, vol. iii. *Museum Pium Clementinum*. Basso-reliefs. In the fine antique groups, as the Læocoon, Niobe and her Daughter, Cupid and Psyche, and the Fauns and Nymphs, the lines are intercalated (chained) as it were linked into each other in whatever view they are seen.

Light and Shadow. Sculpture is not like painting, seen and forced on our perception, by the variety and brilliancy of its colours. On the contrary, it has properly no colour at all; and its forms are understood by the effect of light and its privation, with the degrees of their medium called middle tint; these, in fact, produce the all of sculptural forms to the eye, because no such thing as outline really exists, and when we speak of it or use it, it is only to demonstrate form geometrically. Light and shadow will be continually varied in the varied forms of the human figure. If seen abroad in the open air, or illumined from a sky-light within doors, the light will strike most powerfully on the head and breast, and gradually with less force on the lower part of the body and inferior limbs as they approach nearer to the earth. If the figure be recumbent, or in a horizontal position, those parts will have most light which are nearest to the luminary. If the figure be inverted, the bottoms of the feet will have the strongest lights, which will gradually diminish as they approach the head; and consequently all those parts which are shadowed, when the figure is upright, will be lightened in this position, and *vice versa*. It must be remembered that, as the human figure partakes of globular forms, some one part will be lighter than the rest, and that light will be brightest in one point. It will be found that figures in sculpture are almost covered with middle tint, having a small portion of bright light nearest the luminary, with a very few dark and strong shadows which relieve particular projections. Basso-reliefs present the general effect of darkish figures on light back-grounds; in distribution of quantity, of both lines and form, that will be most agreeable which is inherent in the nature of things, which pervades all creation, and is more particularly evident in musical proportion of 3ds, 5ths, and 8ths, with their subdivisions and relative quantities.

We must however observe, that the rules for composition, like all other rules laid down for liberal art, will only assist genius; they will never produce any thing without the vigorous exertion of mental powers and manual industry in the subtle investigation and diligent imitation of nature; all must be done by sympathy and beautiful representation; rules may be compared to the scaffold for raising a building. We must therefore remember that the beauties of nature are also various as they are endless, and from them only we can furnish ourselves with original materials for composition, by continually observing the expression of sentiment and passion in men, women, and children; the characters of their faces, the forms and action of their limbs, their draperies, and the manner in which the direction of the folds obscures or indicates the bodies or limbs, in the grouping of figures; the entwining of the limbs should be carefully observed, and the planes in which the different parts of the bodies and limbs are directed.

In the liberal arts, the sentiment of a composition applies to our sympathetic feelings, as the invention surprises and delights by its novelty, and both together animate the mass as a body is animated by the soul; and as no composition would be complete or interesting without them, so when these vital principles are obtained, great care should

be taken to confine their demonstrative forms within that department of art to which they b-long, in order that the whole may be as pleasing as interesting, without deformity or absurdity. Thus, for example, all those positions which extend the human figure by violent action should in basso-relievo be represented in the flattest view, in which all the lines of the body and limbs may be understood in the fullest and clearest manner, without legs or arms standing out horizontally from the back ground, like scaffold poles driven into a wall. Such extended members belong only to the class of entire sculpture, as statues and groups. The lines and limbs in the composition must be more parallel to the back ground, as the alto-relievo or basso-relievo recedes from entire sculpture, until, in the flattest relief, the most complicated forms and groups are distinguished by little more projection than an outline gives.

COMPOSSIBLES, COMPOSSIBILIA, in *Logic*, such things as are compatible, or capable of subsisting together.

COMPOST, in *Agriculture*, a term signifying that sort of manure which is formed by the mixture or combination of one or more different ingredients with dung or other similar matter, so as to constitute an uniform mass or substance fit for the improvement of the soil.

These composts are usually made by mixing various substances with stable or yard dung; and hence, in some countries, are called *mixens*.

The most common materials for this purpose are turf pared from waste places, virgin earth, peat earth, lime, the scourings of brooks, ponds, and ditches, weeds, sea-sand, rubbish of buildings, coal-ashes, &c. That dung alone, properly managed and applied, is a most valuable manure, is beyond all doubt, but it is certainly not equally useful in all soils and situations. It is much better calculated for active than inactive soils. On lime-stone, chalk, &c. it meets with abundance of active materials; but upon clays, deep loams, &c. it operates best in conjunction with lime or some other stimulating substance. When dung is intended for a compost, no attempts should be made to add a large quantity of lime, earth, &c. till it is properly fermented, every addition of this checking the fermentation. The lime, earth, &c. should be added after the fermentation is finished, and the whole then carefully mixed, and laid up together. In a few days a second fermentation will come on; and if the mixture has been properly turned over and properly incorporated, it will be fit for use in a month or six weeks. Some judgment and attention will be requisite, with regard to the quantity of lime and other active principles employed; for, if the quantity be small, their action upon the rich substances in the dung will be partial and imperfect; and if too great, a considerable loss may be sustained by their over action. If the quantity of earth also be such as to press the dung too hard, the air will be excluded, and the second fermentation be impeded or prevented. It is certainly a right method to lay a good coat of earth as a foundation for the dunghill, into which the moisture of the dung may soak down; and it is no bad way to make a heap of such substances as can be readily obtained, apart from the dung, and to throw the moisture of the dunghill, and the urine of cattle over it frequently.

The composts employed by the farmer are formed in various ways. In some places where there is a head or foot ridge, too high to admit the water being readily discharged from the field, they plough it, then fill it full of lime, dung, or both, and, after frequent ploughings, spread it upon the field. After the lime by this means is sufficiently mixed, the earth may be gathered into a heap with the spade, and

mixed with dung; or the whole operation may be performed with the spade, which is still better.

It is remarked by Mr. Young, that "the farmer may have great advantage from composts; which, when they consist of proper materials, and are skillfully mixed, he may safely depend upon. Where a variety of materials can be had, they may, he says, be laid as follows: first clay or strong earth, next soap ashes, dung, loamy earth, lime, tanners' bark, green vegetables before they run to seed, earth, or as many of these as can be got; also fat chalk, sea-weeds, sea-sand, and several others; which may be so mixed, as not only to raise a general fermentation throughout the whole compost; but likewise to suit the nature of the land on which it is intended to be laid. The common way is to lay the several materials in layers, one over the other, till a large heap is raised; and it is advised by some authors, and the practice of many farmers is, to make these layers from six inches to a foot in thickness; but this he has found by experience is wrong. For the fermentation raised in the compost is not strong enough to penetrate these thick layers, especially those of clay, or strong earth; for after the rest have sufficiently fermented, and the compost is turned, these layers rise almost as whole as when first laid, and must be broken by hand, to mix them with the rest of the compost; whence arise two inconveniences, one an extraordinary expence, and the other that twice or thrice turning is sometimes necessary to dissolve these large pieces; and as a new fermentation is excited every time the compost is turned, the strength of the manure is greatly wasted before it is laid upon the land, where it is then incapable of raising any considerable fermentation, which is, he thinks, one of the principal uses of manure."

It has been suggested, that the best way of making compost is not in thick layers; but after the ground is marked out for the compost, to lay the several materials, after being well broken, in heaps round the space marked out for the compost heap; and to place a man between each two heaps, to throw the manure spreading upon that space. In this manner, the compost heap will soon be raised to the intended height, and the several sorts of manure being thus well mixed, the whole will soon begin to ferment, and will incorporate as fully in two months, as the same manures, placed in layers in the usual way, will in four or five. The owner, therefore, in making such composts, should not prepare them too long before they are laid upon the land; otherwise they will be much wasted, and their best parts evaporated and destroyed. And "composts prepared in this manner need not be turned, or at most not above twice. If the fermentation is observed to abate too soon, holes should be made with a pole from the top almost to the bottom of the heap, upon which throw urine, or the returning of a dunghill, which will fill the holes, force through the whole substance of compost, and soon complete the fermentation." It is added, that "such a compost, by duly proportioning the ingredients, may be made to suit any sort of land, and is excellent for meadow or pasture grounds. A way to improve these, is to cut them five or six inches deep with the five-coiterated cutting plough, or scarifier, which cuts the surface in slips four or five inches asunder, but does not raise or turn them. This cutting of the roots of the grass, and the manure laid on at the same time, sinking into these incisions made by the coulter, cause an improvement in the quality of the herbage, and also make such grass grounds produce much more than they did before. But here it is to be noted, that cutting the ground first, and then laying on the manure,

nure, makes a greater improvement than manuring first, and then cutting; and both are superior to manuring and not cutting; all which have been proved by experiments. The cutting-plough is used with success upon clay grounds, loams, and gravel; but in very strong grounds, the coulters are apt to be thrown out of their work by stones; and therefore, it is not proper to use the cutting-plough where stones abound to any great degree."

It is added, that "in such composts, where it is intended to use a large proportion of earth, that lies at a considerable distance from the limestead, to save the double carriage of it to and from the compost heap, the dung and other materials may be carried to a head land of the field to be manured, and be there mixed into a compost."

It is contended that "the best situation for a compost, is upon level ground; or if made upon a descent, a trench should be cut on the lower side to receive the running of the heap, which is some of the best part of it, and should from time to time be thrown up again, which will quicken the fermentation."

It is supposed that "the richest composts may be made in the farm-yard, which should be made deepening all round from the sides to the middle in form of a hollow ditch or basin. When the yard is made in this form, little of the urine or liquid part of the manure can run off or be wasted. When the dung is carried from the stables, cow-houses, &c. into the farm-yard, it should not be thrown carelessly in heaps, each fort by itself, but carried in carts or wheelbarrows, and laid regularly, and spread all over the yard. Upon this should be spread a thin layer of earth, mud, the sweepings of ditches and ponds, green vegetables before they run to seed, and other such materials as are most suitable to the nature of the land, to be manured with them. The racks and cribs out of which the cattle are foddered, should be frequently moved over the yard, that the offal straw and hay may be equally dispersed, and trod in by the cattle. This method of spreading the dung and other materials being continued, the whole will be incorporated with the urine of the cattle, and make an extraordinary rich compost."

It is supposed that the only inconvenience of this kind of compost, is its being filled with the seeds of weeds, from the earth mixed with it, the hay, straw, and dung of the cattle. It is, therefore, a manure best suited to grass-grounds, and to such arable lands as are to be hoed, as turnips, cabbages, carrots, potatoes, beans, &c. as these weeds will in a great measure be destroyed by good hoeing," or a proper attention to the after culture of the crops. And the earth or mud gathered from the bottom of ditches is excellent for composts. It is usually the lightest part of the soil, carried thither by water, and frequently contains a large proportion of vegetable matter. To this may be added, the cleanings of roads, especially where they are laid with limestone. But one of the best materials for composts is peat-earth: this fills up the pores of a sandy or gravelly soil, without diminishing its friability. Even where applied by itself to such soil, peat increases its fertility. But in a hard clay soil, it should be fermented with lime or dung, or both, and frequently turned, to make it mix properly. Without this precaution it dries, hardens, and cannot be afterwards properly mixed and incorporated with the soil. With regard to the making of composts, if only one sort of manure be used, it is only necessary to put the manure and earth into alternate layers, in a long ridge, and top it so that the rain may not wash through it. When both lime and dung are used, a layer of earth should be interposed between every two beds of lime and dung; for lime, if mixed with dung in the first stage of its putrefaction, corrodes and dissipates its

effluvia. After the first fermentation of the dung is completed, the whole should be turned, to mix the ingredients; and this operation should be repeated until the mass be sufficiently pulverized; which is done by cutting the compost with a spade in perpendicular slices. All the weeds should be collected from the neighbouring fields, before they run to seed, and mixed with the compost. The weeds also that grow upon it should be buried down in it. Such kinds of composts may be used for any crop, and when sufficiently pulverized, are excellent for a top dressing to pastures; the parts being gradually crumbled down, and beaten into the soil by the feet of cattle, or washed in by rains. Some are of opinion, that no advantage results from mixing dung with earth; a bottom of earth, however, will always be useful to detain the moisture that flows from the dung. Quicklime mixed with the dung is useful, by keeping the moisture in a proper state, and preventing the putrefaction from proceeding to too great a length. It has been observed, that making compost dunghills is a general practice in Norfolk. The principal source of them is the shovellings of ditches, which are found there to be singularly fertile. It is not the sediment of water from the inclosures, but it consists entirely of dead weeds, leaves of the hedge, and the mouldering of the bank and sides of the ditch. The most barren sub-stratum, exposed a few years in the face of a ditch bank, is frequently changed into a rich black mould. Perhaps the sea air, acting upon a loose porous soil, may assist in producing this change. Other sources of manure are useless turf, the backs of ditch-banks, the borders of fences in general, the sides of lanes, the nooks of yards, and which, in many places, are suffered to remain the nursery of weeds. These are turned up into ridges, to rot the roots of the grass and weeds, and to receive the melioration of the air; which done, they are carted in due season to the dunghill, to be well incorporated with that substance. It is stated as a good and effectual mode of raising a large quantity of compost manure, to bed the farm-yard about two feet deep with earth, and on this cleanse the stables, cow-houses, hog-sties, &c. and to move the cribs in which loose cattle are fed, with straw about it. This bed of earth will retain the urine, so that, when the whole is mixed together, it will all be nearly of equal goodness, and admirably adapted to gravelly and loose soils in general, through which the effluence of dung alone would be washed in one season; and a top dressing of foot, pigeons' dung, &c. would last but one crop, and very rotten pure dung would be little better. Having the drains from the stables, cow-sheds, and other offices, made so as to discharge themselves into places where these different sorts of earthy materials are deposited, might be a cheap and expeditious method of procuring good compost-manure. And another good method of raising compost dunghills is by making them into clamps. Make a layer of hedge earth from a grubbed border, two feet deep, and about twelve feet square, in the beginning of November; the quantity of earth will be about twenty-six loads of sixteen bushels each; on this clean all the yards and sheds. The yard not being bedded with earth, should be well littered, to soak up the urine, and to be made into dung by the hogs and loose cattle; this may be cleaned once a fortnight, and the sheds once a week, and piled regularly on the foundation of earth, until the heap is about seven feet high; and when one clamp is thus filled up, another foundation of earth may be laid adjoining to it. In order to enrich the compost, the flowings of the heap should be prevented from running off, and thrown up occasionally on it. By thus piling the compost in clamps, it will be in very good order for arable land early in the spring; which will not be the case if it be left to be trodden flat over
the

the whole yard, and every particle washed by the rain. Fermentation goes on much quicker in this method: and it would be better still if the heap were made under a roof, to keep off all water but what is thrown up. Another advantage of this method is, that any part of the compost may be used, by taking a division of the hill that has been the longest finished, and is consequently in the most suitable state for application. See *Dung*.

It is found that all sorts of animal substances, mixed with earth, litter, or any vegetable material, make a rich compost. Saw-dust, mixed in layers with the blood and offal of a slaughter-house, and incorporated till the whole becomes a moist feid mafs, is a rich compost. Two loads of it, with three loads of earth, will be sufficient for an acre of wheat or spring corn. Being a kind of top dressing, it should be put on at the time of sowing, and harrowed in with the grain.

This kind of manure is best adapted to lands of an open texture. Tough clays require lime, and plenty of dung, to break the cohesion of their parts. As this compost takes up little room, it is very convenient for the use of such farmers as are obliged to bring manures from a distance: it is also extremely rich, and will probably continue longer in the land than yard or stable dung. All animal substances being of the same nature, the refuse of whale-fat, after the oil is boiled out, will make a rich compost with fresh dung, which will reduce the blubber speedily into a putrid state, or with earth and dung. Having marked out the length and breadth of your intended dunghill, make a layer of earth, such as moor earth, or that of ant-hills, about a foot in thickness; over this put a layer of yard or stable dung of the same thickness, then a layer of blubber, and over that another layer of dung. Repeat the operation till the heap be raised about six feet, then give it a thick covering of earth, and coat the heap with sods. In about a month, turn the whole in the usual manner; and when turned, coat with earth as before, to confine the putrid steam. In a month or two, the heap will be considerably fallen, when it should have a second turning. This operation must be repeated at proper intervals, till the whole becomes an uniform putrid mafs. In general, this compost should not be used till it is a year old. The heap must be guarded from dogs, swine, &c.

This compost may with great advantage be applied to all purposes where good rotten dung is required. It is excellent for cabbages and for meadow ground. One hoghead of whale refuse will make eight loads of dung; and must be of great importance to such farmers as lie at a distance from manure, but within reach of those places where train oil is prepared. The practice of throwing this kind of offal into the sea was highly wrong and inconsiderate. And it is obvious, that the refuse of all sorts of fish, and fish itself, when in shoals too great for consumption in the way of food, may advantageously be made into a compost in the way above described. These are local advantages; and are mentioned principally with a view to put farmers upon searching diligently for such substances as are within their reach, that are capable of affording the sheepfold and common dunghill, upon which in many places they rely wholly, however inadequate to their wants; abundance of good manure properly managed, being the life and soul of husbandry. Where there is a deficiency of materials for making good composts, proper for the soil in many cases, a mixture of different soils may answer the purpose. Thus, where clay predominates, the addition of sand, where it is happily within reach, is often sufficient to ensure fertility; and where sand prevails, the addition of clay or chalk will answer the same purpose. Gravel enriches peat-moss; and that in return improves gravel. The farmer should, therefore, search every where

above ground and below, for such substances as may improve his several soils, by being properly mixed with them.

In considering the nature of manures, and the methods of applying them to lands, under different circumstances, further directions will be given in regard to the making and applying of composts. See *MANURE*.

COMPOSTELLA, or **ST. JAGO DE COMPOSTELLA**, in *Geography*, a city of Spain, and capital of the province of Galicia, with an archbishop's see and an university, situated in a peninsula formed by the rivers Tambre and Ulla. N. lat. 42° 54'. W. long. 7° 17'. It has a great number of nunneries and monasteries, and contains about 2000 houses. The public squares, the churches, and particularly the cathedral, are magnificent. The Spanish military order of St. Jago derives its origin from this place, where the body of St. James is reported to lie buried, which circumstance likewise used to draw a vast concourse of pilgrims from most parts of Christendom in former times.

The number of pilgrims who went thither from England in 1428, amounted to 916 persons; in 1433 the number was 520; in 1434, 2460, and in 1445, 2100. It was the practice for the crown to grant licenses to masters of ships for carrying out a limited number of these votaries of superstition, who took with them considerable sums of money, not only for their necessary expences, but for offerings and other charges incurred by this pilgrimage. See *ST. JAGO*.

COMPOSTELLA Nueva, or **Nova Compostella**, a rich town of North America, in Old Mexico, or New Spain, in the province of Xalisco, built by Nunez de Guzman in 1531, near the South sea; 400 miles N.W. of Mexico. The soil is barren and the air insalubrious; but it has several mines of silver at St. Peaque, in its neighbourhood. N. lat. 21° 20'. W. long. 110° 12'.

COMPOUND, the result or effect of a composition of different things; or that which arises from them.

Strictly speaking, every new composition does not produce a new compound; but only that from which a new essence arises. Thus, when one drop of water is added to another, there does not arise a new physical compound; the essence being the same now as before the union.

Compound differs from complex, and stands opposed to simple, which see respectively.

COMPOUND, in *Botany*, applied to leaves, expresses their being composed of more than one piece, or leaflet, connected by a common footstalk, which is either simple or branched. *Folium decompositum* is applied to a leaf more than once compounded, and *supra-decompositum* to any greater degree of such conformation. See *LEAF*.

A compound flower is limited by Linnæus to that particular kind of aggregate flower, (see *AGGREGATE*), whose florets are sessile on a common receptacle, within a common calyx, and furnished with anthers united into a tube. These are the exclusive characters of the great natural class *Syngenesia*, the 19th in the Linnæan System, the last order of that class, *monogamia*, consisting of simple flowers, being now, by general consent, diffused. Compound flowers consist either of uniform perfect florets, each furnished with filaments and pistils, and all ripening perfect seed; or of such florets in the disk, with female, or even neutral, ones in the radius; or, lastly, of male florets in the disk and female florets in the radius. Their partial corollas are either tubular and five-cleft, or ligulate, strap-shaped. Their manner of becoming double is for the tubular and perfect florets of the radius to become ligulate and female only, or even neuter, which change is often extended to all the florets, even to the centre, in which case no seed is perfected. Sometimes the ligulate florets become not only abortive, but

tubular,

tubular, or quilled. The prevailing colour of compound flowers is yellow, especially their disk. The ligulate radius is often white, red, or blue, with a yellow disk, but if the radius be yellow, the disk is never of any other colour, except what arises from the anthers or stamens.

COMPOUND *Force, Forms, Poffils, Fractions, Fracture, Gland, Harmony.* See the substantives.

COMPOUND *interest*, called also *interest upon interest*, is that which is reckoned not only upon the principal, but upon the interest itself forborn; which hereby becomes a sort of secondary principal. See INTEREST.

COMPOUND *Larceny.* See LARCENY.

COMPOUND *Machine, Majesty.* See the substantives.

COMPOUND *motion*, that motion which is effected by several conspiring powers.

Powers are said to conspire, if the direction of the one be not directly opposite to that of the other; as when the radius of a circle is conceived to revolve about a centre; and at the same time a point to move straight along it.

All curvilinear motion is compound.

It is a popular theorem, in *Mechanics*, that in an uniform compound motion, the velocity produced by the conspiring powers, is to that of either of the powers separately, as the diagonal of a parallelogram, according to the direction of whose sides they act separately, to either of the sides. See COMPOSITION of motion.

COMPOUND *numbers.* See COMPOSITE.

COMPOUND *pendulum*, in *Mechanics*, that which consists of several weights constantly keeping the same distance, both from each other, and from the centre about which they oscillate. See PENDULUM.

COMPOUND *proposition.* See PROPOSITION.

COMPOUND *quantities*, in *Algebra*, are such as are connected together by the signs + and - : thus, $a + b - c$, and $bb - b$ are compound quantities.

COMPOUND *ratio* is that which the product of the antecedents of two or more ratios has to the product of their consequents. Thus 6 to 72 is a ratio compounded of 2 to 6, and 3 to 12. See PROPORTION and COMPOSITION of ratios.

COMPOUND *Sounds, Sord, Taste, Ulcer, Words.* See the substantives.

COMPOUND *stops* on an organ, are such wherein each finger-key acts upon two, three, four, or even five pipes of different pitches, and causes them all to sound together, whenever a key in this stop is put down. The most common of these are the CORNET, the SESQUIALTER, and the MIXTURE, or furniture stops. (see these articles;) the use of these compound stops with others which are not tuned to the actual note which they represent, or that on the diapason stop, but to the XIIth or XVIIth thereof (see TWELFTH, TIERCE, and LARGOT, Stops) is to introduce an inconceivable number of actual discords into the common chord, even during full performances, as any person may, at leisure, satisfy himself, by writing down the several notes produced by a chord formed of the stops above-mentioned, combined with the diapason and other unisonant stops, or by putting down all the keys on a piano-forte at the same time, to which a chord on these stops answers. No problem in the science of harmonics is more difficult of solution, than to account for the ear's receiving pleasure from such a confused and dissonant assemblage of sounds: and it can only perhaps be accounted for by supposing, that the concordant notes being so many more in number in these kinds of chords, overpower and drown the discords to such a degree, that the ear is able by a sort of mental exertion to pass over and not attend to the latter, any more than to the rattling of the

keys of a badly constructed harpsichord, or the noise of carriages in the street adjoining a concert-room, &c.

COMPOUNDED IDEA, in *Logic*, unites several ideas of a different kind, which are usually considered as distinct single beings, whether those united ideas be simple or complex. See COLLECTIVE idea.

COMPOUNDING FELONY, in *Law.* See THEFT-BOTE.

COMPOUNDING of information upon penal statutes, is an offence of an equivalent nature to CHAMPERTY in criminal causes; and, besides, it is an additional misdemeanour against public justice, by contributing to make the laws odious to the people. At once therefore to discourage malicious informers, and to provide that offences, when once discovered, shall be duly prosecuted, it is enacted by statute 23 Eliz. c. 5, that if any person, informing under pretence of any penal law, makes any composition without leave of the court, or takes any money or promise from the defendant to excuse him, (which demonstrates his intent in commencing the prosecution to be merely to serve his own ends, and not for the public good), he shall forfeit 10*l.*, shall stand two hours on the pillory, and shall be for ever disabled to sue on any popular or penal statute.

COMPREHENSION, in *English Church History*, denotes a scheme proposed by sir Orlando Bridgman in 1667-8, for relaxing the terms of conformity in behalf of protestant dissenters, and admitting them into the communion of the church. A bill for this purpose was drawn up by lord chief baron Hale, but disallowed. A project to the same purpose was proposed and argued in parliament soon after the restoration, in 1661; but the royalists and zealous churchmen formed a majority, and the endeavours of those who wished to avail themselves of the king's declaration to this effect, proved ineffectual. The attempt was renewed by Tillotson and Sillingfleet in 1674, and the terms were settled to the satisfaction of the non-conformists, but the bishops refused their assent. This scheme was likewise revived again immediately after the Revolution; the king and queen expressed their desire of an union: however the design failed after two attempts; and the act of TOLERATION was obtained. Birch's Life of Tillotson, p. 42, 167, &c.

COMPREHENSION, in *Metaphysics*, is that act of the mind, whereby it apprehends, or knows, any object presented to it, on all the sides, whereon it is capable of being apprehended, or known.

To comprehend a thing, is defined by the schoolmen, *rem aliquam totam & totaliter cognoscere.* See APPREHENSION.

COMPREHENSION, in *Rhetoric*, a trope, or figure, whereby the name of a whole is put for a part; or that of a part for a whole; or a definite number of any thing for an indefinite.

COMPREIGNAC, in *Geography*, a town of France, in the department of the Upper Vienne, and district of Bellac; 10 miles N. of Limoges.

COMPRESS, in *Surgery*, from the Latin word *comprimere*, to press together, is a bolster of linen cloth folded several times, and employed on various occasions.

Compresses are formed sometimes of lint or surgeon's tow, but more commonly of half-worn linen without seam or selvage. The size, thickness, and form of them, must be regulated by the part to which they are applied, or the object which the surgeon has in view.

When they are intended to cover other dressings to a wound, &c., they must be always larger than the subjacent plasters, and must lie upon the part in an equal and even manner.

manner, so as to retain the dressings readily on the affected part.

Compresses are divided into simple and graduated. A simple compress consists of linen or flannel folded from two to eight times; and are made quadrangular, triangular, or with pieces cut off a square at the corners, so as to give the compress a crucial form, &c. A graduated compress consists in a number of simple ones laid one above the other, and sometimes sewed together in the shape of a pyramid; these latter are used for compressing a bleeding artery, or they are applied to the bottom of a fistulous sore, or to the sides of a deep fleshy wound, or upon ganglions, and some other tumours, in order to disperse them.

Compresses are employed to fill up inequalities, or hollow parts of the body; they are also used to guard wounds against the contact of irritating substances, and sometimes merely to receive the purulent discharge. They are frequently moistened with different medicated fluids, and are applied either warm or cold according to the surgeon's intention.

Compresses are sometimes of considerable length, and of little breadth, especially when employed to the extremities of the body in a circular form, after the manner of common bandages. (See *BANDAGE*.) The latter kind of bandage is named by the French *longuëte*. The methodical application of such compresses has effected a cure in some aneurisms: they are also found particularly useful in sinusitis and deep sores, where matter is apt to collect and require counter openings. From the various uses of compresses, writers have named them contentive, uniting, diversive, &c.

Tourniquets, trusses, and some other surgical instruments, are only particular kinds of compresses. (See *ANEURISM*, and *HERNIA*.) Compression is now and then more advantageously by means of the finger only, and will often stop a violent bleeding in parts where no surgical apparatus can be employed. Thus the root of the nose is compressed with the fingers, in order to stop violent sneezing, and the crown of the teeth in order to relieve the tooth-ach; and in order to make polypi suppurate, sphacelate, or fall-off, their roots are compressed between the fingers. A great number of the bandages that are used, produce their effects merely by the support which they give to the parts.

The diversity of cases in which a skilful surgeon will employ compression with advantage, cannot here be detailed; but in addition to what has already been said, we may add that by this means alone dropical swellings may frequently be dissipated; and of this, Mr. John Bell records a striking example in his "Principles of Surgery," 4to. vol. i. p. 128, where he treats of bandages in general. By the way, we may mention, that Mr. John Bell has here given some excellent general observations; but (as in other parts of his writings) he affects to have read in authors what no one else can find; and in the instance before us, he pretends to have read "the treatises of Soranus, Glaucus, and Diocles, in which," he says, "I find nothing but what has fallen into deserved neglect;" whereas these authors have not written any treatises upon bandages that have descended to the present generation! Well might this author ask the question, "Why should we go back to the ancients in this pitiful manner?"

COMPRESSED Fossils, this term is applied by naturalists to various extraneous substances found in the earth, which seem to have suffered a flattening or change of shape, from the weight of the superincumbent strata; this is not uncommon with fossil shells, of large size compared with their thickness, as echini, &c., and should be particularly noted

in describing the circumstances of any stratum, where such compressed fossils appear.

The mountains of Quedliac and Portfallet in Norway, contain an argillaceous pudding-stone, the siliceous pebbles of which have been thought by some to be compressed, because those in the lower part of the stratum are progressively thinner than those above (Kirwan's Geo. Exp. 8.); but this probably was their original shape. The small black chert pebbles, which form uniform layers in the lower part of the London clay stratum, are all of them somewhat flat, but certainly not by compression, we think.

Bituminized wood, or the resemblance of trunks of trees in wood-coal, is often found flattened, as at Todt, and near Aqua-Sparta in Umbria, at Thun in Switzerland, in Iceland, &c. Siliceous petrifications have frequently somewhat the appearance of compressed wood, and have been so denominated; but a careful examination of several specimens, in which the transverse section presented two equal segments of circles joined together by their chords, instead of a dilated ellipsis, which would probably be the form of round wood when compressed, has induced us to think that these, and probably many extraneous fossils said to be compressed, may originally not have been round.

Peat-fossils of the present race, such as the trees found in the sea at Sutton in Lincolnshire, and in other places, have without doubt been flattened, by the weight of peat and earth lying upon them, when in a soft and decaying state.

COMPRESSION, from the Latin *compressio*, is the act of pressing, or squeezing matter together, so as to force its parts nearer to one another, and enable the whole to occupy a smaller space; or the effect produced by that cause. *Compression* and *condensation* denote the production of the same effect; that is, the reduction of a certain quantity of matter into a smaller space; with this difference, however, that when the effect is produced by the application of any external force, as by the pressure of a superincumbent fluid, or by means of mechanical engines, it is more properly denominated *compression*; but when the effect is produced by some internal action, as by the escape of caloric in cooling, it is then called *CONDENSATION*, which see.

Compression takes place in various natural processes, and it is also practised by art for various mechanical and economical purposes. The inquiries which may be made concerning it, are, 1st, the principal cases in which compression is produced in nature; 2dly, the mechanical methods which are used for compressing bodies in manufactories and in civil economy; and 3dly, the principal effects which result therefrom. Of the natural compressions, those which arise from the weights of superincumbent solids are sufficiently obvious, and they will, besides, be particularly examined under the articles *GRAVITY*, and *MECHANICS*; but those which are occasioned by fluids, being much less evident, are seldom sufficiently underlooked even by those who are concerned with them.

Water and air are the two fluids with which mankind is naturally and unavoidably conduced; and the pressures of those fluids differ materially from each other. The pressure of water is proportionate to its perpendicular height and not to its quantity, and that pressure is exerted in every direction; for instance, let two vessels of the same height, but of different sizes, as a small pipe and a large reservoir, be filled with water to the same height; then if you measure a square inch in the bottom of the small pipe, and a square inch in the bottom of the reservoir, the pressure upon those two different square inches is the same; though the reservoir

may contain twenty or thirty thousand times more water than the pipe. Also, if you take a square inch on the side of the vessel close to the bottom, the lateral pressure upon it will be equal to the pressure on the square inch of the bottom; excepting indeed a trifling difference which arises from the perpendicular height of the water above the latter, which barely exceeds the perpendicular height of the water above the former.

But though water presses upon every body that is immersed in it in proportion to its perpendicular height, and tends to force the parts of those bodies closer to each other, provided that those bodies have not pores large enough to admit the water; yet water is not itself susceptible of compression, unless it be in a very slight, and scarcely perceptible degree; hence at different depths, water is nearly, if not exactly, of the same density.

The air of the atmosphere, as well as the other aerial fluids, is highly elastic, in consequence of which it not only presses upon all bodies that are immersed in it; but, by pressing upon itself, its own density is rendered different at different altitudes. The bulk of a given quantity of air has been found to decrease in the direct ratio of the force with which it is compressed; hence it has been demonstrated, that if the altitudes above the surface of the earth be taken in arithmetical progression the densities of those altitudes will be in geometrical progression decreasing. If a very long tube, closed at one end be filled with water, and then be inverted in a basin of water, that fluid will remain suspended in it to the height of about 33 feet, that weight of water being counterpoised by the pressure of the atmosphere: (see the articles ATMOSPHERE, PNEUMATICS, and HYDROSTATICS.) Therefore, since a man on the surface of the earth is pressed by the weight of the atmosphere, if he places himself at 33 feet below the surface of the water, he will be pressed by twice the above-mentioned weight of the atmosphere; if he places himself at 66 feet below the surface of the water, he will sustain a pressure equal to three atmospheres, and so on.

If the above-mentioned experiment be tried with a tube filled with and inverted in a cup of quicksilver, instead of water, it will be found that the quicksilver will remain suspended in it to the height of about 30 inches, the specific gravity of quicksilver being much greater than that of water. As the pressure of the atmosphere counterpoises a perpendicular pillar of quicksilver about 30 inches high, or, more accurately speaking, between 28 and 31 inches; for it varies between those limits (see BAROMETER); the weight of such a pillar. Let its base be what it may, shews the pressure of the atmosphere upon a surface equal to that base. A pillar of quicksilver, whose base is an inch square, and whose altitude is a mean between 28 and 31 inches, weighs 14½ pounds avoirdupois; therefore, at a mean, the pressure of the atmosphere upon every square inch on the surface of the earth, is equal to 14½ pounds; and by the rule of proportion, or by simple multiplication, we may determine the weight of the atmosphere upon any other given surface. Thus the pressure of the atmosphere on a square foot, (which is equal to 144 square inches) is 2088 pounds. The pressure on the body of a middle sized man, whose surface is equal to about 12 square feet, is 25056 pounds; and the pressure on the surface of the whole earth is equal to about 1164201684000000000 pounds. For further explanation of the mechanical properties of fluids in general, see the articles referred to above, and likewise the article ELASTICITY.

The artificial methods of compressing substances, either solid or fluid, as employed in the arts, and for economical purposes, are very numerous; different compressing instru-

ments being used for almost every particular purpose. Thus there are hammers, levers, screw-presses, hydraulic presses, condensing engines, rolling or fluting mills, &c. Thus the apothecary obtains his expressed oils by means of a screw-press, the book-binder compresses the leaves of his book, both with the hammer, and with a screw-press of a different form; the gold-beater compresses and flattens his metallic plates first through the rolling (or flattening) mill, and then by the strokes of a hammer, and so forth. Descriptions of those instruments may be seen under their different names.

Besides the above-mentioned mechanical properties, compression produces some remarkable physical effects, of which it will be necessary to give a distinct account. We shall, however, previously to this, briefly state the discoveries that have been made with respect to the compressibility of water, which, as has been already mentioned, is so very slight as to be next to nothing.

Water was, during a very long period, considered as a fluid perfectly unelastic; that is, unyielding, or incompressible; and this opinion was corroborated by an experiment of the Academy del Cimento in Italy. About a century and a half ago the members of that academy endeavoured to ascertain whether water was capable of being compressed in any degree. For this purpose, they filled a hollow metallic sphere with that fluid, and stopped the aperture very accurately. This ball then was pressed in a proper machine, but no contraction could be observed, nor indeed was the apparatus capable of manifesting small degrees of compression. Hence they concluded that water was not capable of compression. This opinion prevailed until the year 1761, when the ingenious Mr. Canton discovered the compressibility of water, and of other liquids, which he immediately made known to the Royal Society. He took a glass tube, having a ball at one end; filed the ball and part of the tube with water, which he had deprived of air as much as it was in his power; then placed the glass thus filled under the receiver of an air-pump; and on exhausting the receiver, which removed the pressure of the atmosphere from over the water and the glass vessel which contained it, in consequence of which the water rose a little way into the tube, viz. expanded itself. He then placed the apparatus under the receiver of a condensing engine, and on forcing the air into it, which increased the pressure upon the water, a diminution of bulk evidently took place; the water descending a little way within the tube. "In this manner," Mr. Canton says, "I have found by repeated trials, when the heat of the air has been about 50°, and the mercury at a mean height in the barometer, that the water will expand and rise in the tube by removing the weight of the atmosphere, one part in 21740; and will be as much compressed under the weight of an additional atmosphere. Therefore the compression of water by twice the weight of the atmosphere is one part in 10870."

"Water has the remarkable property of being more compressible in winter than in summer, which is contrary to what I have observed, both in spirit of wine and oil of olives."

By the same means, and in the same circumstances, Mr. Canton ascertained the property of being compressed in some other fluids, and the results are as in the following table:

Compression	{	of spirit of wine	66	} millionth parts,
		of oil of olives	48	
		of rain water	40	
		of sea water	40	
		of mercury	3	

Mr. Canton was of opinion that the above-mentioned diminution of bulk under the receiver of the condensing engine, is not to be attributed to any air contained in the water, or any of the other fluids; because when he tried the experiment with water which had been forced to imbibe more than an usual quantity of air, the compression did not appear to be greater. Yet it may be observed, that considering the slight degree of compression which water is capable of, and the difficulty of depriving water entirely of air, one might still be induced to doubt whether that compression is not to be attributed to the air. See Canton's account of those experiments in the 52d and 53th vols. of the Philosophical Transactions.

With respect to the effects produced by compression, it is in the first place to be remarked, that certain bodies, when pressed, suffer a derangement of form; but as soon as the pressure is removed, they recover their former shape. Those bodies are said to be *elastic*, and they are distinguished into *perfectly elastic*, when they recover their former bulk and shape entirely, as is the case with common air, and *imperfectly elastic*, when they recover their former shape only in part, which is the case with far the greatest number of bodies.

When the bulk of a body is reduced by compression, the specific gravity of that body is proportionately increased; thus the specific gravity of fine gold, that has been fused only, is 19,258; but the specific gravity of the same, after having been hammered, is 19,362. The specific gravity of pure silver, that has only been fused, is 10,474; that of the same hammered, 10,511. The specific gravity of copper, simply fused, is 7,738; that of the same hammered, is 8,8;8, and so forth.

Whenever the bulk of a body, and especially of a metallic one, is diminished in bulk by hammering, flattening between rollers, or by any other sort of compression, its hardness or rigidity is increased at the same time; thus soft brass, or silver, or copper, by hammering, or pressing, is rendered hard and elastic. By the application of a degree of heat, somewhat lower than incandescence, that hardness or elasticity of the metal is removed, and at the same time its specific gravity becomes equal to what it was before the hammering. This process is called *annealing* or *softening*.

The other remarkable effects of pressure may be reduced to three; namely, a modification of the action of the same degree of heat on bodies, an extrication of heat, and an extrication of light. When heat is applied to any body, the effects differ according as the application takes place under different atmospherical pressures. On the tops of mountains, where the pressure of the atmosphere is considerably less than it is on the level of the sea (in consequence of which the quicksilver does not stand so high in the barometer in the former place as it does in the latter), water boils at a lower temperature; and so do other fluids. At the level of the sea, water boils at about the temperature of 212° of Fahrenheit's thermometer; but Mr. Sauffure found on Mount Blanc (which is reckoned the highest mountain of any in Europe; where the barometer stood at 17,05 English inches), that the heat of boiling was 185½°. From the experiments of Sir George Shuckburgh, and of Mr. De Luc, the following table of the heats of water boiling under different pressures of the atmosphere, which are indicated by the altitudes of the mercury in the barometer, was calculated by Mr. Kirwan.

Heat of boiling water under different barometrical altitudes

Barom.	Heat.	Barom.	Heat.
30	212°	21	195,36
29	210,28	20	193,36
28	208,52	19	191,66
27	206,75	18	189,46
26	204,99	17	187,76
25	203,26	16	184,36
24	201,48	15	180,66
23	199,27	14	176,70
22	197,22		

Mr. Watt observed, that in a very good vacuum water boils, or produces copious vapours, even when its heat is not greater than 70°. On the other hand, when water is caused to boil under a great pressure, a much greater degree of heat must be applied: thus, in Papin's digester (being a strong vessel in which a quantity of water is confined) the water may be rendered nearly red hot; and in that state the dissolving property of water is increased prodigiously. In Iceland a natural discharge of hot water comes out of a deep pit, and when this water falls upon the surface of the earth, it deposits a white powdery siliceous substance, which, it is supposed, the water was enabled to dissolve by the volcanic heat, that acted upon it under a great degree of compression.

Dr. Hutton, like some other geologists, has ascribed the formation of the various minerals chiefly to the action of subterraneous fire; but he thought that that action was modified by the compression of the superincumbent strata of the earth, which rendered it capable of producing such effects as could not be easily imitated on the surface of the earth; for it seemed to him, that under a great degree of compression, volatility would expose to a high degree of heat such substances as generally fly off in our fires, on the slightest application of heat. Hence, by their chemical relations peculiar combinations might arise; such as are dug from the bowels of the earth. What Dr. Hutton supposed, was in a great measure verified by Sir James Hall, bart., who, by his numerous and well imagined experiments, has shewn a variety of remarkable effects, on different substances, by the action of heat modified by compression; but his interesting experiments will be described amongst the effects of heat.

The other two remarkable effects of compression on bodies, are an extrication of heat and an extrication of light. These effects having been observed with all those bodies which may be subjected to decisive experiments; it may be presumed from analogy, that the same effects take place in various degrees, with all bodies which are susceptible of compression, but not with those which are not compressible; and, in fact, liquids which are only compressible in the slightest degree imaginable, cannot be heated by agitation, which is friction amongst their particles; and there is no friction without compression. As heat is evolved from a body when compressed, so when the bulk of a body is enlarged, heat is absorbed, in consequence of which the surrounding bodies are cooled; and this absorption of heat seems to be directly proportioned to the enlargement of bulk. The following instances will illustrate the nature of these remarkable effects. The blacksmith, by about twenty strokes of the hammer upon a piece of iron bar not thicker than a man's little finger, can render one extremity of it red-hot, visible in the day light. But it is to be remarked, that the same extremity of the iron bar cannot be rendered red-hot

COMPRESSION.

red-hot a second time, unless it be previously softened in the fire. The condensation of common air, quickly performed, produces a considerable degree of heat; so much so, that cotton has been set on fire, and so has heated charcoal, by compressing the air quickly upon it. An ingenious mechanic in Paris is said to have kindled tinder in tubes, or compressing pumps, of about a quarter of an inch in diameter, and six inches in length, by a single stroke of the piston. Steam, also, by mechanical compression, may be made to yield its latent heat. A mixture of oxygen and hydrogen gases, if quickly compressed, takes fire and explodes with great force. The discharge of an air-gun is attended with a faint flash of light, visible in a darkened room; and the sudden compression of the air in a tube, to the end of which a strong glass is fitted for the purpose of manifesting what passes within, is likewise attended with light.

In explanation of these phenomena, it is supposed, that independent of the specific caloric, peculiar to every body, a quantity of it is lodged in the pores of each body, and that this may be extricated by compression, in the same manner as water is squeezed out of a sponge. But a farther examination of facts will throw more light upon the subject.

It is well known, that friction amongst solids generates heat, which often occasions actual inflammation and combustion. Thus the axes of wheels of carriages, and other machines, are sometimes set on fire by the violence of the friction; thus, in a turning lathe, the pieces of work are heated to a great degree; thus, the violent collision of a steel against a flint, renders the abraded particles of the former perfectly red-hot. Count Rumford, willing to investigate the origin of the heat produced by means of friction, instituted an intertelling series of experiments in the workshops of the military arsenal at Munich, where cannons are bored; in which case a degree of heat far exceeding that of boiling water is produced. After having examined the temperature of the metallic shavings, their quantity, capacity for containing caloric, &c. and finding reasons sufficient to account for the production of that remarkable quantity of heat which was manifested in the course of the boring, he began to consider which way that heat might be derived, whether from the contiguous metal or from the air, and in order to determine the matter by means of actual experiment, he contrived a suitable apparatus, the principal part of which was intended to turn a piece of metal in a box full of water, whilst a blunt borer acted forcibly against it, so as to produce a considerable degree of friction, without abrading from the piece of metal more than an inconsiderable quantity of it in a fealy powdery state. With this apparatus, in which both the piece of metal and the borer were plunged in water of the temperature of the atmosphere, no heat could be derived from the air. The machine which turned the piece of metal being put in motion, the water in the box, &c. began to be heated soon after, and in 2½ hours time, from the commencement of the operation, the water actually boiled. The result of this experiment shewed, that the heat, which had caused the water to boil, was not derived from the air, and from computation it appeared, that the abraded metallic powders could not furnish it in consequence of the change of their capacity. "Is it possible," count Rumford says, "that the heat could have been supplied by means of the iron bar, to the end of which the blunt steel borer was fixed? or by the small neck of gun-metal by which the hollow cylinder was united to the cannon?" "These suppositions appear more improbable even than either of those before-mentioned, for heat was continually going off, or out of the machinery, by both these

passages, during the whole time the experiment lasted. And in reasoning on this subject, we must not forget to consider that most remarkable circumstance, that the source of the heat generated by friction, in these experiments, appeared evidently to be inexhaustible. It is hardly necessary to add, that any thing which any insulated body, or system of bodies, can continue to furnish without limitation, cannot possibly be a material substance; and it appears to me to be extremely difficult, if not quite impossible, to form any distinct idea of any thing, capable of being excited and communicated in the manner the heat was excited and communicated in these experiments, except in motion." Phil. Transf. for the year 1798.

It seems strange that so distinguished a philosopher as Count Rumford should be induced to admit the immateriality of heat from the result of the above-mentioned experiment, without adverting to the compression which the metal must have received from the action of the borer.

Having mentioned the principal effects which arise from compression, amongst which the extrication of heat has been reckoned the most intertelling; we might now state several instances of the contrary effect, namely, of the absorption of heat attending the enlargement of bulk which takes place in several bodies after the removal of the cause which occasioned their compression. With respect to this, however, we need not be very prolix in this place. The hydraulic engine at Schemnitz furnishes a strong instance of the latter effect. That engine operates by causing a fall of water to compress air in a strong vessel, the re-action of which forces other water to rise in another pipe for certain purposes. Now, in consequence of the great height of the superincumbent column of water, the air in the air-vessel of this machine, is very much compressed, and it is said that if the stop-cock of this vessel is opened, the air, in rushing out of it and expanding itself, absorbs so much heat, and, of course, cools the adjacent bodies so much, as to produce a copious deposition of moisture from the atmosphere, and the actual formation of ice upon the stop-cock. The cold produced by the evaporation of water, and especially by that of spirituous liquors, might be likewise adduced as instances of the above-mentioned property. But the farther investigation of these latter phenomena belongs to other branches of natural philosophy, which will be explained in other places.

The term *compression*, in astronomy and geography, has often been used to denote that diminution of the curvature of the surface of the earth, which has been observed about the poles, as if the earth had been compressed at the poles by some external force, which caused it to lose its perfect spherical form, and to assume nearly that of an oblate spheroid; it being, however, well known that the spheroidal figure arises from the centrifugal force of the parts distant from the poles, which is likewise the case with the other planets. The precise quantity of deviation of the polar regions of the earth from the spherical form, or the difference between the equatorial and polar diameters, has been variously stated by different astronomers. Sir Isaac Newton, supposing the density of the earth to be uniform, has assigned $\frac{1}{230}$ for the difference of the above-mentioned two diameters. Boscovich, taking a mean of all the different measurements, found the difference of the two diameters equal to $\frac{1}{227}$. From other measurements and calculations since made by other able mathematicians, this difference has been reckoned equal to $\frac{1}{17}$ or $\frac{1}{250}$ by De la Lande; to $\frac{1}{17}$ by De la Place; to $\frac{1}{17}$ by Séjour; to $\frac{1}{17}$ by a late anonymous writer. These latter results agree pretty well with the lengths of the pendulums, which have

been found to vibrate seconds in different latitudes; so that upon the whole $\frac{1}{15}$, or a fraction not much differing from this, seems to be the nearest to the true difference of diameters; and the difference between the different measurements probably arises from the imperfection of instruments, from the partial attraction of mountains, and from the unequal density of the earth. See professor Playfair's paper on the figure of the earth, in the Transactions of the R. Society of Edinburgh, vol. v. p. 1.

COMPRESSION, in Surgery, not only signifies the act of compressing, but denotes a class of diseases produced by the pressure of an extraneous body; and, in some cases, a compression will cause the most serious consequences. For example, compression of the brain, arising from a fracture of the cranium, and a portion of the bone in a depressed state, may occasion inflammation, suppuration, and destruction of that part of the brain to which the mechanical effect is applied; which will be, more or less, attended by comatose symptoms, and privation of sense or voluntary motion. In such cases, the surgeon endeavours to remove the cause, by elevating the edge of the bone, or extracting it entirely, either with or without trepanning, as the circumstances may indicate. (See TREPANNING and TREPINI.)

When the symptoms of a compressed brain are evidently marked, no time ought to be lost in setting about an examination of the state of the cranium, wherever appearances point out, or even lead us to conjecture, in what part a fracture may be situated. For this purpose an incision is to be made upon the spot through the integuments to the surface of the bone, which must be sufficiently exposed to admit of a free examination. Some authors have recommended a crucial incision; others one in form of the letter T; while many advise a considerable part of the integuments to be entirely removed. But as it is more agreeable to the present mode of practice to save as much of the skin as possible, a simple incision is generally preferred, unless the fracture run in different directions, and then the incision must vary accordingly. It will frequently happen, that a considerable part of the integuments must be separated from the skull, in order to obtain a distinct view of the full extent of the fracture; but no part of the integuments is to be entirely removed. When blood-vessels of any considerable size are divided, either before or at the time of the examination, they ought to be allowed to bleed freely, as in no case whatever is the loss of blood attended with more advantage than the present. When, however, it appears that the patient has lost a sufficient quantity, the vessels ought to be secured.

After the integuments have been divided, if the skull be found to be fractured and depressed, the nature of the case is rendered evident; but even where there is no external appearance of fracture, tumour, discoloration, or other injury, if the patient continue to labour under symptoms of a compressed brain, if the pericranium has been separated from the bone, and especially if the bone has lost its natural appearance, and has acquired a pale white or dusky yellow hue, the trepan ought to be applied without hesitation, at the place where these appearances mark the principal seat of the injury. Again, although no mark, either of fracture or of any disease underneath, should appear on the outer table of the bone, yet there is a possibility that the inner table may be fractured and depressed. This indeed is not a common occurrence, but it happens perhaps more frequently than surgeons have been aware of; and where it does happen, the injury done to the brain is as great, and attended with as much danger, as where the whole thickness of the bone is beaten in. The application of the trepan is therefore usually deemed a necessary measure.

But if after the application of the trepan, it happens that no mark of injury appears either in the outer or inner table in that part, or in the dura mater below it, and that the symptoms of a compressed brain still continue, a fracture in some other part is to be suspected; or that kind of fracture termed by practitioners *counter-fracture*, where the skull is fractured and sometimes depressed on the opposite side to, or at a distance from, the part where the injury was received. This is fortunately not a very frequent occurrence, and has even been doubted by some; but different instances of it have, beyond all question, been found. If therefore the operation of the trepan has been performed, and no fracture is discovered, no extravasation appears on the surface of the brain; and if blood-letting, and other means usually employed do not remove the symptoms of compression, the operator is to search for a fracture on some other part. The whole head should again be examined with much accuracy; and, by pressing deliberately but firmly over every part of it, if the smallest degree of sensibility remains, the patient will shew signs of pain, either by moans or by raising his hands, when pressure is made over the fractured part. In this way, fractures have been frequently detected, which might otherwise have been concealed.

Having here considered every thing preparatory to the operation of the trepan, we shall point out the means best adapted for the removal or elevation of a depressed portion of the bone, by the use of that instrument, under the article TREPAN. After the operation, the patient should be placed in as easy a position, in bed, as possible, with his head and shoulders elevated a little more than ordinary. If the operation be attended with success, he will soon begin to shew signs of increasing sensibility and the original bad symptoms will gradually disappear. In this state, he ought to be kept as quiet as possible; proper laxatives being occasionally administered, and such as may be least of a nauseating nature. His food ought to be simple and easy of digestion, and his drink of the most diluent kind. If he complain of the wound being uneasy, an emollient poultice should be immediately applied, and renewed three or four times in the twenty four hours. By these means there will commonly be a free suppuration from the whole surface of the fore.

Every time the wound is dressed, the purulent matter ought to be wiped off from it with a fine warm sponge; and if any degree of sloughiness takes place on the dura mater or parts adjacent, it will then be completely separated. Granulations will begin to form, which will continue to increase till the whole arise to a level with the surface of the cranium. The edges of the fore are now to be dressed with some mild cerate, and the rest of it covered with fine lint, kept gently pressed on it by a night-cap properly secured. In this way the cure will go on favourably; luxuriance of granulations will commonly be prevented; the parts will cicatrize kindly; and as all the skin has been preserved in making the first incision, the cicatrix will be but little observed.

But things do not always proceed in this favourable manner. Sometimes, in a few hours after the operation, the patient is seized with a kind of restlessness, tossing his arms, and endeavouring to move himself in bed, while the symptoms of a compressed brain remain nearly the same as formerly. In this case, especially if the pulse be quick and strong, the patient ought to be bled freely, as there will be reason to suspect some tendency to inflammation in the brain. Sometimes, though the trepan has been properly applied, the symptoms are not relieved, on account of extravasated fluids collected internally under the dura mater, or between the pia mater and brain, or in the cavity of the ventricles. The danger in these cases will be in proportion to the depth of the

the collection. Particular attention, therefore, ought always to be paid, to the state of the dura mater after the perforation has been made. If blood be collected below the dura mater, this membrane will be found tense, dark coloured, elastic, and even livid; in which case, an opening becomes absolutely necessary to discharge the extravasated fluid. Gentle scratches are to be made with a scalpel, till a probe or directory can be introduced; upon which the membrane is to be sufficiently divided in a longitudinal, or sometimes even in a crucial, direction, till an outlet to the fluid be given.

After the dura mater has been cut in this manner, there is a possibility of the brain protruding at the opening; but the danger from this is not equal to that arising from effused fluids compressing the brain. A troublesome appearance also now and then follows the operation of the trepan; namely, the excrescences called *fungi* (see FUNGUS), formerly supposed to grow immediately from the surface of the brain, but which, in general, originate from the surface of the dura mater or cut edge of the bone granulating too luxuriantly. After the wound is cured, only a small cicatrix will remain, and, in general, the parts will be nearly as firm as at first, but when much of the integuments hath been separated or destroyed, as they are never regenerated, the lobe will be left covered only by a thin cuticle, with some small quantity of cellular substance. When this is the case, the patient usually wears a piece of silver, copper, or tin, properly fitted and lined with flannel, to protect it from the cold and other external injuries.

This is the method now commonly practised in cases of compression: but it frequently happens, that instead of compression, such a degree of concussion takes place that no assistance from the trepan can be attended with any advantage; for the effects of concussion (see CONCUSSION) are totally different from those of compression, and therefore to be removed in a different manner. In Part III. of his Surgical and Physiological Essays, Mr. Abernethy says, the degree of pressure which the brain can sustain without great injury to the system, probably may vary according to the disposition of that organ to be affected by it, the suddenness of its application, and the direction in which it is made; and although it must be very difficult to obtain any precise knowledge on this subject, yet there is great reason to believe that the brain can bear more pressure without injury to it, than was formerly supposed. The first of these circumstances seems evident; for, in some persons, a slight pressure produces severe symptoms; whilst in others a much greater degree is borne without inconvenience. Where a compressing cause does not, in the first instance, occasion bad effects, if inflammation of the brain ensues, it seems then to act injuriously; which probably arises from the increased susceptibility of the brain. We can rarely judge of the effects of pressure when any part of the cranium is beaten in by a blow; for in that case the shock generally occasions stupor. Internal hæmorrhages, perhaps, afford us the best criterion whereby to determine the effects of pressure on the brain. A case (the seventh) which Mr. Abernethy relates, sufficiently illustrates this remark, for it appears that a considerable hæmorrhage must have taken place before it deprived the patient of his faculties; since he walked home, undressed himself, and went to bed, after the trunk of the middle artery of the dura mater had been ruptured. In cases of apoplexy, also, the hæmorrhage is generally very large, before it produces those consequences which destroy life.

Compression of the brain will sometimes arise from the luxuriant growth of a part of the inner table of the skull, or

a small projecting piece of bone, which may have advanced spontaneously; and it has now and then been discovered that epileptic fits arose from this cause. In apoplexy the common cause of a compression of the brain is effused blood or serum. When persons have a palsy of the lower extremities from incrustation of the spine, the paralysis arises from compression made on some part of the spinal marrow by a disease of the vertebra; and nothing can relieve a patient effectually in this case, unless the pressure be removed by extending the spinal column mechanically. (See CURVATURE OF THE SPINE.)

A dangerous compression may be produced in different parts of the body, by the existence of tumours, by dislocation of the joints, or by fractures, &c. See TUMOUR, DISLOCATION, and FRACTURE.

COMPRESSOR *Naris*, or *Narium*, in *Myology*, is a muscle of the nose, described also under the name of *compressor nasi*. It arises from the root of the ala nasi, where its fibres are strongly connected with the depressor labii superioris et alæ nasi, and are also mixed with those of the depressor alæ nasi. It ascends on the dorsum of the nose, and scatters its fibres between the ala and the ossæ nasi; they are partly joined with the fibres of the opposite muscle, and partly connected with those of the frontal portion of the fronto-occipitais. By drawing down the movable part of the alæ nasi, and bringing it to the septum, it closes the aperture of the nostrils: in this case the depressor alæ nasi must concur with it, in order to render the inferior part of the ala fixed. If this latter muscle does not act at the same time, the compressor naris will elevate the lower portion of the ala, and thereby expand the nostril. Cowper calls it *elevator alæ nasi*: Santorini and Winslow, *transversalis nasi*.

COMPRESSOR *prostatæ*. It seems doubtful whether this should be considered as a distinct muscle, or only as a portion of the levator ani. It arises from the under surface of the arch of the pubis, and is lost between the prostate and rectum. It will therefore have the power of elevating or compressing the former part.

COMPRINT, a surreptitious printing of one book-feller's copy by another person, for gain; which was contrary to common law, and is now, under certain limitations, restrained by statute. See LITERARY PROPERTY.

COMPRISE NIENT. See NIENT.

COMPROMISE, a treaty or contract, whereby two contending parties establish one or more arbitrators, to judge of and terminate their differences in an amicable way.

The regular way of appointing a compromise is by a writing, expressing the names of the arbitrators, the power of choosing an umpire, or super-arbitrator, in case of need, a time limited for the arbitrage, and a penalty on the party who does not abide by the decision.

By the civil law, a slave cannot make a compromise without the leave of his master, nor can a pupil without the authority of his guardian, or a wife without that of her husband. So a slave, a deaf or dumb man, a minor, and the person who is a party in the cause, are incapable of being chosen arbitrators in a compromise.

The occasions on which a compromise is not allowed of, are restitutions, marriage-causes, criminal affairs, questions of state; and, generally, any thing wherein the public interest is more concerned than that of private persons.

In our law, a compromise is not of so much extent. West defines it the faculty, or power of pronouncing sentence between persons at controversy, given to arbitrators by the mutual private consent of the parties, without public authority.

Matters compromised are also matters of law referred, or made an end of. See ARBITER and ARBITRATION.

COMPROMISE is also used in beneficiary matters; where it signifies an act, whereby those who have the right of election, transfer it to one or more persons, to elect a person capable of the office or dignity.

COMPS, in *Geography*, a small town of France, in the department of the Var, and chief place of a canton in the district of Draguignan; ten miles N. of Draguignan. It contains 739 and the canton 2949 inhabitants. The territory includes 525 kilometres and 9 communes.

COMPSA, CONZA, in *Ancient Geography*, a town of Italy, in Samnium, towards the south-east, upon the Aufidus. At the siege of this city was killed Milo, so well known by Cicero's oration on occasion of his murder of Clodius. See CONEZA.

COMPSTATUS, a river of Thrace, mentioned by Herodotus, which ran from north to south, and discharged itself into the lake Bisbonis, near Abdera.

COMPTE, LEWIS LE, in *Biography*, a native of Bourdeaux, and of the order of jesuits, went to China in the character of missionary in the year 1685. Upon his return, he published "Memoirs on the present State of China," &c., in two vols. As an historian he has been accused of a too great partiality for the character and manners of the Chinese, and of attributing to them earlier advances in civilization and improvement than he was warranted by real facts. His work was profcribed, and condemned to the flames, as the best means of refuting his opinions. He died at his native place in the year 1729. *Nouv. Dict. Hist.*

COMPTE, NICHOLAS DE, a French monk, a native of Paris, is known as the author or editor of different works which have met with a favourable reception. Among others, he published "The remarkable Travels of Peter della Valle, a Roman Gentleman, translated from the Italian, in 4 vo s. 4to."—"A new and interesting History of the Kingdoms of Tonquin and Laos, in 4to." translated from the Italian of father Manni, in 1666. In the year preceding this, he published the third volume of father Lewis Coulon's "History of the Jews." He died at Paris in 1689.

COMPTING, or COUNTING-HOUSE, an office in the king's household, under the direction of the lord steward, so called, because the accounts for all expences of the king's household are there taken daily by the lord steward, comptroller, cofferer, master of the household, the clerks of the green-cloth, and the clerks comptrollers. They also there make provision for the household, and make payments, and orders, for the good government thereof.

In the counting-house is the board of green-cloth.

COMPTON, HENRY, in *Biography*, an eminent English bishop, was the youngest son of Spencer, the second earl of Northampton. He was born in the year 1632, and, though deprived of his father by death at a very early age, was initiated with great care in the rudiments of learning, after which he was entered at Queen's college, Oxford, where he prosecuted his studies with much diligence, till the year 1652. From the university he went to the continent, with a view of perfecting himself in the modern languages, and of acquiring an accurate knowledge of foreign establishments, ecclesiastical and civil. On his return, he accepted under Charles II. a cornet's commission in the king's horse guards, which he soon resigned and devoted himself to the service of the church. He was immediately admitted to the degree of master of arts in the university of Cambridge, and afterwards obtained the grant of the next vacant canonry of Christ-church, Oxford. In 1666, he was admitted canon-commoner of that college, and shortly after was in possession of the re-

ctor of Cottenham in Cambridgeshire. He was in the following year made master of St. Croffe's hospital near Winchester, and in 1669 inflated canon of Christ-church. Without farther delay he took the degrees first of bachelor of divinity, and then of doctor of divinity. In 1674, he was nominated to the bishopric of Oxford, where he remained but a single year, when he was appointed dean of the royal chapel, and translated to the see of London. For these valuable and highly important preferments, Dr. Compton was indebted as well to his own excellent character as to his family connections. Soon after he had been made bishop of London, he was sworn in of his majesty's privy council, and undertook the superintendency of the religious education of the princesses Mary and Anne. To the conscientious discharge of his duty as a preceptor may be justly ascribed the zealous attachment of his pupils, afterwards sovereigns of England, to the Protestant religion, as by law established. This worthy prelate endeavoured to devise methods of reconciling the dissenters to his own church; his intentions were unquestionably good, but some of the means which he used to effect his purpose could not be justified on the principles of protestantism. Under the pretence of guarding the church from heresy, he obtained a royal mandate to prohibit certain discussions on the doctrine of the Trinity; he nevertheless shewed himself a decided friend to the Protestant reformation, and encouraged his clergy to defend it with Christian zeal, when the principles of popery, or a more blameable indifference to all religion, were encouraged by the profligate court of Charles II. His conduct, in this respect, which cannot be too highly applauded, rendered him obnoxious to the king and to his brother, who soon after ascended the throne as James II. The name of the excellent prelate was immediately after this event struck out of the list of the privy council, after which he was deprived of his office as dean of the royal chapel. For refusing to become an instrument of ecclesiastical tyranny among his own clergy, and to sanction various unconstitutional measures of the king, he was, in 1686, suspended from his episcopal office. In 1688 the dread of a revolution in favour of the prince of Orange, induced the king to attempt regaining the affection of Dr. Compton, and that of the other clergy, who had been familiarly treated, by restoring them to their office. It was, however, too late to effect a reconciliation, and the bishop shortly after took a decided part in favour of the new order of things. He joined in conducting the princess Anne of Denmark from London to Nottingham; in signing the association begun at Exeter, and in waiting on the prince of Orange at the head of his clergy, to thank him for his interference in preserving the laws and liberties of the nation; and in the house of peers he voted for the prince and princess of Orange in the room of the abdicated king. Immediately after this event had been determined on, he was restored to the office of privy counsellor, and to that of dean of the royal chapel; he had also the honour of performing the ceremony at the coronation of king William and queen Mary, instead of archbishop Sancroft, who refused to take the oaths to the new government. In the year 1689 he was appointed one of the commissioners for reviewing the liturgy, and president of the convocation, in which certain proposed amendments were to be discussed. In this situation he at first joined the moderate party, who were for comprehending dissenters by adapting the liturgy to their minds, but afterwards he united himself with those members who advised and obtained the discontinuance of the convocation session. Dr. Compton was appointed, as bishop of London, a commissioner of trade and plantations, and in this capacity he selected and sent

over to the colonies in America, such clergymen as he thought best adapted, by their talents and zeal, to promote the interests of the church of England. In the year 1690, he attended the king, at his own expense, to the congress at the Hague, where the grand alliance against France was concluded. From this period he united himself more closely with the tory party, in consequence of which his influence at the court of king William was greatly diminished, if not wholly terminated; but in the reign of queen Anne, he recovered his former power and interest. Dr. Compton was in the commission for promoting the union of Scotland with England; he was assiduous in obtaining the act for augmenting small livings, by a grant of the first fruits and tenths; and he maintained a friendly correspondence with the foreign Protestant churches, and the university of Geneva, with a view of impressing them with favourable sentiments towards the Church of England, and of obtaining their disapprobation of those who should dissent from its discipline. He died at Fulham in the year 1713, in the eighty-first year of his age. For some time before his decease he is represented to have been much in the power of others, and to have followed their will rather than the dictates of his own mind. Through the whole of a long life he was exemplary in his moral conduct, and displayed the manners of a gentleman. He was a warm friend, a generous patron, and truly charitable to the wants of those about him. As a bishop he maintained the interests of the church, and was attentive to the conduct and advancement of his clergy, but as a preacher he was extremely dull and inanimate. His character as a literary man was respectable, though his works are not numerous nor of the first rank in merit. He published a translation from the Italian of "The Life of Donna Olympia Maldacchini, who governed the church during the time of Innocent X." "The Jesuits' Intrigues with private Instructions of that Society to their Missaries," translated from the French. "A Treatise of the Holy Communion," and letters to the clergy at different periods, which were reprinted in 1686, under the title of "Episcopalia, or Letters of the Right Reverend Father in God, Henry Lord Bishop of London, to the Clergy, &c." He also published "A Letter on Non-resistance," which may be seen in memoirs of Mr. John Kettlewell. Biog. Brit. Tindal's Continuation of Rapin, vol. vi. &c.

COMPTON, *Little*, in *Geography*, a town of the United States of America, in Rhode island.

COMPTONIA, in *Botany*, (so named by Dr. Solander, in honour of the right reverend Henry Compton, lord bishop of London, who cultivated many exotics at Fulham.) L'Herit. Stimp. Nov. Schreb. 1764. Willd. 1644. Gært. 564. Class and order, *monocia triandria*. Nat. Ord. *Amnaceae*.

Gen. Ch. *Male flowers*. *Catkin* cylindrical; loosely imbricated all round with concave, kidney-shaped, acuminate, caducous, one-flowered scales. *Cal.* Perianth two-leaved; leaves equal, boat-shaped, shorter than the seale. *Cor.* none. *Stam.* Filaments three, shorter than the calyx, forked; anthers six, two-valved. *Female flowers*. *Catkin* egg-shaped, closely imbricated with scales similar to those of the male. *Cal.* Perianth six-leaved; leaves opposite, in pairs, filiform, membranous at the base, many times longer than the seale. *Cor.* none. *Pist.* Germ roundish; styles two, capillary. *Peric.* none. *Seed.* Nut oval, one-celled, without valves. Eff. Ch. *Male flowers* in a catkin. *Calyx* two-leaved. *Corolla* none. *Anthers* forked. *Female flowers* in a catkin. *Calyx* six-leaved. *Corolla* none. *Styles* two. *Nut* oval.

Sp. C. *asplenifolia*. Hort. Kew. 3. 334. Mart. Willd.

Gært. tab. 90. fig. 7. (*Liquidambar asplenifolia*; Lian. Sp. Pl. Myrica. Lina. Hort. Clif. Gale marina. Pat. Mus. 773. Myrta brabantica æstis americana; Pluk. alm. 250. tab. 100. fig. 6, 7.) *Stems* near three feet high, shrubby, slender, hairy, branched. *Leaves* from three to four inches long, half an inch broad, alternately situated almost to the midrib, resembling those of spleenwort, dark green, hairy underneath, fitting close to the stalks. *Males calkins* lateral, erect. *Nut* obscure, tardily lenticular, naked, smooth, shining, obsoletey striated, of a bay colour. A native of New York, Pennsylvania, Virginia, and Carolina; cultivated by the dutchess of Beaufort in 1714; flowering from March to May. Bose was well acquainted with it in Carolina, and observed, that the branches generally died at the end of the third year, the new wood then succeeding to the old, as in the rubi; it was also seldom found in fruit, though it flowered abundantly.

COMPTROL, or CONTROL, is properly, a double register, kept of acts, issues, &c. of the officers or commissioners in the revenue, army, &c. in order to perceive the true state thereof, and to certify the truth, and the due keeping of the acts subject to that enregistrement. See REGISTER.

COMPTROLLER, an officer established to comptrol, or over-see public accounts, and to certify, on occasion, whether things have been comptrolled and examined, or not. Thus, we have a *comptroller of the king's bouhold*, or of the accounts of the board of green-cloth; *Comptroller-general of the customs*; *comptroller of the navy*; *comptroller of the mint*; *comptroller of the excise*; *comptrollers of the accounts of the army*; of the chamber, &c. See CLERK.

COMPTROLLER of the *Artillery*, is the person who inspects the artillery-munitions, makes out the pay bills, takes the accounts of stores and the remains of them, and is accountable to the office of ordnance.

COMPTROLLER is also the name of an officer, who superintends, examines, and inspects the accounts of the army at large.

COMPTROLLER of the *hanaper*, is an officer in chancery, attending the lord chancellor daily in term and seal time. This officer is to take all things sealed from the clerk of the hanaper, inclosed in bags of leather, and to note the just number and effect thereof; to enter them in a book, with all the duties belonging to the king and other officers for the same, and so charge the clerk of the hanaper with them. See CLERK and HANAPER.

COMPTROLLERS of the *peils*, are officers of the exchequer, whereof there are two, *viz.* two chamberlains clerks, who keep a comptrol of the peil of receipts, and gongsgout; originally they took notes of other officers' accounts, in order to discover if they did amiss.

COMPTROLLER of the *pipe*, an officer of the exchequer, who writes out summonses twice a year, to levy the farms and debts of the pipe. See EXCHEQUER and PIPE.

He was anciently called *duplex ingrossator*.

COMPTROLLER'S *bay*, in *Geography*, a bay of the Pacific ocean in the N.W. part of America, situated to the north of Cape Suckling, and of an island, stretching S. E. and N.W. about 3 leagues, and lying on the N.W. side of the N. E. end of Kaye's island. N. lat. 60° 0'. W. long. about 215° 30'.

COMPULSION, and *inevitable Necessity*, in *Law*, constitute a species of defect of will, and they denote such a constraint upon the will, by which a man is urged to do that which his judgment disapproves; and which, it is to be presumed, his will (if left to itself) would reject. As punishments

punishments are only inflicted for the abuse of that free will, which God has given to man, it is highly just and equitable that a man should be excused for those acts, which are done through unavoidable force and compulsion. Of this nature is the obligation of *civili* subjection, whereby the inferior is constrained by the superior to act in a manner contrary to what his own reason and inclination would suggest; as when a legislator establishes iniquity by a law, and commands the inferior to do an act contrary to religion or sound morality. How far the excuse will be admitted "in foro conscientie," or whether the inferior in this case is not bound to obey the divine rather than the human law is a question, which admits of no doubt. Nevertheless, obedience to existing laws is unquestionably a sufficient extenuation of civil guilt before the municipal tribunal. The sheriff, who burnt Lutimer and Ridley, in the bigotted days of queen Mary, was not liable to punishment from Elizabeth, for executing so horrid an office; being justified by the commands of that magistracy, which endeavoured to restore superstition under the holy auspices of its merciless sister, persecution. As to persons in private relations, the principal case where constraint of a superior is allowed as an excuse for criminal misconduct, is with regard to the matrimonial subjection of the wife to her husband; for neither a son nor a servant is excused for the commission of any crime, whether capital or otherwise, by the command or coercion of the parent or master; (1 Hawk. P. C. 3.) though in some cases the command or authority of the husband, either express or implied, will privilege the wife from punishment, even for capital offences. And, therefore, if a woman commit theft, burglary, or other civil offences against the laws of society, by the coercion of her husband; or even in his company, which the law construes a coercion; she is not guilty of any crime; being considered as acting by compulsion, and not of her own will. (1 Hal. P. C. 45.) This doctrine is at least a thousand years old in this kingdom, being found among the laws of king Ina the West-Saxon. (cap. 57.) This rule, however, with regard to crimes, admits of an exception in crimes that are "mala in se," and prohibited by the law of nature, as murder and the like. Also in treason, no plea of coercion shall excuse the wife. In infer or misdemeanors there is likewise an exception; for a wife may be indicted and set in the pillory with her husband, for keeping a *brothel*. And in all cases where the wife offends alone, without the company or coercion of her husband, she is responsible for her offence, as much as any female. Another species of compulsion or necessity is what our law calls *duress per viam*; which see. A third species of necessity, distinguishable from the actual compulsion of external force or fear, is, when a man has his choice of two evils set before him, and being under a necessity of choosing one, he chooses the least pernicious of the two. Of this sort is that necessity, where a man by the commandment of the law is bound to assist another for any capital offence, or to disperse a riot, and resistance is made to his authority; it is in this case justifiable and even necessary to beat, to wound, or perhaps to kill the offenders, rather than permit the murderer to escape, or the riot to continue. 1 Hal. P. C. 53. There is another case of necessity, which has occasioned much speculation among the writers upon general law; viz. whether a man in extreme want of food or clothing may justify stealing either, to relieve his present necessities. Grotius and Puffendorf, and many other of the foreign jurists, maintain the affirmative; alleging that in such cases the community of goods by a kind of tacit concession of society is revived. Some of our own lawyers have held the same opinion (See Binton, c. 10. Mirr. c. 4.

§ 16.); though it seems to be an unwarranted doctrine, borrowed from the notions of some civilians; at least, it is now antiquated; the law of England admitting no such excuse at present. 1 Hal. P. C. 54. However, the founders of our constitution have thought it better to vest in the crown the power of pardoning particular objects of compassion than to countenance and establish theft by one general unadvising law. Blackst. Com. vol. iv.

COMPULSOR, formed of the verb *compellere*, to oblige, *coercere*, an officer under the Roman emperors, dispatched from court into the provinces, to compel the payment of taxes, &c. not paid within the time prescribed.

These were charged with so many exactions, under colour of their office, that Honorius cashiered them by a law in 417.

The laws of the Visigoths mention military compulsors; who were officers among the Goths, whose business was to oblige the tardy soldiers to go into the fight, or to run to an attack, &c.

Cassian mentions a kind of monastic compulsors, whose business was to declare the hours of canonical office, and to take care the monks went to church at those hours.

COMPULTERIA, in *Ancient Geography*, a town of Italy, in Campania. It abandoned the Romans to surrender itself to Hannibal; but Fabius restored it by the sword.

COMPUNCTION, formed from *compungere*, of *purgere*, to prick, in *Theology*, an inward grief in the mind for having offended God.

The Romanists own their confession insignificant, unless attended with compunction, or pricking of heart. See CONFESSION.

Among spiritualists, compunction bears a more extensive signification; and implies not only a grief for having offended God, but also a pious sensation of grief, sorrow, and displeasure, on other motives. Thus, the miseries of life, the danger of being lost in the world, the blindness of the wicked, &c. are to pious people motives of compunction.

COMPURGATOR, in *Law*, one that by oath justifies, or clears, another's innocence. They were introduced as evidence in the jurisdiction of the middle ages, and their number varied according to the importance of the subject in dispute, or the nature of the crime with which a person was charged. In some cases these compurgators were multiplied to the number of three hundred. (Præf. Nicol. ad Wilkins, p. 11.) But the usual number was eleven. It has, indeed, been held by later authorities, that fewer than eleven compurgators will answer the purpose; but sir Edward Coke is positive that there must be this number; and his opinion is founded both on better authority and on better reason, for as wager of law is equivalent to a verdict in the defendant's favour, it ought to be established by the same or equal testimony, namely, by the oath of twelve men. Thus Glanvil expresses it (l. 1. c. 9.) "iurabit duodecima manu;" and in 9 Hen. III. when a defendant in an action of debt waged his law, it was adjudged by the court "quod defendat se duodecima manu." Thus too, in an author of the age of Edward I. we read, "adjudicabit reus et legem tuam duodecima manu." And the ancient treatise, entitled, "Dyve'site des courts," expressly confirms sir Edward Coke's opinion.

This device, which was adopted for rendering the purgation by oath more certain and satisfactory, was found to be in effectual. It was a point of honour with every man in Europe, during several ages, not to desert the chief on whom he depended, and to stand by those with whom the

ties of blood connected him. Whoever then was hold enough to violate the laws, was sure of devoted adherents, willing to abet and eager to screen him in whatever manner he required. The formality of calling comparators proved an apparent, not a real security, against falsehood and perjury; and the sentences of courts, while they continued to refer every point in question to the oath of the defendant, became so flagrantly iniquitous as to excite universal indignation against this method of prevention. See OATH and WAGER of Law.

COMPUTATION, the manner of accounting and estimating time, weights, measures, and money.

The word is sometimes also used among mathematicians in the like sense as CALCULATION.

COMPUTATION of a planet's motion. See PLANET.

COMPUTATION is particularly used in Law in respect of the true account, or construction of time, so understood, as that neither party do wrong to the other, nor the determination of time be left at large, or be taken otherwise than according to the judgment and intention of law.

A deed, dated May 11, to hold from the day of the date, shall be construed to begin on the 12th day of May.

If indentures of demise be ingrossed, bearing date May 11, 1769, to have and to hold the land in S. for three years from henceforth; and the indentures be delivered the 4th of June following; in this case, from henceforth shall be computed from the day of the delivery, and not from the date. And if the indentures be delivered at four of the clock in the afternoon, the said 4th of June, the lease shall end the third day of June in the third year; the law, in such computation, rejecting all fractions or divisions of the day, on account of that uncertainty which is the mother of contention. In writings, ordered by the stat. 27 Hen. VIII. to be inrolled within six months, if such writings have date, the six months shall be accounted from the date, and not from the delivery: if they want date, it shall be accounted from the delivery. Coke, lib. 5.

If a deed be shewn to a court at Westminster, it shall remain in court (by judgment of law) all the term in which it is shewn: for all the term is but as one day in law. Coke, ibid.—If a church be void, and the patron does not present within six months, the bishop of the diocese may collate his chaplain; but these six months shall be computed according to 28 days of the month; and not according to the calendar.

COMPUTATION of Miles, after the English manner, allows 5280 feet, or 1760 yards to each mile; and the same shall be reckoned, not by straight lines, as a bird or arrow may fly, but according to the nearest and most usual way. Cro. Eliz. 212.

COMPUTO, a writ thus called from its effect, which is to compel a bailiff, chamberlain, or receiver, to yield his accounts. It is founded on the statute of W. & M. 2. c. 12.

The same lies for executors of executors; and against the guardian in socage, for waste made in the minority of the heir.

COMPUTO vicemilitis habendo respectu. See RESPECTU.

COMPZA, in Ancient Geography, a town of Italy, in the territory of the Hirpini, towards the frontiers of Lucania. Hannibal, after the battle of Cannæ, was invited into the country of the Hirpini by Statius, who promised to surrender to him the town of Compa. The modern name is CONSA or CONZA. See also COMPSA.

COMRADE is a common appellation for a fellow-soldier in the same regiment, troop, or company.

COMSHE, in Geography. See COMPSHE.

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COMTAT VENAÏSSIN, a country situated in the south of France, formerly belonging to the pope, by whom it was ceded, together with its chief city Avignon, to the French government, soon after the revolution of 1789. It now forms part of the department of Vaucluse.

COMTE, COUNT. The titles of *comte*, of *duc*, of *vicaire*, of *centenier*, or *thungen* before the time of Charles the Bald, were not hereditary in families. These officers administered the finances and justice in the provinces: they were, at the same time, magistrates and military characters; they convoked the *ban* and *arrière-ban*. They assembled and conducted the troops to the general rendezvous. And when they judged a cause they had their shields on.

COMTE du Palais. See MAJORDOME.

COMUM, in Ancient Geography, a town of Gallia Transpadana, situated towards the north, on the southern bank of the lake Larius. It was founded by the Gauls, became a Roman colony, and was enlarged by Scipio. Julius Cæsar established Greeks in it, and then called it the new Comum, but upon their departure it lost this epithet. It was a municipal town. Pliny founded in it schools and a public library. See COMO.

COMUS, in Mythology, the god of jollity or festivity. There is great reason to believe he was the Chamos of the Moabites; Baal-Phegor, Baal-Peor, Priapus, and Bacchus. He is represented under the appearance of a young man, with an inflamed red countenance, his head inclined, and crowned with flowers; his air drowsy; leaning on a huntsman's spear in his left hand, and holding an inverted torch in his right. His statue was placed at the chamber doors of new married persons; his pedestal crowned with flowers.

CON, Ital. a preposition, placed before many musical terms; as *Con aris*, with the bow, after a *pirricato*, which see. *Con fordini*, with the fordini or mute. *Con affetto*, tenderly. *Con furia*, furiously. *Con discrezione*, discreetly, as to rapidity. *Con violini*, with violins, &c.

CONADIPSAS, in Ancient Geography, an ancient town of Scythia, on the other side of Imaus.

CONAFADOS, an episcopal town of Arabia, under the metropolis of Bosra.

CONAJOHARY, in Geography, a post town of America, on the south side of Mohawk river, in the state of New York, 36 miles above Schenectady, and 318 from Philadelphia.

CONAME, in Botany, the name given by Aublet to a genus formed by him for a shrub found in Cayenne, which has since been considered as a phyllanthus. He gives it the following character. Male and female flowers on different plants. *Calyx* six-cleft. *Cor.* none. *Stam.* numerous. *Pist.* Germ. striated; style bifid; stigma villous. *Peric.* Capsule six-celled.

CONANA, in Ancient Geography, an episcopal town of Asia, in Pamphylia.

CONANICUT, in Geography, an island near the coast of America, a little to the east of Rhode island. N. lat. 41° 25'. W. long. 71° 20'.

CONANT, JOHN, in Biography, was born at Yeatonton, Devon, in the year 1628. He was entered at Exeter college, Oxford, in 1646, where he acquired great reputation for his diligence and for his talents as an able disputant. As a classical scholar he was remarkable for the purity of his Latin style, and for his intimate and extensive acquaintance with the Greek language. He was also well versed in the several oriental tongues. In 1633, he was chosen fellow of Exeter college, where his fame, as a tutor, procured him pupils from many very respectable families. The commencement

commencement of the civil wars obliged him to retire from the university, and he officiated for some time at the living of Lynnington, where he was plundered of his property, and imprisoned. As soon as he was liberated he went to London, and became domestic chaplain to lord Charles. While he continued in his lordship's house at Hanfield in Middlesex, he preached a gratuitous lecture at Uxbridge on a week day to numerous audiences. On the 7th of June 1649, he was unanimously chosen rector of Exeter college, without any sollicitation on his own part. Shortly after this he was in danger of being driven out of all public employment, by the parliament's requiring his subscription to the "engagement," by which a promise was to be given to be true and faithful to the commonwealth of England, without a house of lords. This he at first declined; having however a fortnight given him to reconsider the matter, he submitted; but under a declaration, subscribed at the same time with the "engagement," which rendered that instrument almost nugatory. He now entered upon his office as rector with increased zeal, and discharged the several duties incumbent upon him, with the utmost diligence and fidelity. In December 1654, he was appointed divinity-professor of the university of Oxford, and in three years afterwards he was raised to the dignity of vice-chancellor of that university, which he retained till August 5, 1655. While he held this high office, he was very instrumental in procuring Mr. Selden's valuable collection of books for the public library; he distinguished himself by the correction of abuses, and by the regulation of the public exercises in such a manner, as proved highly beneficial to the interests of solid learning. By some of his biographers, Mr. Conant has been applauded for the share which he took in defeating a project for erecting an university in the county of Durham. Praise on this account to us seems very ill bestowed, because the intended object was worthy of a great nation, whose places of public instruction cannot be regarded as sufficiently numerous, to supersede the necessity of others in distant parts of the kingdom. Upon the restoration of Charles II. Dr. Conant, in his official capacity, came to London, attended by the proctors, and others, and being introduced to the king he made a Latin speech on the occasion, and presented his majesty with a book of verses written by the members of the university. He was appointed, in March 1663, a commissioner with others to review the book of common prayer, and he assisted at the Savoy conferences. After this, upon the passing of the act of uniformity, he was deprived of his preferments, because he refused to conform. During eight years he lived in retirement, when, upon serious deliberation on the nature and lawfulness of conformity, he resolved to comply, and submitted to a re-ordination by Reynolds, bishop of Norwich, whose daughter he had married nearly twenty years before. Preferments were now immediately offered to his choice; and he accepted of the vicarage of All-Saints, Northampton, in which town he had for several years resided, in the highest estimation of the most respectable inhabitants. In Sept. 1675, his church and the greater part of the parish were destroyed by fire; but his own house escaped. In the succeeding year the bishop of Norwich offered him the archdeaconry, with this high compliment, "I do not expect thanks from you, but shall be very thankful to you, if you will accept of it." He condescended to this handsome request, and discharged the office worthily, as long as his health would allow. In December 1681, he was installed a prebendary in the church of Worcester, at the request of the earl of Radnor, who asked for a very desiring person, who never sought any thing for himself.

He had long laboured under a weakness of sight, which terminated in total blindness in the year 1686. This heavy calamity, and the weight and infirmities of old age, he bore with exemplary resignation to the divine will till his death, which happened March 12, 1693. He was interred in his own parish church of All-Saints in Northampton, where a handsome monument was erected to his memory. Dr. Conant was a man of solid and extensive learning, but his great diffidence led him to conceal his acquirements. We have six volumes of his sermons, of which one was dedicated by himself to the inhabitants of Northampton, the others were published after his death, by Dr. John Williams, afterwards bishop of Chichester, and Mr. Coates principal of Magdalen-hall. *Biog. Brit.*

CONARIUM, in *Anatomy*, a term which has been applied to the pineal gland of the brain, in consequence of its conical figure. See *BRAIN*.

CONATUS, *endeavour*, a term frequently used by philosophical and mathematical writers; nearly equivalent to *visus*. Conatus seems to be the same, with respect to motion, that a point is with respect to a line; at least the two have this in common, that as the point is inceptive of the line, or the term from which it commences; so is the beginning of all motion called the *conatus*. Add, that as in mathematical demonstrations, the extension of the point is conceived as if it were nothing at all; so, in the *conatus* of motion, there is no regard to the time wherein, or the length which, it advances. See *Law of NATURE*.

Hence, some define conatus to be a quantity of motion not capable of being expressed by any time or length. Accordingly, all motion tends precisely the same way wherein the moveable is acted on, or determined by the same moving power. See *MOTION*.

CONAWANGO, in *Geography*, a northern branch of Alleghany river, in Pennsylvania, which rises from Chattanooga lake.

CONCA, CAV. SEBASTIANO, in *Biography*, an historical painter of considerable reputation in the 18th century. He was born at Gaeta in the year 1676, and became the disciple of F. Solemene, the most celebrated master of the school of Naples at that period. At the age of forty, Conca established himself at Rome, and spent five whole years in drawing from the finest productions of ancient and modern art, in the vain hope of uniting to the graceful facility he had acquired from his master, a greater purity and correctness of design. But it was too late; bred a mannerist, he had insensibly imbibed those maxims which were to decide his future character; and at length he had the good sense to adopt the advice of the sculptor Le Gros, by pursuing the track which had originally been pointed out to him. He soon became an able machinist (*pittrice di macchina*), in a style not very unlike that of Cortona. He united to facility of invention, and rapidity of pencil, a gay and fascinating distribution of colour; but his flesh has generally too green a hue in the shadows. Amongst his large works at Rome, the "Assumption," at the church of St. Martino, and the "Prophet Jonas," at St. Giovanni Laterano, are of the best. Many of his other productions are at Loreto, Ancona, and other towns of the ecclesiastical state, besides an infinity of cabinet pictures dispersed throughout all parts of Europe. This artist died in 1764. He had a brother, Giovanni Conca, who assisted him in the execution of many of his large works, and is said to have been an excellent copyist. Lanzi, *Storia Pittorica*.

CONCA, in *Geography*, a town of the island of Corfica, 12 miles N. of Porto Vecchio.—A *Lu.*, a market town in a small lake in the Campagna di Roma, in Italy.—Alfo, a small

small river of Italy, which has its source in the duchy of Urbino, and flows into the gulf of Venice.

CONCALE. See CANCALE.

CONCALE Bay, in the channel, on the coast of the department of Ille and Vilaine in France, is a fine bay, in which the English effected a landing in June 1758, and whence they proceeded to the port of St. Malo, where they burnt above 100 vessels of different sizes.

CONCAMERATED, among *Builders*, an appellation given to such roofs as are arched in the vaults.

CONCAMERATIO, was an arched room in our ancient churches, between the east end of the church and the high altar; so formed, that in processions they might surround it.

CONCAN, or COCKUN, in *Geography*, a tract of country on the western coast of Hindoostan, situated between Bombay and Goa, and separated from the rest of the continent by a ridge of high mountains called the Gauts. When the Moguls seized on Hindoostan, they found this coast infested with pirates, and fitted out a fleet to protect their vessels. The Mahrattas, finding their piracies interrupted, armed against the Moguls, ravaged their possessions, and fitted out a fleet to protect their pirates. Conagy Angria, who by his courage had acquired the supreme command, was appointed governor of Severndroog, one of the best fortresses on the coast, where he formed an independent state, and in a little time extended his dominions for the space of 40 leagues along the coast, and six leagues wide towards the mountains. His successors assumed the name of Angria, and made peace with the Mahrattas on paying an annual tribute. They continued to make depredations on the coast, and seize all vessels that passed that way till the year 1756, when their fleet was destroyed, and the strong fort of Gheriah, in which the chief resided, was taken by admiral Watson and colonel Clive. The country now belongs to the Mahrattas. The principal towns are Choul, Fort Victoria, Dabul, Severndroog, Gheriah, Tamana, and Sunderdoo.

CONCANA, in *Ancient Geography*, a town of Spain, towards the north-east of Lucus Asturum, and to the south of Salis, near the sea. Horace says, that the inhabitants of this city took pleasure in drinking the blood of horses: and although a chalice took place in the manners of the people in Spain under the dominion of the Romans, Silius Italicus, who wrote under Trajan, gives an account of them similar to that of Horace.

CONCANGIUM, a Roman station, under the government of the honourable the duke of Britain, not mentioned in the Itinerary, but recorded in the *Notitia Imperii*, and generally believed to have been situated at Watercock, near Kendal, where are visible remains of a Roman station, and where Roman antiquities have been found.

CONCARNEAU, or CONQUERNEAU, in *Geography*, a small, but neat sea-port town of France, in the department of Finistere, and chief place of a canton in the district of Quimper, 42 miles S. E. of Brest. The place contains 2,200, and the canton 6,320 inhabitants; the territory includes 125 kilometres, and 4 communes. Its principal and almost only trade, is in pitchards, of which the average annual shipment is 600 barrels. The price of a barrel varies from 150 to 300 livres. N. lat. 47° 55'. E. long. 3° 45'.

CONCATENATION, in *Philosophy*, a connexion of things, in manner of a chain.

The concatenation of second causes is an effect of Providence. See CAUSE.

CONCAVE is applied to the inner surface of a hollow body; particularly if it be circular.

CONCAVE is particularly understood of mirrors and lenses: concave lenses are either concave on both sides, called *concavo-concave*; or concave on one side, and plane on the other, called *plano-concave*; or concave on one side, and convex on the other, called *concavo convex*, or *convexo concave*, as the one or the other surface is a portion of a less sphere.

The property of all concave lenses is, that the rays of light, in passing through them, are deflected, or made to recede from one another; as in convex lenses they are inflected towards each other; and that the more, as the concavity and convexity pertain to less circles.

Hence, parallel rays, as those from the sun, by passing through a concave lens, become diverging; diverging rays are made to diverge the more, and converging rays are either made to converge less, or become parallel, or go out diverging.

Hence, objects viewed through concave lenses appear diminished; and the more so, as they are portions of less spheres; and this in oblique, as well as in direct rays. See LENS.

Concave mirrors have the contrary effect to lenses: they reflect the rays which fall on them, so as to make them approach more to, or recede from, each other than before, according to the situation of the object; and that the more as the concavity is greater, or the spheres whereof they are segments, less.

Hence, concave mirrors magnify objects presented to them; and that in a greater proportion, as they are portions of greater spheres. See MIRROR.

Hence, also, concave mirrors have the effect of burning objects, when placed in their focus. See BURNING-GLASS.

CONCAVITY. An arch of a curve has its concavity turned one way, when the right lines that join any two of its points are all on the same side of the arch.

Archimedes, intending to include such lines as have rectilinear parts, in his definition, says, a line has its concavity turned one way, when the right lines that join any two of its points are either all upon one side of it, or while some fall upon the line itself, none fall upon the opposite side. Archim. de Sphær. and Cyl. Def. 2. Mac Laurin's Fluxions, art. 180.

When two lines, having their concavity turned the same way, have the same terms, and the one includes the other, or has its concavity towards it, the perimeter of that which includes, is greater than the perimeter of that which is included. Archim. ib. ax. 2.

CONCEALERS, in *Law*, such as find out concealed lands, *i. e.* lands kept privily from the king, by common persons, having nothing to shew for their title, or estate therein.

They are thus called *per antiphrasim*, a *concelando*; as *mons* is a *movento*, &c. Lord Coke calls them *turbidum hominum genus*.

CONCEALMENT of *bastard's death*. See BASTARD.

CONCEALMENT of *Treason*. See MISPRISON.

CONCELHO DE ANCIENS, in *Geography*, a town of Portugal, in the province of Tra-jos-Montes, 8 miles W.N.W. of Mirandela.

CONCELHO DE JAES, a town of Portugal, in the province of Tra-jos-Montes, 10 miles W. S.W. of Mirandela.

CONCELLANA, a town of Naples, in the province of Basilicata; 5 miles S. of Acerenza.

CONCENTEYNA, a town of Spain, in the province of Valencia; 25 miles N. of Alicante.

CONCENTRATION, in general, denotes the retiring, or withdrawing of a thing inwards, towards the centre, or middle.

External cold is said to concentrate the heat within bodies: after meals, the natural warmth retires, and as it were concentrates to promote the digestion.

CONCENTRATION is also used by Dr. Grew for the highest degree of mixture, viz. that wherein two or more atoms or particles touch, by a reception, and intrusion of the one within the other. See MIXTURE.

This he takes to be the case of all fixed bodies without taste or smell; their constitution being so firm, that till the particles be detached from each other by some extraordinary means, they cannot affect those senses.

CONCENTRATION, in *Chemistry*, the act of increasing the strength of fluids, which are rendered stronger by abstracting a portion of the mere menstruum. This is generally effected by evaporation, where the menstruum is driven off at a lower heat than is required to drive off the substance with which it is united. Thus, dilute sulphuric acid may be considered as a mixture of the real acid with water, and by applying a certain heat, the water may be evaporized, leaving the acid behind in a state of concentration. When concentrated as much as possible, its specific gravity is about twice as great as that of water, but it can rarely be obtained denser than 1.85. When concentrated to 2,000 it contains a considerable portion of water, as has been proved by combining it with barytes or potash, in which case water remains behind, and does not enter into the combination. Again, vinegar consists of an acid and water, and brandy of alcohol and water, and in proportion as the acid and alcohol are freed from the water, they are said to be more or less concentrated. This may be performed, 1. Either by simple distillation, in which case the acid or spirit comes over first, leaving the water behind; or, 2. By exposing the vinegar or brandy to severe frost, when the water will be frozen, and the acid or alcohol will be found in a state of concentration in the middle of the ice; the greater the cold, the higher the state of concentration; M. Lowitz has found, that the acid, however concentrated, congeals at -22° . Sulphuric acid, on the other hand, exposed to a much less severe cold, crystallizes, and to effect this, it must not be greatly concentrated. 3. Another mode of concentrating the acetic acid, is by distilling acetate of copper, reduced to powder, in a retort; at first there comes over a liquid nearly colourless, and almost insipid, and afterwards a highly concentrated acid tinged with green; but being distilled a second time in a moderate heat, it is colourless, transparent, exceedingly pungent and concentrated. 4. The most perfect method of obtaining this acid in a concentrated state, was discovered by M. Lowitz of Peterburg; it is thus: distil a mixture of three parts of acetate of potash, and four parts of sulphuric acid, till the acetic acid has come over into the receiver. To separate it from the sulphuric acid, with which it is slightly contaminated, it must be distilled over a portion of acetate of barytes. By the experiments of Adet, Darraacq, and others, on concentrating the acetic and acetic acids, it is ascertained that they differ only in concentration, each containing precisely the same proportion of oxygen. Concentrated acetic acid is capable of an access of oxygen, and in that state it is called oxygenated acetic acid. Sulphuric and nitric acids, whether diluted or concentrated, are still the same sulphuric and nitric acids; but sulphuric, and sulphurous, or nitric and nitrous acids, whatever be the state of concentration, have different properties, and are of course

specifically different acids. Elem. de Chymie. Thompson's Chemistry, Gren's Principles.

CONCENTRATION, in *Distillery*. Dr. Shaw, in his "Essay on the Distillery," is for introducing a method of concentrating the fermentable parts of vegetables from which their spirits are to be drawn by distillation; which, if it can be practised to be practised in the large way, will prove of very great use to the British distillery, as it will greatly shorten the distiller's business; which, at present, including the brewing, fermenting, &c. is much too long. He proposes only to evaporate carefully the wort, or other tinctures or decoctions of vegetables made for the distilling of their spirits, to the consistence of treacle: in this form they might be sold to the distiller, who might keep them by him as long as he pleased, and occasionally use them, by the easy method of reducing them into wort, by mixing warm water with them.

CONCENTRIC, in *Geometry and Astronomy*, something that has the same common centre with another.

The word is principally used in speaking of round bodies and figures, viz. circular, elliptical ones, &c. but may be likewise used for polygons, drawn parallel to each other, upon the same centre.

Concentric stands opposite to excentric.

To find the area of the space included between the circumferences of two concentric circles; see ANNULUS.

Nonius's method of graduating instruments, consists in describing with the same quadrant 45 concentric arches, dividing the outermost into 90 equal parts, the next into 89, &c. See NONIUS.

CONCENTRICITY of the *Strata*, in *Natural History*. The idea has very generally prevailed among geologists and mineralogical writers, that the several layers of matter or strata, which compose the surface of the earth we inhabit, were originally formed or deposited in uniform and level beds, or concentric to the centre or mass of the earth. Among these Mr. Whitehurst, in his "Enquiry into the Original State and Formation of the Earth," 1st edit. p. 192, says, the strata "obtained an uniform concentric arrangement, surrounding the centre of the earth, as so many shells may be supposed to surround an egg." And nearly similar have been the opinions of a large portion of writers on this subject. Mr. Kirwan, "Geological Essays," p. 22, supposes, that the crystallization of strata from the chaotic or polygenous fluid, in some cases, began at the surface, as we see happen to some salts and to lime water under evaporation, and that thus extensive strata might have been formed and sunk to the bottom, mollly in an horizontal position, but often from accidental ruptures during their fall, in an oblique or nearly vertical position. Dr. Townson, "Philosophy of Mineralogy," p. 68, says, "we must not suppose that the strata regularly surround the globe like the concentric circles of an onion; they are rather like the scales of a fish; rather *sguamosus* than *tunicatus*." Though, in general, they are of great extent when not broken and lost, they are known to have a natural termination." In the "Philosophical Transactions," No. 391, Mr. John Stracey gives a figure for explaining a supposition of his on this subject, viz. that the strata were originally formed while in a soft state, as so many wedges, each pointing to and terminating in the axis of the earth; and that by the diurnal revolution of the earth from west to east, these became bent into spirals, each lapping round each other, for some distance, and then ending, in succession.

Whimsical as this last idea must have appeared, when it was first published, now more than 80 years ago, we are somewhat

somewhat surprized that it had not the effect of occasioning subsequent geological observers to notice, more particularly, the endings of the strata, and the remarkable prevalence of their dip towards the south-east, compared with those in any other direction; especially when practical miners must have so often mentioned the dip "towards the 10 o'clock sun," as being the most common. Under the articles COAL, and COLLIERY, the writer of this has endeavoured to shew that the strata of the British islands end in succession in proceeding from the south-eastern part of England towards the north-west; the general dip being towards the south-east or nearly so, except in immensely dilocated parts of the country, as the wealds of Suffex, Kent, and Surry, the peak of Derbyshire and Staffordshire, &c. of which some further and curious particulars will be given under the articles DENUDATION, ELEVATION, and ENDINGS of Strata. From all which, it is expected that it will be made evidently to appear, that the strata were not originally concentric with the earth's centre, but that the same formed planes or zones, inclined eastward in a small angle with the horizon, which were of amazing extent, and were perfectly regular in their position, before they experienced the rude and almost inconceivable violence, which broke and tore the earth in pieces, and left it in its present form.

CONCEPTACULUM, in *Botany*, was originally applied by Linnæus to that kind of seed-vessel which he afterwards termed *folliculus*, and which consists of one valve only, bursting longitudinally, as in the natural order of *asclepiadeæ*. Gartner uses the term *conceptaculum* in a general and lax sense for a seed-vessel, nor is it at present technically applied to any particular kind of fruit.

CONCEPTION, in *Geography*, otherwise called *Penco*, a city of Chili, in South America, and capital of a jurisdiction or bishopric, suffragan of the archbishop of Lima, and having a chapter, consisting of a bishop, dean, archdeacon, and two prebendaries. The ancient city stood at the mouth of the river St. Pierre, E. of Talcahuana, on the S.W. shore of a beautiful bay, and on a small declivity, having a little river running through it, in S. lat. $36^{\circ} 43' 15''$, and in longitude from the meridian of Teneriff, according to Father Feuillée, $303^{\circ} 18' 30''$. The houses were built with mud or burnt bricks, and covered with tiles; the churches, and also the Franciscan, Augustine, and Dominican convents, as well as those belonging to the fathers of mercy, were small and mean, but the college of the Jesuits was constructed in a superior style of architecture. This city was first founded by captain Pedro de Valdivia in the year 1550; but the powerful revolt of the Indians of Arauco and Tucapel, obliged its inhabitants to remove to Santiago. Pedro de Valdivia, its founder, was killed in this contest, and his successor in the command shared the same fate. The inhabitants, however, petitioned the audience of Lima for leave to return to their original city; they were again either slain or dispossessed by the Indians; but those that survived were afterwards restored to their former possession, which they for some time continued to enjoy with apparent security. In 1603 a more general confederacy was formed against the city, by which it was almost wholly destroyed; but receiving fresh succours, it was again repaired. Subject, however, to dreadful earthquakes, and consisting of buildings ill adapted for permanent duration; it was totally destroyed by an earthquake in 1751 and nothing but its ruins are now visible on the spot where it once stood. After the destruction of this town, which, during the earthquake, was swallowed up rather by the sea than by the land, the inhabitants dispersed and encamped in the environs. In 1763 they selected another spot, situated about a quarter of a

league from the river Biobio, and three leagues from the ancient town of Conception, and the village of Talcahuana. On this spot they erected a new town, to which the bishopric, the cathedral, and the religious houses were transferred. The houses consist only of one story, that they may be able more effectually to resist the shock of earthquakes, which occur in those parts almost every year. This town occupies a large extent of ground. The inhabitants are about 10,000; and here is the residence of the bishop and a colonel of horse, who is the military governor. The bishopric is nominally bounded on the north by that of Santiago, the capital of Chili, where the governor-general resides, and on the east by the Cordilleras, and extending on the south as far as the straits of Magellan. But its true limit is the river Biobio, about a quarter of a league from the town. M. de La Pérouse says of this part of Chili, that it is the most fertile spot in the world. Corn, he says, produces sixty-fold, and the vine is equally abundant; the fields are covered with innumerable flocks, which, without requiring any care, multiply beyond all calculation. The only care necessary is to keep separate the different property of individuals; and oxen, horses, mules, and sheep herd together in the same pastures. A large ox is commonly worth eight dollars, a sheep $\frac{2}{3}$ of a dollar; but there are no purchasers, so that the inhabitants kill every year a great quantity of cattle, the skins and tallow of which are sent to Lima. They also cure some provisions for the consumption of the small coasting vessels which navigate the south seas. The climate is remarkably healthy, and M. Pérouse found several in this town that had completed 100 years; but notwithstanding all these advantages, the colony is not thriving, which he attributes principally to the prohibitory regulations that extend through every part of Chili. This kingdom, he says, of which the productions, increased to their maximum, would supply all Europe; whose wool would be sufficient for the manufacture of France and England, and whose herds, converted into salt provision, would produce a vast revenue; has no commerce. Four or five small vessels bring every year from Lima tobacco, sugar, and some articles of European manufacture, which the miserable inhabitants receive after having been charged with heavy customs at Cadiz, at Lima, and, lastly, at their arrival at Chili; in exchange for which they give their tallow, hides, some deals, and their wheat, which, however, bears so low a price, that the cultivator has no inducement to extend his tillage. Unfortunately, says Pérouse, for this country, it produces a small quantity of gold; the annual amount of which in the diocese of Conception is estimated at about 200,000 piastres. The administration of justice is very defective. To these several circumstances it is owing that the land remains uncultured, that commerce is in a low state, that the houses of the most opulent inhabitants of La Conception are almost destitute of furniture, and that the only workmen in the town are foreigners. The dress of the women consists of a plaited petticoat, discovering half the leg, formed of gold and silver luffs, which, being reserved for extraordinary occasions, is transferred, like jewels, from grand-mother to grand-daughter, striped stockings of red, blue, and white, and very short shoes, but such ornaments are only within the reach of a few; the rest having scarcely clothes to cover their nakedness. The idleness, together with the credulity and superstition of the inhabitants, has filled this kingdom with convents, both for men and women. The common people are a mongrel race, much addicted to theft, and the women are very easy of access. Nevertheless, those of a superior class, or the

trus Spaniards, are extremely polite, and hospitable. The inhabitants, and even the women, excel in horsemanship; they are very dextrous in managing the lance and noose; and they rarely miss their aim, though at full speed, with the noose, which they throw 40 or 50 yards, and thus halter the object of their diversion or revenge. The noose is made of thongs of cow-hides, which they twist with oil, till it is rendered supple and pliant, and so strong, as to hold, it is said, a wild bull which would break a halter of hemp of double thickness. De Ulloa's, &c. Voyage to South America, vol. i. Peroufe's Voyage round the World, vol. i.

CONCEPTION, *the bay of*, is one of the most commodious that can be found in any part of the world. The length from Terra-firma, N. and S. is nearly $3\frac{1}{2}$ leagues, and its breadth from E. to W. almost 3 leagues, which is contracted by the island of Quiriquina, forming two entrances; of these, that on the east side is the safest, being two miles broad, and accordingly frequented by most ships. The west entrance is between the island and Talcahuana point, and is near half a league in breadth. In the principal entrance of this bay is 30 fathom water, which depth afterwards decreases to 11 and 10, till within about a mile of the shore, opposite to the entrance. The western entrance, though the numerous rocks and breakers in it make it to appear very dangerous, has a channel with water sufficient for the largest ship, the depth being at first 30 fathoms, and never less than eleven. Within the bay are three roads or harbours, where ships anchor; for though the bottom be every where clear, it is only in one of these three places that ships can ride in safety, being no where else sheltered from the wind. The first, called Puerto Tomez, lies east and west, with the north point of Quiriquina, contiguous to the coast of Terra-firma. The anchoring place is about half a league distant from the land; in about 12 fathom water. But this road is used only when the ships come in during the night; it being difficult to reach either of the other two before day-light, as several tacks must be made for that purpose. In this bay the principal point is that of Talcahuana. It is properly an elbow, and bears S. S. W. from the fourth point of Quiriquina. This is much the most frequented, ships in general anchoring here, as it has not only better ground than any other part of the bay, but is most sheltered from the north winds. Whereas at Cirillo Verde, a little green mountain, situated near the city, they lie exposed not only to these winds, but also to the south winds; the land which should intercept them being low. Besides, the bottom is of a loose mud, so that the anchors in a hard gale of wind generally come home; and consequently the ships are in great danger of being stranded on the coast. From these inconveniences it may be concluded, that the only ships which anchor here are such as happen to be in these parts in the midst of summer, for which this road is most convenient, as it is nearest to the city. Although the tide rises in this bay six feet three inches, the water is smooth, and there is scarcely any current. It is high water here at the full and change of the moon, at 45 minutes past one. The bay is open only to the north winds, which never blow but in the winter, that is, from the end of May to October. Two rivers empty themselves into this bay; one of which passing through the city of Conception bears its name; the other is called St. Pedro. The first is the watering place for ships anchoring at Cirillo Verde; whereas those at Talcahuana supply themselves from streams that flow from the adjacent ennuences; they easily take on board a sufficient quantity of wood, of which there is plenty, and also of all other necessaries.

Ships, before they enter the bay of Conception, endeavour to make the island of Santa Maria, and then coast along it keeping at the same time a good look out for a reef of rocks which stretches out almost three leagues from the north-west point; thence they continue their course, keeping at a little distance from the main, there being no rocks besides those that are above the water. After weathering the rocks on the island of Santa Maria, they steer directly for Talcahuana point, at the distance of about half a league; from which sea-ward is a rock called Quiebra ollas, which should be carefully avoided, as it is surrounded with shoals. After being abreast of this rock, they steer for the north point of Quiriquina; off which lie two rocks swarming with sea-wolves; but as there is a sufficient depth of water all round them, there is no other danger in standing near them besides that which is visible. After passing them, the course is continued as near as possible to the island of Quiriquina, care being taken to avoid some other rocks lying along the shore. In making several tacks to get into Conception-bay, the island of Quiriquina must be avoided on the east and fourth sides, as there is a shoal on the south extending to a considerable distance from the shore. At a third part of the distance between the road at Talcahuana, and the point of the same name, is another shoal, running about half a league towards the east, in the middle of which is a ridge of rocks. To avoid this shoal, it is best at entering the bay with a land wind, to steer directly for the middle of a spot of red earth on a mountain of middling height, situated at the bottom of the bay, continuing this course till the ship has passed the shoal; and then to steer directly for the houses at Talcahuana, till within about half a mile from the shore, which is the usual anchoring place in 5 or 6 fathom water. The same care is also necessary to avoid another reef of rocks, lying between the Morro and the coast of Talcahuana.

CONCEPTION, or *Conception de los Pampas*, a town of South America, in Paraguay, on the S. side of the river Plata. S. lat. $36^{\circ} 30'$. W. long. $57^{\circ} 11'$.

CONCEPTION, *La*, a sea-port town of America, in the province of Veragua, on the Spanish main, with a harbour, formed by the river Veragua; 60 miles W. of Panama. N. lat. $8^{\circ} 52'$. W. long. $81^{\circ} 51'$.

CONCEPTION, a river of America, on the isthmus of Darien, which runs into the Spanish main. N. lat. $9^{\circ} 4'$. W. long. $78^{\circ} 15'$.

CONCEPTION *Bay*, a large bay on the east coast of Newfoundland island, whose entrance is between Cape St. Francis on the southward, and Plamborough head on the northward. It runs a great way into the land in a southern direction, having numerous bays on the W. side, in which are two settlements, Carboniere and Havre de Grace. Settlements were made here in 1610, by about 40 planters, under governor John Guy, to whom king James had granted a patent of incorporation. N. lat. $47^{\circ} 40'$. W. long. $52^{\circ} 40'$.

CONCEPTION *de Salawa*, or of *Salaya*, a small town of North America, in the province of Mechoacan, in Mexico. It was built by the Spaniards, as well as the Nations of St. Michael and St. Philip, to secure the road from Mechoacan to the silver mines of Zacateca. N. lat. 10° . W. long. $83^{\circ} 5'$. They have also given this name to several boroughs of America, to a sea-port of California, &c. &c.

CONCEPTION *de la Vega*, a town of Hayti, in what was formerly the Spanish part of Hispaniola, or St. Domingo. It gave the title of duke to the family of Columbus, the immortal discoverer of America.

CONCEPTION, in *Grammar*. See SYLLEPSIS.

CONCEPTION.

CONCEPTION, in *Logic* and *Metaphysics*, the simple apprehension or perception which we have of any thing, without proceeding to affirm or deny any thing about it.

The schoolmen usually make two kinds of conception; the one formal, the other objective.

The first is defined to be the immediate and actual representation of any thing proposed to the mind: on which footing, it should be the same thing to the understanding, that a word or voice is to the ear; whence some also call it *verbum mentis*.

The second is the thing itself represented by a formal conception. But others explode the notion of an objective conception, as being, in reality, no conception at all; excepting where the mind contemplates its own acts, &c.

Formal or proper conceptions, are subdivided into univocal, where several things are distinctly represented as under some common ratio, or in the same degree of perfection; analogous, where several things are represented as under some proportional likeness; and equivocal, where they are represented immediately as such, without regard to any common ratio or likeness.

Dr. Reid, in his "Inquiry into the Human Mind, on the Principles of Common Sense," and also in his "Essays on the Intellectual Powers of Man," (Ess. iv.), substitutes the word conception instead of the simple apprehension of the schools, and employs it in the same extensive signification. He also uses it, in common with some other writers, as synonymous with *Imagination*, which see. To this purpose, he says, that "conceiving, imagining, apprehending, understanding, and having a notion of a thing, are common words to express that operation of the understanding, which the logicians call "Simple APPREHENSION;" which is defined by them to be the bare conception of a thing without any judgment or belief about it. However, although conception may be exercised without any degree of belief, even the smallest belief cannot take place without conception; for he who believes must have some conception of the object of his belief. Dr. Reid, without attempting a definition of this operation of the mind, explains some of its properties, states different theories concerning it, and points out some mistakes of philosophers in their account of it. In every operation of the mind, says this writer, and in every thing which we call thought, there must be conception. Our senses cannot give us the belief of any object, nor can we remember or reason, nor exert any of our active powers, without this mental operation; but in bare conception, there can, he thinks, be neither truth nor falsehood, because it neither affirms nor denies. In this respect, conception differs from opinion; as an opinion, though ever so wavering, or ever so modestly expressed, must be either true or false; whereas a bare conception, which expresses no opinion or judgment, can be neither; to this purpose, Mr. Locke observes very justly, if we substitute conceptions for ideas, that our ideas, being nothing but bare appearances, or perceptions, in our minds, cannot properly and simply in themselves be said to be true or false, no more than a simple name of any thing can be said to be true or false. Mr. Locke, following the example of Des Cartes, Gassendi, and other Cartesians, has given the name of perception to the bare conception of things; and he has been followed in this respect by bishop Berkeley, Mr. Hume, and many late philosophers, when they are discussing the subject of ideas. They have been probably led into this impropriety, says Dr. Reid, by the common doctrine concerning ideas, which teaches us, that conception, perception by the senses, and memory, are only different ways of perceiving ideas in our own minds; and if that doctrine be well

founded, he thinks that it will be very difficult to find any specific distinction between conception and perception. He adds, there is reason to distrust any philosophical theory, when it leads men to corrupt language, and to confound, under one name, operations of the mind, which common sense and common language teach them to distinguish. This author further observes, when he is tracing the analogies that subsist between the operations of body and those of the mind in the plastic arts, and particularly in painting, that nothing more readily gives the conception of a thing than the seeing of an image of it; and hence, by a figure common in language, conception is called an image of the thing conceived. Nevertheless, the image in the mind is not the object of conception, nor is it any effect produced by conception as a cause, but it is conception itself. In this mode of illustrating conception, Dr. Reid differs from many other philosophers, who have generally maintained, that in conception there is a real image in the mind, which is its immediate object, and distinct from the act of conceiving it. This author proceeds to trace the analogy that subsists, not only between conceiving and painting in general, but between the different kinds of our conceptions, and the different works of the painter. As this artist makes fancy-pictures, or copies from the painting of others, or paints from the life, that is, from real objects of art or nature which he has seen, our conceptions, in Dr. Reid's opinion, admit of a very similar division. Some conceptions may be called fancy-pictures, being commonly called creatures of fancy or of imagination, which are not the copies of any original that exist, but are originals themselves. There are other conceptions, which may be called copies, because they have no original or archetype, to which they refer, and with which they are believed to agree; and we call them true or false conceptions, as they agree or disagree with the standard to which they are referred. There are of two kinds, *viz.* such as are analogous to pictures taken from the life, or such as we have of individual things that really exist; and such as are analogous to the copies which the painter makes from pictures done before, which are the conceptions we have of what the ancients called universals, or of things which belong or may belong to many individuals. These universals are always expressed by general words; and all the words of language, proper names excepted, are general words, or the signs of general conceptions, or of some circumstances relating to them. Such general conceptions are formed for the purpose of language and reasoning.

Having thus stated the three different kinds of our conceptions, and illustrated them at large, our author proceeds to describe their different properties. Accordingly he observes, that our conception of things may be strong and lively, or it may be faint and languid in all degrees. In this connection it is said, that imagination, when it is distinguished from conception, seems to signify one species of conception, *viz.* the conception of visible objects. Again, our conceptions of things may be clear, distinct, and steady; or they may be obscure, indistinct, and wavering. Moreover, when we barely conceive any object, the ingredients of that conception must either be things with which we were before acquainted by some other original power of the mind, or they must be parts or attributes of such things. Thus, a man cannot conceive colours, if he never saw, nor sounds, if he never heard. If man has not a conscience, he could not conceive what is meant by moral obligation, or by right and wrong in conduct. Nevertheless, we are unconfined with regard to the arrangement of the ingredients of our conception; and this last property of the faculty of conception, and that which essentially distinguishes it from

every other power of the mind, is this, that it is not employed solely about things which have existence.

The powers of sensation, of perception, of memory, and of consciousness, are all employed solely about objects that do exist or have existed; but conception is often employed about objects that neither do, nor did, nor will exist. To prevent imposition in this matter, we ought to distinguish between that act or operation of the mind, which we call conceiving an object, and the object which we conceive. When we conceive any thing, there is a real act or operation of the mind; of this we are conscious, and can have no doubt of its existence; but every such act must have an object: for he that conceives must conceive something. For the different theories of conception fluted by Dr. Reid, with his observations upon them, we must refer to the article *IDEA*. This author closes his account of the faculty of conception with an enumeration of what he conceives to be the errors into which writers have fallen in their discussion of the operations of the mind. In all judgment and in all reasoning, he says, conception is included. We can neither judge of a proposition, nor reason about it, unless we conceive or apprehend it; and therefore those are mistaken who so distinguish between conception, judgment, and reasoning, as to imply, that a proposition, or even a syllogism, may not be simply apprehended. Dr. Reid further observes, that the division, commonly made by logicians, of simple apprehension into sensation, imagination, and pure intellect, seems to be, in several respects, very improper. Sensation, and the perception of external objects by the senses, are, in his opinion, very different operations of the mind; and, though commonly conjoined by nature, they ought to be distinguished by philosophers. Neither sensation, nor the perception of external objects, is simple apprehension; because both, as he thinks, include judgment and belief, which are excluded from simple apprehension. Moreover, those who distinguish imagination from pure intellect, by referring to the imagination an image in the brain, and to pure intellect an image in the intellect, ground their distinction upon an hypothesis; since we have no evidence, as he apprehends, that there are images either in the brain, or in the intellect. See *IMAGINATION*. Dr. Reid further observes, that it is a mistake to represent simple apprehension as the first operation of the understanding, and judgment as a composition or combination of simple apprehensions, which mistake probably has arisen from supposing that sensation and the perception of objects by the senses, are nothing but simple apprehension. Although these are very probably the first operations of the mind, they are not simple apprehensions. See *PERCEPTION*. Instead of saying, that the more complex operations of the mind are formed by compounding simple apprehensions, we ought rather to say, that simple apprehensions are obtained by analyzing more complex operations. In this connection, Dr. Reid observes, that a similar mistake pervades the whole of Mr. Locke's Essay. It is this, that our simplest ideas or conceptions are got immediately by the senses, or by consciousness; and the complex afterwards formed by compounding them. He notices also another mistake concerning conception, which is, that our conception of things is a test of their possibility; so that, what we can distinctly conceive, we may conclude to be possible; and of what is impossible, we can have no conception. This opinion has been held by philosophers for more than 100 years, without contradiction or dissent, as Dr. Reid believes; and he considers it as a necessary consequence of the received doctrine of ideas; since it is evident, that there can be no distinct image, either in the mind, or any where else, of that which

is impossible. Our author has investigated this opinion, and urged a variety of objections against it. Whatever, he says, is declared to be possible or impossible is expressed by a proposition; and every proposition, of which you understand the meaning distinctly, is possible. Farther, every proposition, that is necessarily true, stands opposed to a contradictory proposition that is impossible; and he that conceives one, conceives both: thus, a man who believes that two and three necessarily make five, must believe it to be impossible that two and three should not make five. Again, mathematicians have, in many cases, proved some things to be possible, and others to be impossible; which, without demonstration, would not have been believed; "yet I have never found," says Dr. Reid, "that any mathematician has attempted to prove a thing to be possible, because it can be conceived, or impossible, because it cannot be conceived." Moreover, mathematicians often require us to conceive things that are impossible, in order to prove them to be so; and this is the case in all their demonstrations, "ad absurdum." For other particulars connected with the subject of this article, and a fuller view of Dr. Reid's illustration and reasoning, we must refer to his Essays above cited.

A late excellent writer, to whom those who wish to understand the philosophy of the human mind are under great obligation, though they may not admit all his principles and reasoning, has particularly considered the power of conception. By conception professor Dugald Stewart (see his "Elements of the Philosophy of the Human Mind," ch. iii.) means, that power of the mind which enables it to form a notion of an absent object of perception, or of a sensation which it has formerly felt. Although this is not exclusively the proper meaning of the word, yet he thinks that the faculty now defined deserves to be distinguished by an appropriated name. Conception is often confounded with other powers; memory recognizes the features of an absent or deceased friend, and every act of this faculty includes an idea of the past; whereas conception implies no idea of time whatever. Thus considered, the word conception corresponds to what was called by the schoolmen *simple apprehension*; with this difference only, that they included, under this name, our apprehension of general propositions; whereas the professor wishes to limit the application of the word *conception* to our sensations, and the objects of our perceptions. By thus restricting the application of the term, more than Dr. Reid has done, our ideas become more distinct; and for such a restriction the authority of philosophers in an analogous case may be justly pleaded. In ordinary language, we apply the same word *perception* to the knowledge which we have by our senses of external objects, and to our knowledge of speculative truth; and yet an author would be justly censured, who should treat of these two operations of the mind under the same article of perception. "Thus," says the professor, "there is as wide difference between the conception of a truth, and the conception of an absent object of sense, as between the perception of a tree, and the perception of a mathematical theorem." For this reason, he has confined conception to that faculty, whose province it is to enable us to form a notion of our past sensations, or of the objects of sense which we have formerly perceived. The business of conception, thus defined, is to present us with an exact transcript of what we have felt or perceived. The first remarkable fact which strikes us with regard to conception is, that we can conceive the objects of our senses much more easily than those of others. Thus, we can conceive an absent visible object much more easily than a particular sound, a particular taste, or a particular pain, which we have formerly felt. This peculiarity seems to arise from

this circumstance, that when we think of a found, or of a taste, the object of our conception is one single detached sensation; whereas every visible object is complex, and the conception which we form of it as a whole, is aided by the association of ideas, which connects the different parts together, and presents them to the mind in their proper arrangement; whilst the various relations which these parts bear to one another in point of situation equally contribute to strengthen the associations. This power of conceiving visible objects may be much improved by habit. These observations, together with others adduced by our author, are applicable to conception as distinguished from imagination, though the two powers are very nearly allied, and often so blended, that it is difficult to say to which of the two some particular operations of the mind are to be referred. Among logicians, it is a common, and almost an universal doctrine, that conception (or imagination, often used as synonymous with it) is attended with no belief of the existence of its object. To this purpose, Dr. Reid says, "perception is attended with a belief of the present existence of its object; memory with a belief of its past existence; but imagination is attended with no belief at all; and was therefore called by the schoolmen *apprehensio simplex*." Professor Stewart controverts the truth of this principle, and alleges several circumstances in justification of his doubts concerning it. "If it were a specific distinction between perception and imagination, that the former is always attended with belief, and the latter with none; then the more lively our imagination were of any object, and the more completely that object occupied the attention, the less should we be apt to believe its existence; for it is reasonable to think, that when any of our powers is employed separately from the rest, and there is nothing to withdraw the attention from it, the laws which regulate its operation will be most obvious to our observation, and will be most completely discriminated from those which are characteristic of the other powers of the mind. So very different however is the fact, that it is matter of common remark, that when the imagination is very lively, we are apt to ascribe to its objects a real existence, as in the case of dreaming or madness; and we may add, in the case of those who, in spite of their own general belief of the absurdity of the vulgar fables of apparitions, dare not trust themselves alone with their own imaginations in the dark. That imagination is in these instances attended with belief, we have all the evidence that the nature of the thing admits of; for we feel and act in the same manner as we should do, if we believed that the objects of our attention were real; which is the only proof that Metaphysicians produce, or can produce, of the belief which accompanies perception." The author acknowledges, however, that in most cases it is true that imagination is attended with no belief, if by belief we mean a permanent conviction which influences our conduct. But if the word be used in the strict logical sense, he inclines to think, that the exercise both of conception and imagination is always accompanied with a belief that their objects exist. From a variety of observations, which we cannot state within the limits of this article, the ingenious professor infers, that when the conceptions of the mind are rendered steady and permanent, by being strongly associated with any sensible impression, they command our belief no less than our actual perceptions; and, therefore, if it were possible for us with our eyes shut to keep up for a length of time the conception of any sensible object, we should, as long as this effort continued, believe that the object was present to our senses. See NOMINALS, REALISTS, and UNIVERSALS.

CONCEPTION, in *Physiology*, denotes the changes which

take place in the internal organs of generation of the female sex, connected with the development and growth of the embryo. See GENERATION.

CONCEPTION, in *Animals*, is said to be occasioned by something emitted by the male, in the act of coition, impregnating and vivifying the rudiments of an animalcule contained in the female. To explain in what manner this is effected, and to shew

"How the dim speck of entity began
To expand its recent form and stretch to man,"

Gaith.

has been the object of anxious inquiry from the earliest ages. But though much learning has been expended on the subject, and several ingenious theories contrived, to explain the mystery (see GENERATION), yet very little of real knowledge has been obtained.

In this place, without deciding whether the male sperm contains the animalcule, or only a subtle aura, giving life to something engendered in the female, it will be sufficient to observe, that the first effect of impregnation, or conception, will be found in one of the ovaries, or female testicles, as they are called (see Ovary), and not in the uterus, as was generally believed.

That the ovaries are necessary to conception, has been long known, as is evident by the practice of spaying (that is, taking out the ovaries of) sows and other animals, to prevent their breeding. The late Mr. John Hunter took one of the ovaries out of a sow (Obs. on the Animal Econ. &c.), and found the left breeding two years sooner, and produced fewer pigs at each litter, than another sow, kept with her, that was perfect. The perfect sow continued breeding six years, and produced 162 pigs; the half-spayed sow continued to be fruitful only four years, and brought only 79 pigs; whence he concluded, that there is a certain limited number of eggs in each of the female ovaries, and when they are exhausted, the animal is no longer fit for conception.

Anatomists, in the course of their examination of the bodies of females, have found hair, teeth, and other organized parts in the ovaries; and ova, containing fustules, have been found in the Fallopian tubes. (See Fallopian tubes, also FOETUS *extra uterinae*.)

On carefully examining into the contexture of the ovaria, they are found to consist of clusters of vesicles, like bunches of grapes, which are supposed to be ova or eggs.

When one of the vesicles, or eggs, as they are called, become ripe, it enlarges, and puts on a yellowish hue, and it at this time it should be impregnated by the male sperm, it bursts the thin membrane that confines it to the ovarium, enters the fibrinated end of the Fallopian tube, and thence descends into the uterus.

The rent in the ovarium, through which the ovum had passed, forms a cicatrice, which is called, from its colour, *corpus luteum*. (See *Corpus luteum*.) On dissecting the ovaria, there are always found as many of these corpora lutea, as the woman, the subject of the dissection, had borne children.

While impregnation, or conception, is taking place in the ovarium, and the fertilized ovum is descending through the Fallopian tube, a proccis is going on in the uterus, to prepare it for its reception. The vessels of the uterus, which were before so extremely minute, as not to be visible, begin to be conspicuous; the whole organ is enlarged, and a secretion of a mucus takes place, and lines its internal surface. This mucus soon puts on the appearance of a rough and shaggy membrane, destined to become the medium of connection between the ovum and the uterus. The late Dr.

William Hunter called this membrane the decidua, because it is cast off at the birth of the fœtus. He was supposed to have first discovered it: but Needham, who published his "Observations de formato Fœtu," in 1667, gives a clear description of it and of its office, but acknowledges that his account is taken from brutes; he never having had an opportunity of opening the body of a woman who had died undelivered. There are three membranes, he says, lining the uterus of viviparous animals when pregnant; "extima profusa fibrosa est, nulla vena, aut arteria visibili donata," p. 176; it serves as a sheath, he says, to the other membranes. Though he gives no name to this membrane, yet, as he places it between the chorion and the uterus, it can be no other than the decidua. Harvey describes it also still more distinctly. Before any vestige of the conception can be seen, he says, "mucosa quadam filamenta tanquam araneorum telæ, ab ultimo five superiore cornu angulo ducuntur; quæ simul junctæ membranofam ac mucilaginosam tunicam, five manticam vacuum referunt." Exercit. sexagesima nova.

The ovum being received into the uterus, in a little time, pushes out small fibres, or vessels, principally, perhaps, from that part by which it had been connected to its calyx in the ovarium, in a manner not dissimilar to that by which an acorn is joined to its cup, or a hazel nut to its outer green shell. These vessels, piercing the decidua, which affords a support to them, insinuate themselves into the pores of the uterus, and absorb the moisture from it, for the support and increase of the ovum, as the young fibrils, or slender radicles of plants and trees, absorb their nourishment from the earth. Although the uterus is intended by nature, and is thus prepared for the reception of the ovum, yet if it happens to be detained in the Fallopian tube, or to fall into the cavity of the abdomen, it there puts forth its radicles, and attaches itself to the part it happens to fall upon, or be in contact with, and the inclosed fœtus is nourished and comes to maturity nearly in the same manner, as if it had been received in its proper matrix. (See *Poërus extra uterine*, also *Poërus, Nourishment of, in Utero*.)

On examining the ovum, soon after its descent into the uterus, it appears to contain a clear glutinous fluid, like the white of an egg; in a little time a concretion, like a small maggot, is seen in the centre of the fluid, which is the primordium of the embryo. Very minute blood-vessels are now visible, branching upon a part of the chorion, hereafter to become placenta; the little galba, or maggot, being attached to it by slender threads, scarce a line in length, the future funis umbilicalis. At one extremity of the concrete three vesicles are seen, the rudiments of the eyes and brain; and beyond them, a crimson moving point, the punctum saliens, or heart. Soon after, fine white filaments are perceived, variously circumvolved, the intestines. The rest of the viscera are now faintly delineated; then the integuments covering and confining the viscera; then the extremities, or limbs, begin to sprout, at first short stumps, without hands or feet, which at length emerge, complete the transformation. The whole fœtus is said to be completely formed, by the end of the fourth week from the time of conception. See Harvey, *De Generat. Anim.*: and his predecessor, under whom he studied at Padua, Fabricius ab Aquapendente. For the further development and growth of the fœtus, see *EMERYO*, and also *POËRUS*.

CONCEPTION, Symptoms of, in Women. As soon as a woman hath conceived, a train of symptoms commence, which announce some considerable alteration has taken place. "Mulier ubi concipit," Hippocrates says, "statim inhorrescit, et incalcescit, ac dentibus fridit, et articulos reliqu-

umque corpus, convulsiõ prehendit, et uterum torpor." A woman, as soon as she has conceived, shivers, and then becomes hot, her teeth chatter, and she suffers a slight convulsive motion of her whole body. And in another place, "Pregnantem mulierem, si aliter non cognoscas, oculi trahit, et caviores fiunt, et candidum oculorum albicinis naturam non habet, sed lividius exiit." *Op. Om. cura Vaud. Linden*, t. iii. p. 235. In pregnancy the eyes become hollow, the whites of them lose their clearness, and become thick and muddy. If towards the end of the term of uterine gestation, he adds, the eyes become hollow, and the face and the whole body are affected with œdema, if the tips of the ears and of the nose are white, and the lips livid, the child will be found to be diseased or dead. Andreas Laurentius, who was physician to Henry IV. of France, recites the following circumstances, as indicative of a woman having conceived. "Nos mulierem concepitse existimamus," he says, "si in femine concursu totum corpus leviter cohœrerit, aut titulata quodam utero contrahi precepit; si excerptum eum voluptate semen non excedit; si uteri os internum exquisitè convocat; si menstrua subsistat purgatio; si lenis doloris sensus circa umbilicum et hypogastrium oberret; si mammae obdurecant, extuberant, perdolescant; si venenis appetentia languescat; si ocyllimè lactatur, et subinde marore afficiatur; denique si in edulis salidum."

We know a woman to have conceived, if immediately after copulation she is affected with shivering; if the menses, received with pleasure, is not suffered to escape; if the mouth of the womb is found to be completely closed; if a slight sense of pain is perceived about the navel; if she ceases to menstruate, and the breasts become large, hard, and painful; if the appetite for venery abates; if she has frequent and sudden changes from mirth to sadness; and, lastly, if she has a loathing to her usual food, and a desire for things before indifferent, or to which she had an aversion. These observations are in general just, and may serve to shew the accuracy with which the ancients noticed the minutest circumstances; but they are for the greater part such as we can make little use of in practice; as we should neither be permitted to inquire whether a superior degree of pleasure was felt at the moment of coition, or whether the semen was retained, or to examine whether the os uteri was completely closed. Waving, therefore, these minutæ, it will be sufficient to describe the most usual symptoms attendant on conception and pregnancy, in the order they occur, and to make some observations on each of them, with the view of shewing the causes from which they are derived, and the means by which they may be mitigated, or appeased, when they are so violent as to endanger abortion, or are likely to occasion any permanent evil to the constitution.

The first symptom by which women judge themselves to have conceived, is an intermission of the regular discharge of the menses. This is so general, that women who have been accustomed to be regular, always date their conception from the time they first miss their courses, as they are popularly called; and in this judgment, they are almost constantly right, unless fever, or some other cause has intervened, to which the interruption of them may be attributed.

Nausea and vomiting are also pretty constant attendants on pregnancy. These are most troublesome in the morning, and often commence before the period for menstruation arrives. They have been supposed to be occasioned by the subsidence of the uterus into the pelvis, dragging part of the bowels with it. But as they come on before the uterus has obtained sufficient bulk to disturb the bowels by its weight, they are with more propriety ascribed to sympathy,

between

*between the stomach and the uterus. Nausea and vomiting, unless uncommonly violent, are rather to be esteemed salutary than dangerous, and it has been observed, that women, attacked with these symptoms, are less liable to miscarry, than those who are free from them. Blood has even been known to be thrown up from the stomach, from the violence of the straining, without any subsequent ill consequence. When, however, the vomiting is extremely violent, and obstinate, if there are also signs of plethora, or general fulness of the vessels, two or three small bleedings have often proved salutary. In the mean while the body should be kept open, by administering gentle ecoprotics, which the costive state of the bowels, incident also to pregnancy, makes particularly necessary. Infusion of senna, with soluble tartar, or the bitter purging salt; lenitive electuary, rhubarb, magnesia, or castor oil, may be conveniently used, or emollient and opening glysters, administered advantageously for this purpose. In the relaxed state of the bowels, to which some delicate women are inclined, the confection alkermes, or aromatica, given in weak cinnamon water, with three or four drops of the tincture of opium, twice or thrice a day, or from a quarter of a grain to a grain of opium may be given advantageously every night at bed time; where these have failed, the diarrhoea has been removed, by giving occasionally, in addition to the above, small doses of ipecacuanha; or, lastly, by change of air, all other methods having proved unsuccessful.

The disposition to vomiting usually ceases between the fourth and fifth month, or soon after the woman has quickened, (see QUICKENING). The uterus now rising above the brim of the pelvis, and entering into the cavity of the abdomen, is less pressed upon by the neighbouring parts, and has more room for distension; perhaps also having been long used to the irritation, occasioned by the increase of the ovum, it is less sensibly affected by it. In some constitutions, however, the sickness and vomiting continue to harass the women through the whole course of pregnancy; yet even in these cases, although the vomiting is so incessant, that the whole of what is taken into the stomach seems to be ejected that way, yet such women have ordinarily as favourable labours, produce as healthy children, and recover from child-birth as speedily and completely as those who pass through their pregnancy with only the usual sickness.

Subsidence, or falling in of the abdomen, so as to be less prominent than usual, is considered as another of the early symptoms of pregnancy.

Dans une ventre plat
Un enfans il y a,

as the old French proverb has it. This has been said to be occasioned by the descent of the uterus into the pelvis, drawing with it a portion of the bowels, but with little propriety. The real cause seems to be emptiness of the bowels: Women not only vomiting up the greater part of the food they take in, during the first five or six weeks of their pregnancy, but being usually during that time so troubled with nausea, as to have little inclination to take sustenance.

The areola, or circle round the nipple, which in virgins is of a beautiful pink colour, becomes darker, it is said, after conception. It is certain, the areola is darker in women who have had children, than in those who were never pregnant, and in some women who have borne many children, it becomes of a dark chocolate colour, but as that colour continues after child-birth, no indication can be taken thence, whether the woman is actually pregnant, unless perhaps with the first child.

Enlargement, hardness, and tenderness of the breasts, with pains darting through them, and a discharge of a thin palish milk, or whey, are commonly attendant on a pregnant state. This alteration in the state of the breasts usually takes place in the third or fourth month after conception, sometimes earlier, and is indicative of the preparation making in them for the secretion of milk, the future nourishment for the child. If from this plump and firm state, the breasts subside, and become loose and flaccid, unless a violent diarrhoea may have supervened to occasion it, the fœtus may be expected to be weak, sickly, or dead.

Cardialgia, or heart-burn, is a frequent and troublesome attendant on pregnancy. (See CARDIALGIA). This has obtained its name cardialgia, from its being supposed to be an affection of the cardia, or upper orifice of the stomach. A sense of burning, or of intense heat, molests the patient, which demands almost incessant drinking to appease it. As the uterus enlarges, it thrusts the intestines higher into the abdomen, hence the liver, and other viscera, are disturbed and frightened, and thence probably a more plentiful secretion of bile, which flowing into the stomach, is thought to occasion this uneasy sensation, which is observed to be more troublesome in a recumbent, than in an upright posture. Pills with soap and rhubarb, Colombo root, magnesia, and other testaceous powders, are found to be the most useful medicines in this complaint. Milk and water, pyrmont and other chalybeate waters, bark and tonics are also serviceable; but it sometimes resists every medicine, and only subsides after the food is digested, and the stomach is nearly emptied. This points to the only preventive, abstinence. Women subject to this complaint should content themselves with the lightest diet, and that taken in small quantities. In the mean while, the rhubarb, soap, and Colombo, should be persisted in to help digestion, and to cleanse and empty the bowels.

Cramp, attacking the legs, thighs, or belly, is also a frequent attendant on the pregnant state. This is probably occasioned by the pressure of the head, or other part of the fœtus on the iliac or neighbouring nerves, and consequently becomes more troublesome the farther the woman advances in her pregnancy. An unnaturally irritable state of the nervous system seems to be the pre-disposing cause of this complaint. Hence, persons in the higher ranks of life, whose constitutions are debilitated by sitting up late at nights, by large companies, luxurious diet, &c. are most frequently tormented by it. A more simple diet, early hours, exercise in the open air, keeping the bowels empty, bark, and other bitter and tonic medicines, promise most, both in preventing and curing this troublesome complaint.

Of the symptoms here enumerated, many are equivocal, as happening indifferently in the pregnant, or in the unimpregnated state; and none of them are singly of sufficient validity, to enable us to form a decisive opinion from them; but from the conjunction of several of them, a pretty certain conjecture may be formed. If a woman accustomed to be regular, soon after marriage ceases to be so, and about the same time is affected with nausea and vomiting, there would be little hazard in pronouncing such a person to be pregnant. But where the symptoms are equivocal, it is always best to defer giving a decisive opinion, until the commencement of the sixth month, when from the motion of the fœtus, and the increased bulk of the abdomen, we may be enabled to determine with certainty.

About this time, a new train of symptoms succeeds, principally dependent on mechanical causes. The volume of the uterus, daily enlarging, presses on, and flattens the urinary bladder, and diminishes its capacity. Hence a more tre-

quent necessity for making water. The uterus, at the same time, pressing on the rectum, occasions the alvine feces to be discharged with difficulty; hence costiveness, and the return of the blood by the iliac and hæmorrhoidal veins being prevented, by the same cause, the piles; hence, also, oedematous swellings of the legs, thighs, and labia pudendi.

The labia pudendi, consisting almost entirely of cellular membranes, are sometimes so enormously distended as to prevent the person from walking, and to occasion considerable pain. Scarifying the labia, or making two or three punctures with a lancet, the parts being afterwards fomented with warm water, sometimes succeeds in reducing these swellings. Bleeding and moderate purges are also necessary. However formidable the appearance of the labia, when thus enlarged, may be, they offer no impediment to the labour, which is frequently, in these cases, uncommonly expeditious. In these leuco-phlegmatic habits, the fibres seem to have lost their tone or power of resisting, and to give way to the slightest impulse, so that the child is frequently expelled by the most trifling effort. The hæmorrhoids, or piles, are not so tractable, but frequently elude every attempt to cure them, until after delivery, when they usually grow subside.

Varices, or enlargement of the veins of the legs and thighs, being dependent on the same causes, the pressure of the uterus, preventing the return of the blood from the lower extremities, can only be palliated, until after the birth of the child, when they gradually vanish. It will be right, while waiting for this event, to moderate the distension of the veins, and prevent their bursting, by keeping in a recumbent posture, and by wearing bandages around the parts. The piles may be relieved by taking a desert spoonful of cream of tartar every day, and by anointing them with a preparation, consisting of galls of Aleppo reduced to an impalpable powder, and mixed to the consistence of an ointment with cold drawn linseed oil, or green tea, macerated in boiling water, may be applied as a poultice.

An idea prevails among women, that it is necessary they should take a greater quantity of nourishment during the pregnant state, than at other times, as they are then to furnish sustenance to an additional being; and they frequently, at the exhortation of their friends, take in a greater quantity of food than they have any inclination for, lest they should deprive the child of its necessary nourishment. But as no more of the food they swallow can be of use for that purpose, than what is properly digested, and as all the symptoms shew the depressed state of the stomach, it is evident that by loading that organ unnecessarily, all the complaints incident to the pregnant state will be aggravated and increased. The greater part of the bile being discharged by vomiting, during pregnancy, a sufficiency does not remain to complete the digestion of the food, to which it greatly contributes. Hence the chyle, admitted in too crude a state into the vessels, by its stimulus, excites after every meal a kind of hectic, by which the body is emaciated, the face is contracted, or shrunk, and the eyes, as Hippocrates observed, become sunk or hollow. In this state, therefore, an increased quantity of food, by increasing the labour of digestion, adds to the mischief. A moderate diet, with a due quantity of vegetables, and of ripe fruit, with country air, when it can be obtained, are the best remedies, and are to be recommended in every case during pregnancy.

It has been observed, that the cessation of the menses is one of the earlier signs of pregnancy; but some women continue to have a discharge of blood from the pudenda, recurring at longer or shorter intervals, for the first four,

five, or six months of their pregnancy; but the return of these discharges is rarely regular, recurring at the end of the second, third, or fourth week, and sometimes at the end of longer intervals. The quantity also varies, being sometimes more sparing, at others more profuse than the menses usually are. These discharges happen whenever any portion of the placenta, or membranes, is detached from the uterus, and generally terminate in abortion, or the premature birth of the foetus; or if the woman carries her burthen to the end of the ninth month, the child is usually weak, sickly, or dead born. "Si prægnans," Hippocrates says, in the place last quoted, "purgationes menstruæ cursum suum tenent, bene valere factum est impossibile!" A slender diet, with occasional small bleedings, and mild purges are the best preventives, in these cases.

Pica, or an irregular or depraved appetite, exciting women to long for, or intensely desire, some particular kind of food, is sometimes an attendant on pregnancy. (See PICA.) This formerly, from an improper indulgence of the appetites and fancies of pregnant women, was a very troublesome, and sometimes a formidable affection; as not only the health and life of the mother, but the perfection of the foetus, were supposed to depend on gratifying these longings. If a child happened to be born with some mark or blemish on its body, the memory of the female relatives or friends was racked, to recollect some desire of the woman that had been disappointed, to which the accident was attributed. Sometimes, however, these marks were supposed to have been occasioned by the sudden sight of some object, which it was thought to resemble.

This idea of the power of the imagination of the mother, in marking or disfiguring the foetus, is so ancient that we can scarce trace its origin. We read in Genesis, that Jacob placed peeled rods before the ewes when in company with the rams, "and it came to pass, that when the ewes looked at the rods, that the lambs they yeared, were partly-coloured, and streaked." And Hesiod, the most ancient of the Greek poets, says, "Ne quis rediens e funere, liberos operam det, ne imaginatio rei trillis, in proles transeat, easque permuet." Let no one returning from a funeral, embrace his wife, lest the melancholy he had contracted, should make an impression on the foetus. Dr. Daniel Turner, who was an intire convert to the opinion, has made a large collection of stories of monstrous births, all occasioned, he says, by the disappointed longings of their mothers, or by their being frightened by the sight of some hideous or mishappen object. See his Treatise, De Morbis cutaneis. lib. xii. Turner's book was answered by Dr. Blondie, in a masterly and satisfactory manner. The opinion is now wearing away very fast, and bids fair in a little time to be totally obliterated. See IMAGINATION.

When the appetite, during pregnancy, is inordinate or depraved, requiring improper food, it may be remedied by taking small doses of ipecacuanha, of rhubarb and magnesia, of Colombo, and other bitter and tonic medicines.

CONCEPTION, *immaculate*, of the Holy Virgin, is a feast established in honour of the Holy Virgin; particularly with regard to her having been conceived and born immaculate; i. e. without original sin; held in the Romish church on the 8th of December.

The Latin church, says Gibbon, (Hist. of the Decline and Fall of the Roman Empire, vol. ix. p. 265.) has not disdained to borrow from the Koran the immaculate conception of the virgin-mother. It is darkly hinted in the Koran (c. 3. p. 39.) and more clearly explained by the tradition of the Sonnettes. (Sale's Note, and Maracci, tom. ii. p. 112.) In the 12th century, the immaculate concep-

tion was condemned by St. Bernard as a presumptuous novelty. However Allatius, in his *Prolegomena* on Damascenus, endeavours to prove this feast to have been celebrated by several churches in the East, as early as the eighth century. It was first established about the year 1138, though it is not known, with any degree of certainty, by whose authority it was introduced, nor in what place it was first celebrated; about 1140 certain churches in France began to observe it; but it had been observed in England, in consequence of the zeal of archbishop Anselm, before this period.

The church of Lyons in France was one of the first that adopted this new festival, but the canons of Lyons were severely censured by St. Bernard for the innovation, and he vigorously opposed the immaculate conception of the Virgin, because it supposed her being honoured with a privilege which belonged to Christ alone. Thus commenced a controversy, which occasioned two parties in the Christian church that contended with each other for several centuries.

This has been a great subject of controversy between the Scotts and Thomists; the former maintaining, and the latter impugning it.

The Dominicans espoused the party of St. Thomas, and held out a long time in defence of the Virgin's being conceived in original sin. When this controversy was renewed at Paris in 1384, by John de Montefono, a native of Arragon, a Dominican friar and professor of divinity, who publicly asserted that all who believed the immaculate conception were enemies of the true faith, the college of divines, and the whole university of Paris, condemned this and some other tenets of Montefono. Upon this the Dominicans, together with their champion Montefono, appealed from the sentence of the university to pope Clement VII. at Avignon, (the name assumed by cardinal Robert of Geneva, on his election during the pontificate of Urban VI.) and raised an outcry, that St. Thomas himself was condemned by the judgment passed upon their brother. But, before the pope could decide the affair, the accused friar fled from the court of Avignon, went over to the party of Urban VI., who resided at Rome, and thus, during his absence, was excommunicated. Whether or not the pope approved the sentence of the university of Paris is not ascertained. The Dominicans, however, deny that he did, and affirm, that Montefono was condemned merely on account of his flight; though there are many others who assert, that his opinion was also condemned. And as the Dominicans would not acknowledge the sentence of the university to be valid, they were expelled in the year 1389, and were not restored to their ancient honours in that learned body till the year 1404. The council of Trent, sess. v. in the decree of *original sin*, declares it not to be the intention of the council to include the Virgin under it; her conception it calls immaculate; and appoints the constitutions of Sixtus IV. to be observed with regard to it.

This controversy between the Dominicans and Franciscans was revived in the seventeenth century; and a festival was appointed by Clement XI. in 1708, to be celebrated throughout the Romish church: however, the Dominicans persist in denying the obligation of this law, and in maintaining their ancient doctrines.

In the three Spanish military orders of St. James of the Sword, Calatrava, and Alcantara, the knights take a vow, at their admission, to defend the immaculate conception. This resolution was first taken in 1652.

Peter d'Alva and Altorga have published forty-eight huge volumes in folio, on the mysteries of the conception.

CONCEPTION, *Order of*, in Germany, was instituted in 1618, by Charles de Gonzaguez of Cleves, duke of Nivernois and Rheteblais, and was confirmed by pope Urban VIII. in 1624. The badge of this order was a golden cross of eight points enamelled blue; in the centre a medallion rayonnated gold, thereon the image of the Virgin standing on a crescent, holding in her arms our Saviour, and round her head 12 stars all enamelled proper; the reverse was enamelled as the front, and on the medallion St. Michael; the whole of the star environed with the cordon of St. Francis, tied at the bottom: this badge was worn round the neck pendent to a sky blue ribbon.

CONCEPTION, *religious of the order of*. See THEATINES.

CONCEPTUALISTS, in *Logic* and *Metaphysics*, a denomination given to a party of nominalists, who took a middle road between the two sects of nominalists and realists, into which the scholastic philosophers were divided from the beginning of the twelfth century. That universality, which the realists hold to be in things themselves, and the nominalists in name only, the conceptualists hold to be neither in things nor in names only, but in our conceptions, whence they derived their appellation; but being exposed to the batteries of both the opposite parties, they made no great figure. It is not an easy matter, says professor Dugald Stewart (*Elem. of the Philosophy of the Human Mind*, p. 102), to ascertain precisely the meaning of the conceptualists on the point in question, their language on the subject being indistinct and inaccurate; but the professor thinks that, upon the whole, it amounted to the two following propositions: first, that we have no reason to believe the existence of any essences, or universal ideas, corresponding to general terms; and, secondly, that the mind has the power of reasoning concerning genera, or classes of individuals, without the mediation of language. In denying the existence of universals, the conceptualists agreed with the nominalists. To what then, can we suppose, says the professor, that they differed from them, but about the necessity of language, as an instrument of thought, in carrying on our general speculations? Mr. Locke is referred by Dr. Reid (*Essays on the Intellectual Powers of Man*, p. 478) to the class of conceptualists. He does not maintain, that there are things which are universal; but that we have general or universal ideas which we form by abstraction; and this power of forming abstract and general ideas, he conceives, to be that which makes the chief distinction in point of understanding between men and brutes.

If Mr. Locke, says professor Stewart (*ubi supra*), had any decided opinion on the point in dispute, it did not differ materially from what is stated in the general propositions, which we have already cited. The apparent inconsistencies which occur in that part of his *Essay* in which the question is discussed, have led subsequent authors to represent his sentiments in different lights; but as these inconsistencies plainly shew, that he was satisfied neither with the system of the realists, nor with that of the nominalists, they seem to demonstrate that he leaned to the intermediate hypothesis already mentioned, notwithstanding the inaccurate and paradoxical manner in which he has expressed it. Dr. Reid's opinion seems to the professor to coincide nearly with that of the conceptualists; or, at least, to coincide with the two propositions, which are supposed to contain a summary of their doctrine. The absurdity of the ancient opinion concerning universals, as maintained both by Plato and Aristotle, he has exposed by the clearest and most decisive arguments; and by his own very original and important speculations concerning the ideal theory, he has, in the ingenious

ingenious professor's opinion, completely destroyed that natural prejudice from which the whole system of universal ideas gradually took rise. If, even in the case of individuals, we have no reason to believe the existence of any object of thought in the mind, distinct from the mind itself, we are at once relieved from all the difficulties in which philosophers have involved themselves, by attempting to explain, in consistency with that ancient hypothesis, the process of the mind in its general speculations. On the other hand, it is no less clear from Dr. Reid's criticisms on Berkeley and Hume, that his opinion does not coincide with that of the nominalists; and that the power which the mind possesses of reasoning, concerning classes of objects, appears to him to imply some faculty, of which no notice is taken in the systems of these philosophers. However, he has no where positively asserted, that language is not an essential instrument of thought in our general reasonings. At the same time, as he has not affirmed the contrary, and as he has declared himself dissatisfied with the doctrines of Berkeley and Hume, his readers are naturally led to conclude, that this is his real opinion on the subject. His silence on this point is the more to be regretted, as it is the only point about which there can be any reasonable controversy among those who allow his refutation of the ideal hypothesis to be satisfactory. In consequence of that refutation, the whole dispute between the realists and the conceptualists falls at once to the ground; but the dispute between the conceptualists and the nominalists (which involve the great question concerning the use of signs in general speculation) remains on the same footing as before. See CONCEPTION.

CONCERT, an assembly of musicians, or a band of musical performers assembled for the entertainment of musical hearers.

CONCERT Spirituel, Fr. A concert of sacred music, originally established at Paris in 1725, by permission of the manager of the opera; which permission was purchased by the brother of the celebrated Philidor, to perform concerts in Lent, on the days the theatres were closed, at the price of 1000 livres a year, for three years, on condition that no French music or selections from the opera should be performed at these concerts. This first gave birth to the use of foreign music and foreign musicians in France. The licence was renewed from time to time, but always at an advanced price, till it amounted, in 1749, to 9000 livres a-year. In 1734, the two celebrated *Bezzozzi's*, from Turin, performed at the concert spirituel, one on the hautbois and the other on the bassoon, with more applause than any foreign musicians had ever before received in France. The celebrated *Mondonville* had the direction of this concert for several years, and composed expressly for its use motets for a single voice, accompanied by a rapid and difficult harpsichord lesson. It was at the concert spirituel, which, like our oratorios, takes place when no dramatic performances are allowed, that *Giornovich*, *La Motte*, *Viotti*, the *Agujari*, *Madame Mara*, the *Todi*, *Savoi*, and *David*, were first heard in France; and afforded the inhabitants of Paris an opportunity of comparing the music and performance of foreign musicians with their own.

In 1749, during Lent, *Geminiani* had a concert of sacred music at Drury-lane theatre, the vocal pieces were all Italian, and Latin words. *Geminiani* himself led the band on this occasion, and played one of his own solos. This performance, in imitation of the French, was called **CONCERTO SPIRITUALE**.

In Italy and Spain, *academia*, Ital. implies a concert. In

France, *Academie Royale de Musique*, was the title given at Paris to the establishment of the opera under *Lulli* by *Louis XIV.* in 1672, which it retained till the revolution. *Rouffseau*, the scourge of French music and French musicians, traduced both so much in his famous letter on French music, that he was burnt in effigy at the Opera-house door. And in the article *ACADEMIE Royale de Musique*, in the Encyclopedie, and *Dict. de Musique*, he has given great offence by a pun; when after barely mentioning this academy, he only adds—"I shall say nothing further concerning this celebrated establishment, except that of all the academies in the world, this is that which has made the *most noise*," (*le plus de bruit*).

CONCERT-PITCH. This term, among musicians, implies that particular elevation of tone, as to gravity or acuteness, which ought to obtain between different musical instruments intended to be used in concert, which, when thus adjusted, are said to be tuned, or in tune. In concerts entirely vocal, or those wherein adjustable or perfect instruments only are used, as violins, violincellos, &c., any precise pitch being fixed for the notes is immaterial, so that all the instruments derive their notes from some one sound, within moderate limits of the pitch in general use, and for which the instruments were by their dimensions calculated; fingers therefore usually derive their pitch from a simple wind instrument called a **PITCH-PIPE** (see that article), because the same admits of taking their key-note a little higher or a little lower than the note marked on the stopper of the pipe, according to circumstances, and the nature of the piece of music to be performed. Violin performers, when no keyed-instruments are present, usually derive their pitch from a simple steel fork, tuned to the note A, called a **TUNING-FORK** (see that article.)

Instruments, which either from their large and complicated construction, as organs, piano-fortes, &c., or the fixed nature of their notes, as bassoons, oboes, flutes, &c., cannot admit of the occasional variation in the pitch of all their notes which we have mentioned above, are regulated by the makers and tuners of them, to what is called by some the *concert pitch*, and by others the *opera-pitch*; though others maintain that the latter, or that used by the Italian opera band, is higher than the usual concert-pitch of the country. It were much to be wished, that one invariable pitch were adopted and used, but this cannot be hoped for, until the same is accurately expressed by the number of pulses or vibrations excited in the air in a given time by the given note; and the number of these vibrations is essential to be known, before the theory of *beats*, as laid down by *Dr. Robert Smith* in his "Harmonics," the only general and accurate method of tuning instruments to a required temperament, can be applied. We shall therefore first explain the different methods which have been invented for ascertaining the exact number of vibrations made by any given musical sound, and consequently of fixing its *pitch*, and then relate such experiments as have fallen within our knowledge for determining what is the present concert-pitch in this country.

The problem being of considerable importance, we shall enumerate eight different methods of solving it; in order that experiments may be varied in different ways, both for obtaining greater accuracy, and that the coincidence of their results may inspire confidence in the minds of such as have not sufficient mathematical knowledge or patience to go through the investigations, on which the theory of the vibrations of a musical string, and the *beats* of an imperfect consonance are founded: and since the note *C. sol-fa-ut*, or that

that on which the tenor-cliff is placed, being also the ledger

line above the base staff , or the same below the

treble staff of music , is now generally made the

key-note, in flating the notes of the octave, whether diatonic or temperè; we shall adopt each of the formulas, to the finding of the pulses made by this note in ten seconds of time, to be determined by a stop-watch, a second pendulum clock, or a simple pendulum, used for the express purpose of determining periods of 10th each. (See PENDULUM.)

The first method was suggested by Pere Merfenne. It consists in a wire or catgut string, of about 15 to 17 feet in length, over two fixed bridges at its extremities; and after this, dividing the distance between the bridges accurately into eight equal parts; then fixing another bridge at one of those divisions from the end; taking care that the new bridge, which should have a tolerably sharp edge or top, does not strain the string, or force it out of its straight line. The tuning-fork, pipe, or string C, upon the instrument whose pitch is to be determined, is now to be compared with the found of the $\frac{1}{8}$ th part of the string; and if its double octave below nearly agrees therewith, the tension of the whole string is to be altered, as in tuning a stringed instrument, either tightening or slackening it, until the $\frac{1}{8}$ th part is in exact unison with the double octave below the note C, without any beats or undulations: if the found of the $\frac{1}{8}$ th of the string should be found on trial to give a clear musical note, and yet differ very materially from the double octave below C, it may be necessary to assume a greater or lesser length between the extreme bridges, and to determine anew the place of the bridge for the $\frac{1}{8}$ th part thereof: and after the $\frac{1}{8}$ th part has been nicely adjusted to the double octave below the note C, as above, it will be proper again to compare the measure of the $\frac{1}{8}$ th part of the string with its whole length, to see that the points of bearing on the bridges are accurately adjusted to these proportions. Now remove carefully the middle bridge, and cause the whole string to vibrate, which it will be found to do so slowly, as not to cause an audible sound, [if any sound is heard, it will be one of the HARMONICS of that note, see that article, and TRUMPET], but so that its number of vibrations in 10th can be seen and counted, especially if a quill be held so near to the middle part of the string, that it may touch it at each extremity of its vibration; 32 times the number of these vibrations will give the number of pulses or complete vibrations made by C in 10th, and may be called its pitch.

The second method is that which Dr. Robison used, wherein a machine, consisting of a combination of wheel-work, could be so regulated by the motion of a fly, that any given number of the teeth of a wheel should pass and strike a quill projecting against them, during the space of 10th. In using such a machine as this, the velocity of the last wheel should be so regulated, that the sound produced by the snaps of the quill against the teeth, should be in exact unison with the note C; when the known number of teeth which strike the quill in the given time, will determine the pitch.

The third method is by the same learned and ingenious gentleman, who contrived an apparatus, regulated in the manner last described, which opened and shut the passage to an even current of air, produced by a pair of bellows, such as are used in organs, any required number of times in 10th;

this singular apparatus was found to give a clear musical found, which regulated to an unison with C, gave the exact pitch thereof, by the number of alternate openings and shuttings of the cock in 10th.

The fourth method is founded on the following proposition, by the author last mentioned, viz. "An open organ pipe, when sounding its fundamental note, undulates with one node in its middle, and its undulations are analogous, in respect of their mechanism, with the vibrations of a wire of the same length, and the same weight, with the column of air in the pipe, and stretched by a weight equal to that of a column of the same air, reaching to the top of a homogeneous atmosphere, or equal to the weight of a column of mercury, as high as that in the barometer." (See PIPES, Theory of the Sound of, TRUMPET, &c.) Whence this simple practical rule, when the barometer stands at about 30 inches, and the thermometer at about 55°, viz. divide the number 226620 by the length in inches and tenths, of an open cylindrical pipe which sounds C, and the quotient will be the number of pulses or complete vibrations made thereby in 10th.

The fifth method consists in suspending a known weight (equal to W grains) at one end of a wire, such as is used for the lowest notes of a piano-forte, the other end of which is lapped round a thumb-peg, such as is used for tuning a violin, screwed tightly into the waistcoat, near to an instrument whose pitch is to be determined; then by turning the peg, lengthen or shorten the vibrating part of the wire, until when struck it sounds exactly a double octave below C; measure exactly the length of the vibrating part of the string, between its contact with the peg and the loop which sustains the weight; call this L inches. After this, cut off exactly L inches of this same wire and weigh it, call its weight W grains; then will the number of complete vibrations or pulses made by C in 10th be found by the following theorem; viz. $\sqrt{\frac{154463 \times W}{L \times W}}$. See our article CHORDS.

The sixth method is by Dr. Robison, and is as follows. Let a violin-guitar, or any such instrument, be fixed up against a wall with the finger-board downwards, and in such a manner that a violin-string, strained by a weight, may press on the bridge, but hang free of the lower end of the finger-board. Let another string be strained by one of the tuning-pins, till it be in exact unison with C, then hang weights on the other string, till upon drawing the bow across both strings at a small distance below the bridge, they are found to be perfect unisons, taking care that the pressure of the bow on the strings is so moderate, as not to affect the tension of the string first tuned. Then, having noted carefully the weight appended to the first string, add one-fortieth part thereof to the same. Now draw the bow carefully again across the strings as before, and an audible beating will be heard between the sounds of the two strings; count the number of these beats during 10th, and 80 times this will be the number of complete vibrations, or pulses, made by C in 10th.

The seventh method, as well as the best, depends on tuning a major comma; for which several rules are given under the article COMMA. From the octave below C tune upwards three successive perfect fifths upon a single stop of an organ, C G, G D, and D A; and thence tune downwards the perfect major sixth, A C; which last C will be a major comma above the first C, and will beat considerably when sounded therewith; count these beats during 10th, and 81 times this will be the number of complete vibrations, or pulses of C in 10th. See Dr. Smith's Harmonics, p. 195.

The eighth method (Harmonics, p. 197.) consists in tuning a major

a major *sixth*, C A, above C, not perfect, but such that it may beat sharp B times in 10"; from thence tune downwards three successive perfect *fifths*, A D, D G, and G C; which last note will be an imperfect octave below C, the beats of which octave are to be counted during 10", carefully distinguishing whether it beats sharp or flat, and calling the number, if sharp, S, and if flat, F; then will S1S + 16B, or 16B - 81F, according as the case may be, express the number of complete vibrations, or pulses of C in 10".

It is not in our power to give so satisfactory an account of what is the present concert or opera-pitch in this country, as we could have wished; but we hope that experiments will hereafter be multiplied, for fixing it very exactly (at a mean rate of the barometer and thermometer), and after such determination, that the exact number of pulses or complete vibrations from one extreme of the vibrations of a string until its return to the same point, will be resorted to by instrument makers and tuners, for regulating the pitch of their forks, pipes, and instruments.

The vibrations, mentioned in M. Euler's experiment, (after our fifth method, under our article CHORDS) were semi-vibrations, or those made, while a point in a musical string, went from and returned to the axis, or line of rest, between the two points of suspension, and not complete vibrations, or those made while the string went from and returned to the place of its greatest deviation from the axis: therefore $\frac{392}{2}$, or 196, was the number of complete vibrations per 1", made by the A, a minor third below our C; whence this made $\frac{6}{5} \times 196 \times 10 = 2351$ complete vibrations in 10".

Dr. Robert Smith (Harmonics, p. 220 and 271), calculated about the middle of the last century, that the tenor clef C note, upon the organ in Trinity college, Cambridge, made 232½ complete vibrations in 1", or 2322 in 10", which, he says, was above half a mean-tone lower than the London *opera pitch* at that time, and which therefore probably gave about 2460 or 2470 pulses in 10". The above experiment of Dr. Smith's was made, after Trinity college organ had been depressed a whole tone in its pitch, by making the keys each to act on two pipes lower in the scale than they originally did, by which it was reduced (Harmonics, p. 208, and 218) to the Roman *pitch*, or that to which the pitch-pipes, made about the year 1720, were generally tuned. Dr. Thomas Young, in his lectures at the Royal Institution (Syllabus, p. 95), states our C to make 256 vibrations in 1", apparently only, for the purpose of agreeing with an imaginary C eight octaves below, which is to make but 1 vibration in 1", but which imaginary C, according to the recent determinations of *concert-pitch*, which we are about to mention, ought to make but the $\frac{1}{16}$ part of a vibration in 1", the 8th octave above which will be moved at the rate of 2400 pulses in 10 seconds.

The late Dr. Robison applied our second, third, and sixth methods, for determining the complete vibrations made by C, and relates them all to agree extremely near with 240 in 1", or 2400 in 10". Many other experiments are upon record, but generally some other note than C was selected for the experiment, the exact interval between which and C we are ignorant of, owing to the temperament of the instrument; this is the case with Dr. Smith's determinations (by the fifth and others of the methods above, Harmonics, p. 192, &c.) of the vibrations made by D *la-fel re*, upon the organ above-mentioned.

We were lately present at an experiment by Mr. John Isaac Hawkins, at his house in Great Titchfield-street, where he manufactures the finger keyed viols and double-basses, mentioned under our article CLAVIOL, (see FINGER KEYED VIOL) according to our first method above: two pieces of hard wood, about an inch thick, were sawed down to the floor in his room, at about 22 feet asunder, and were pierced for the two string-pegs of a harpsichord wire; several thin pieces of wood with a sharp edge at top, and fixing a very small height more above the floor, than the fixed pieces of wood, were provided as moveable bridges. A brass wire, called No. 15, by the piano-forte makers, and the largest size which they use in grand piano-fortes, which was found to be .033 inch diameter, was lapped round the pins, and stretched by turning one of them. From a point marked 0 on the floor, 8 or 10 inches from one of the fixed pieces of wood, the several distances 7½ inches, 15, 30, 60, 120, and 240 inches were carefully measured and marked under the string; a bridge was then placed under the string, at the point 0; another at 7½, and another at 240 inches, and one of the tuning pegs was turned until the short portion of the string, 0 to 7½, was in perfect union with Mr. H's snail, or mouth tuning-fork, C; [which is a very considerable improvement upon the large tuning forks which require to be struck upon a table, (see TUNING-FORK) the bridge at 7½ inches was then successively moved to 15 and 30 inches, in order to compare the octave and double octave below with the fork; and which on trial appeared to be accurately in tune. This middle bridge was then removed, and the counting of the visible vibrations of the whole string, 0 to 240, or five octaves below C, was conducted as follows. Mr. H. kneeling down on one knee, placed a seconds watch before him, and held a quill with one hand slightly against the string, about two feet from the bridge, so as to be struck by the wire at each vibration; this was for assisting the sight, in counting the vibrations, by means of the audible strokes thus produced on the quill: for some time Mr. H. continued attentively to notice the vibrations, and to beat down with his toe at every fourth vibration, as a performer on the violin, &c. does in playing in common time; this was pursued, until such a regular rate of beating was obtained by the toe that the experiment was not interrupted by a new twitch or impulse given to the vibrating string by an assidant; the counting then commenced, and was continued during 60 seconds, in the first of which 111 beats of the toe were made, and in a repetition of the experiment, after examining the time of the $\frac{3}{5}$ part of the string, 113 beats were counted; the mean of these, or 112 per minute, gave $112 \times 4 \div 6 = 74\frac{2}{3}$ vibrations for the whole string in 10 seconds, and consequently C, five octaves above, gave $47\frac{2}{3} \times 32 = 2386$ vibrations in 10", which agrees extremely near with Dr. Robison's experiments above mentioned, in shewing, that 2400 may be taken as the present concert pitch.

We have only to add, that an experiment and calculation some years ago by the fifth method above, gave us 2415 pulses in 10" for a tuning-fork then in our possession, marked C, but whether the same had been adjusted to the acknowledged concert-pitch, we are unable to say. The state of the barometer and thermometer should always be noted, at the time of making experiments of this kind, if it is intended accurately to determine the pitch: and it may be well, instead of trusting to the ear alone, in determining the unison or octave of the fork and string, to count and equalize their *beats* with a third found, a little different from both of them, as recommended by Mr. Nicholson, Phil. Journ. 8vo. i. p. 320, for the making of correct tuning-forks.

CONCERT of Ancient Music. This excellent establishment was originally suggested by the late earl of Sandwich in 1776, in favour of such solid and valuable productions of old masters as an intemperate rage for novelty had too soon laid aside as superannuated, was supported with spirit and dignity, by the concurrent zeal and activity of other noblemen and gentlemen of the first rank, who united with his lordship in the undertaking, till 1785, when it was honoured with the presence of their majesties, whose constant attendance ever since has given to this institution an elevation and splendor, which perhaps no establishment of this kind ever enjoyed before. Here the productions of venerable old masters, particularly those of Purcell and Handel, are performed by a select and powerful band, with such correctness and energy, as the authors themselves never had the happiness to hear.

CONCERT, To, in a *Military Sense*, is not only to deliberate upon, but to arrange, form, and agree upon plans of co-operation, for the purposes of either offence or defence.

CONCERTANTE, Ital. from *concertare*, to concert, order, arrange. In the musical technica, it used to be equivalent to harmonizing, adding instrumental parts to vocal. But at present, the term concertante is used substantively, for a symphony or full piece dialogued. In which there are solo parts for the display of great talents on particular instruments. At the concerts of Bach and Abel, solo parts were frequently allotted in these compositions to Cramer, Fischer, the younger Stamitz, Hindmarsh, Shields, Holmes, Tacit, and the elder Florio, Abel, on the viol di gamba, and Bach himself on the pianoforte. Bach's concertante in C \sharp , and Playel's in E \flat , were always heard with rapture; not only from the merit of the composition, but exquisite manner in which they were performed, and the ingenuity of the written cadences, generally furnished by Fischer.

CONCERTATO, a term in *Music*, implying the addition of instrumental parts to a vocal composition; as *motetto concertato*, a motet or anthem, accompanied by instruments.

CONCERTO, synonymous with *concerto*, which long supplied its place. *Concerto* and *suono* implied nearly the same things in the days of Boraccacio, as *concerto* and *sonata* since; but *concertare* and *concertanti* were at first applied to the union of instruments with voices, in motets and madrigals, by doubling the voice-parts. It was not till late in the seventeenth century, that instrumental pieces of many parts, began to be called concertos, and of few parts sonatas.

The earliest compositions which we found in Italy, for three or more instruments of the same species, were Ricercari and Fantasic. But of these none seem to have been printed, when the elder Doni published the second edition of his "Libreria," 1557, as all the instrumental music that appears in his catalogue of musical compositions, which had then been published in Italy, are "Intabolate da organi, et da leuto, d'Anton da Bologna, di Giulio da Modena, di Francesco di Milano, di Jacques Buas, piu di dieci volumi, e la continua."

About the beginning of the seventeenth century madrigals, which were almost the only compositions in parts for the chamber, then cultivated, seem to have been suddenly supplanted in the favour of lovers of music by a passion for fantastics of three, four, five, and six parts, wholly composed for viols, and other instruments, without vocal assistance. And this passion seems to have arisen, from the calling in these instruments to reinforce the voice parts, with which they played in unison, in the performance of motets

and madrigals, thence termed *concertati*. At length the instrumental performers discovered that both the poetry and singing of the times might be spared without any great loss or injury to musical effects; as the words, if good, were rendered unintelligible by fugue, imitation, and multiplicity of parts; and the singing, being often coarse and out of tune, could be better supplied by their own performance. Thus vocal music not only lost its independence, but was almost totally driven out of society; as the ancient Britons, calling in the Saxons to assist them in their conflicts with the Picts, were themselves subdued and forced from their possessions, by too powerful auxiliaries. See FANCIES and BASE-VIOLS.

Simpson in his "Compendium," speaking of fancies, page 118, says: "In my opinion, no nation is equal to the English in this way, as well for their excellence, as for their various and numerous consorts of 3, 4, 5, and 6 parts, made properly for instruments, of which fancies are the chief."

In the MS. "Memoirs of Music," by the hon. Roger North, who speaking of Jenkins, an eminent English composer in the time of Charles I. says, that "of all his concerts, none flew about with his name to it, so universally, as the small piece called his "Five Bell Conforte." And this is only in three parts, so that the import of the term concert or conforte was not then settled.

Montaigne, who travelled through Italy and Germany in 1580, says that the mass in great churches was accompanied by organs and violins. But though the word concerto occurs so early as the year 1587, in the "Trattenimenti" or "Dive'timenti" of Scipion Bargagli, it was only applied to short Fantasic and Ricercari. Salmi concertati was often used when instruments were added to voices, in concerti ecclesiastici.

At the latter end of the 17th century most of Bassani's, Corelli's and Torelli's violin music was composed for the church. The first and third set of Corelli's sonatas, and his first eight concertos, we are certain were thus appropriated. Somis, Veracini, and Tartini, composed their own solo concertos, and performed them likewise in the several churches of Italy. And Pugnani used to accompany the "Messa Bolla," or Silent Mass, at the chapel royal in Turin, with his violin solo concertos.

Concertos merely instrumental, for secular use, seem to have had no existence before the time of Corelli. The honour of the invention has been assigned to Torelli, but from no good authority. Six concertos by Alessandro Scarlatti, manifestly, from the gravity of their style, composed for the church, were printed by Benjamin Cook, in New-street, Covent-garden, about the year 1730. But at the beginning of the last century, besides the concertos of Corelli, Geminiani, and Handel, concertos by Albinoni, Alberti, Tefarini, and Vivaldi, were dispersed all over the kingdom, and heard with great delight at our country concerts, music-meetings, and clubs. These were chiefly on the model of Torelli and Corelli, but with melody of a lighter kind. They were all in seven or eight parts for two choirs; that is, with solo parts for the concertini, or solo instruments, and ripieno parts for the concerto grosso, or chorus of the whole band. But these were soon superseded by great performers on the violin, such as Locatelli, Tartini, Somis, Veracini, Nerla, and Giardini, who, in order to display their superior powers of execution, rendered them too difficult for general use. But these being brought into public favour by the admirable performance of their several authors, were followed by the concertos of Barthelemy, Cramer, La Motte, Lolli, Salomon, Viotti, Giornovich, &c. who, by some peculiar excellence in the knowledge of the finger-board, use of the

bow, or accurate performance of double-stops, seem to have arrived at the acme of perfection in executing solo concertos.

CONCERTO *Croffo*, a grand concerto, or full piece.

CONCERTS, *public*. These were first established in London by Banister, master of king Charles II's new band of 24 violins. The first notice we find of these assemblies is in the London Gazette, No. 742, for Dec. 30th, 1672, in which there is the following advertisement: "These are to give notice, that at Mr John Banister's house, now called the music-school, over against the George Tavern, in White Fryars, this present Monday, will be music performed by excellent masters, beginning precisely at four of the clock in the afternoon, and every afternoon for the future, precisely at the same hour."

There are other advertisements from Banister of the same kind, in 1674, 1676, and 1678. In that for Dec. 11th, 1676, his musical performance is said to be "At the academy in little Lincoln's-inn fields," where it was to begin "with the parley of instruments, composed by Mr. Banister, and performed by eminent masters."

In Mr. North's manuscript "Memoirs of Music," we have a more minute account of these performances. "Banister having procured a large room in White Fryars, near the Temple back-gate, and erected an elevated box or gallery for the musicians, whose modestly required curtains, the rest of the room was filled with seats and small tables, a la mode fashion. One shilling, which was the price of admission, entitled the audience to call for what they pleased. There was very good music, for Banister found means to procure the best hands in London, and some voices to assist him. And there wanted no variety, for Banister, besides playing on the violon, did wonders on the flageolet to a thorough base, and several other masters likewise played solos."

These were followed by other public concerts of a superior kind, at the Crown and Anchor, the Cable in Paternoster row, the Swan and King's Arms, Cornhill, York Buildings, Hickford's Room, &c. &c.

CONCESSI, q. d. *I. herve granted*; a term much used in conveyances, &c. Its effect is to create a covenant in law, as *dedi* (I have given) does a warranty. Co. Lit. 384. This word is of a general extent, and is said to amount to a grant, seoffment, lease, and release, &c. 2 Saund. 96.

CONCESSION, in *Rhetoric*, a figure whereby something is granted or allowed to the adversary, either to prevent being detained by unnecessary incidents, or to make some advantage of. "I will not contend with you the reality of the contract; what I plead for, is relief against the injustice of it." "True, she is fair; but ought the not to shew her acknowledgments to heaven for the favour, by making a virtuous use of her beauty?" See EPITROPE.

CONCESSIT, *Sur*, in *Laws*, a species of *Fine*; which see.

CONCEVEIBA, in *Botany*, Lam Encyc. Aubl. Guian. 924, tab. 353. Class and order, *diancia*. Nat. Ord. *Euphorbie*; Lam.

Gen. Ch. Male flower not known. Female. Cal. one-leaved, fleshy, trigonous near the bottom, with three large glands at its base, terminated by five thick acute teeth, each of which has on the inner side of its base a gland pressing upon the germ. *Pist*. Germ superior, triangular; style none; stigmas three, thick, concave, furrowed, incurved. *Peric*. Capsule globular, trigonous, with three furrows, three-celled, three-valved, each valve dividing into two. *Seeds*, one in each cell, roundish, enveloped in a white pulpy matter which has a sweet pleasant taste.

Sp. C. *guianensis*. A small tree. Trunk ten or twelve feet high, about a foot in diameter, with grey bark and white wood, much branched. Leaves alternate, at unequal distances from each other, oval-oblong, acuminate, toothed, green and smooth on their upper surface, cinereous underneath. *Stipules* in pairs, small, caducous. *Flowers* sessile, alternate, in a terminal spike, common peduncle fleshy, trigonous. A native of Guiana, on the banks of rivers. When the bark is cut, or the leaves torn, a greenish juice issues from the wound.

CONCEZE, in *Geography*, a town of France; in the department of the Correze, and district of Brive; 6 leagues N.W. of Brive.

CONCH, in *Mythology*. See TRITON.

CONCHA *Auris*, in *Anatomy*, is the large hollow of the external ear, included between the tragus, antitragus, and anthelix, and having at its anterior part the commencement of the meatus auditorius externus. See EAR.

CONCHA, *Xoyon*, in *Antiquity*, a liquid measure among the Athenians, which contained two *mystra*, or half an ounce. As much oil as it was capable of holding, weighed five drams one scruple and twenty grains, according to Gor. Defin. Pitisci Lex. & Eisenhom. Others think that the *concha* contained three spoonfuls, ninety-six of which filled a pint vessel (*sestarius*); a *sestarius* was therefore equivalent to thirty-two *conche*, and six *sestarii* made one *congius*, a measure equivalent to our three quarts, according to Salmast. Exerc. Plinian and Bodæus in Theophrast. According to Fernelius, the *concha* was equivalent to two *mystra*, or five spoonfuls; which, according to Jacobus Sylvius, are equivalent to six drams. According to Galen, in his work De Ponderibus & Mensuris, cap. 11, the *concha magna* contained the same quantity with the *acetabulum*, which in liquid measure was an ounce and a half, and in weight fifteen drams. The *concha minor* was in liquid measure half an ounce, and in weight five grams.

CONCHA, in *Conchology*. See CONCHOLOGY.

CONCHA, in *Music*, a trumpet among ancient instruments, or a trumpet-marine, such as Triton used;

— Tritona vocat; conchæque sonaci
Inspirare jubet.

Ov. Met. l.

CONCHA *anatifera*. See ANATIFERA.

CONCHA *anomia*, the name of a fossil shell-fish, found in great abundance, and in a great variety of species, but not known in any of them living, on the shores or in the seas of our own or other countries. In Gloucestershire, and some other of our counties, there are found as common as pebbles on the ploughed lands in other places. They are a sort of bivalve shell, the valves of which are of unequal extent, both of them convex, and the head or beak of the longer valve crooked, and falling over the head of the other.

The great general distinction of this numerous class of bodies, is into those which are of a smooth surface, and those which are of a striated or rough one.

Others also of the same class, or of one very nearly allied to it, are found in many of our inland counties, some very long from the cardo, or hinge, to the margin; and others very short, and very long the contrary way. They are found indifferently in all sorts of strata, in earth, in stone, in sand, and among gravel. See ANOMIA.

CONCHA *fortificata*, a name given by some authors to the genus of shells, called by others the MUREX.

CONCHA *globosa*, the name of a large genus of shells, called by authors the DOLIUM, and in French the *tonne*.

CONCHÆ LAPIDÆÆ, was the name by which some writers

writers distinguished the fossil shells found lodged in the strata of the earth, before the whims of certain authors respecting the *vis plastica, vis formativa, &c.*, by which they attempted to account for the formation of these organic remains, had been entirely exploded, and the truth of their being animal exuvie generally established.

CONCHA margaritifera, a name sometimes used for those *mytili* which produce pearls. See MUSCLE.

CONCHA margaritifera, is the name by which some writers have described a fossil shell, somewhat resembling the recent shells of this genus, in the equality of their valves, the appearance of their guttered and toothed hinges, &c.

CONCHA narium, in *Anatomy*, is a term applied to the turbinated bones of the nose. See SKULLTON.

CONCHA specierorum, in *Natural History*, the *sp. Bre shell*, a name given by authors to a species of voluta, from some odd figures described on its surface, representing rough draughts of terrible phantoms. It is an elegant shell, of a middle size, and is of a white ground, and the figures are reddish; these form three large and broad bands, surrounding the shell at top and bottom, and in the middle; and between these there are several series of small spots. It is a scarce shell, and usually sells at a large price.

CONCHA Veneris, the name by which several species of chama are called. The shell is univalve, wreathed, and has a small longitudinal and denticulated clink, or aperture, in it. It is also called *concha porcellana*, from its aperture in some measure resembling the mouth of a hog; and *concha erythraea*, from its being found in the Red Sea, called *erythraeum*. It is also called *concha cytheriaca*, from Venus, who received the epithet *cytheraea*, from Cythera, a Grecian island. That this fish was used by the ancients as an aliment, we read in Seneca, Ep. 95. Mundius asserts that they prove a stimulus to venery, and provoke urine. Rondeletius informs us, that these shells are an ingredient in the *pitule de bellio*, for removing fluxes, and curing ulcers in the uterus. But instead of the *concha venerica*, the apothecaries generally use cockles. Excellent dentrifices are prepared from this shell, which is also used for curing ulcers in the canthus of the eye, and the *stilla lachrymalis*. It is remarkably drying, without exciting any heat.

CONCHARUM PROMONTORIUM, in *Ancient Geography*, a promontory of Asia Minor, on the Thracian Bosphorus, in the southern part of the Castalian gulf.

CONCHES, in *Geography*, a town of France, in the department of Eure, and chief place of a canton in the district of Evreux, 12 miles S. E. from Evreux, 39 S. from Rouen, and 87 N. E. from Paris. The place contains 2250, and the canton 13550 inhabitants. The territory includes 257½ kilometres, and 33 communes.

CONCHES, a town of France, in the department of the lower Pyrenées, and district of Pau; 6 leagues N. N. E. of Pau.

CONCHITES, or *CONCHITÆ*, in *Natural History*, a name which has been indifferently used by writers, in describing fossil bivalve shells of different kinds.

CONCHITES marmor, a name given by the ancients to a species of marble dug near Megara, and remarkable for containing a great number of sea-shells, and other marine bodies intermixed in it.

CONCHIUM, in *Botany*, from *κόγχη*, a bivalve shell, in allusion to the form of the fruit. Smith. Tr. of Linn. Soc. v. 4. 215. *Donn. Cant. ed. 3. 21. Vent. Jard. de la Malmaison, 110. (Hakea; Schrad. Sert. 27. Cavan. Jc. v. 6. 24.)* Muscle shrub. Clafs and order, *tetrandria monogynia*. Nat. Ord. *Protæe*, Juss.

Gen. Ch. *Cal.* none. *Cor.* of four petals, linear, cohering at their base, somewhat dilated and concave at the summit, nearly equal. *Stam.* four; filaments short, inserted towards the summit of each petal: anthers lodged in the cavity of each petal, erect, oblong, two-celled. *Pist.* Germen superior, small, ovate, oblique; style ascending, recurved, cylindrical, thick, as long as the corolla; stigma turbinate, pointed. *Peric.* Capsule ovate, oblique, gibbous and rugged, pointed, of two hard, thick, woody valves, and one small eccentric cell. *Seeds* two, elliptical, flat on one side, convex on the other, filling the cavity of the capsule, each furnished with a black, membranous, transparent, oblong wing.

Elf. Ch. *Calyx* none. *Petals* four, bearing the filaments. *Stigma* turbinate, pointed. *Capsule*, of one cell. *Seeds* two, winged.

Sp. 1. *C. gibbosum*. *Donn. Cant. 21. (Bankfia gibbosa; White Voy. 224. t. 22. f. 2. Willden. Sp. Pl. v. 1. 536. Hakea gibbosa; Cavan. Ic. t. 534. H. pubescens; Schrad. Sert. 27.)* "Leaves cylindrical, slightly downy, rather longer than the fruit. Corolla smooth. Capsules roundish-ovate, gibbous, rugged." Sm. MSS. *Stem* shrubby, branched, rigid, smooth. Young branches hairy. *Leaves* numerous, evergreen, alternate, sessile, spreading, cylindrical, near two inches long, somewhat downy, especially when young, each tipped with a sharp spine. *Flowers* in small, axillary, hairy umbels, white. *Corolla* nearly or quite smooth. *Capsules* solitary, the size of a walnut, black and rugged, very gibbous underneath; the valves extremely thick, hard and woody, each tipped with a short sharp point; cavity very small, eccentric, uneven, of a mahogany colour. *Seeds* with black wings like gauze or crape. A native of New South Wales, near Port-Jackson. It is now frequent in the more curious European green-houses, but is rather singular than beautiful. 2. *C. sphaeroidem*. "Leaves cylindrical, as long as the fruit, downy as well as the branches. Capsules orbicular, depressed, smoothish." Sm. MSS. A smaller shrub than the last. *Branches* clothed with dense woolly hairs. *Leaves* about an inch long, very hairy. *Flowers* unknown in Europe. *Capsules* of a rusty brown, the size of the last, but much less rugged, and when viewed vertically, almost orbicular, their points scarcely extending beyond the circumference. Sent from Port-Jackson with the preceding. 3. *C. aciculare*. *Donn. Cant. 21. Vent. Jard. de la Malmaison, 111. (Hakea sericea; Schrad. Sert. 27.)* "Leaves cylindrical, smooth, as long as the fruit. Corolla smooth. Capsules roundish-ovate, rugged, elongated at the point." Sm. MSS. Like *C. gibbosum*, but in all its parts about half as large. *Leaves* in every period of their growth quite smooth. *Flower-stalks* and young branches silky. *Fruit* more oblong than in the two preceding, but its lateral protuberances are more glabrous. A native of Port-Jackson, not rare in our gardens. 4. *C. longifolium*. *Donn. Cant. 21. (Bankfia teretifolia; Salisb. Prod. 51?)* "Leaves cylindrical, smooth, thrice as long as the fruit. Corolla clothed with silky hairs." Sm. MSS. *Leaves* three inches or more in length, spinous, as in all the foregoing, always smooth, as well as the branches. *Corolla* clothed with white, close, silky hairs. Perhaps only a variety of *C. pugioniforme* hereafter described, which cannot be determined till the fruit of the present species be known. 5. *C. compressum*. "Leaves cylindrical, smooth, scarcely so long as the fruit. Capsules ovate compressed, somewhat rugged." Sm. MSS. The fruit of this is not more than an inch long, and ovate, partaking but little of the globular protuberant figure of the preceding kinds. *Leaves* small and slender. 6. *C. pugioniforme*. (Hakea pugioniforme; Cavan. Ic. v. 6. 24. t.

533. *H. glabra*. Schrad. Sert. 27. t. 17.) "Leaves cylindrical, smooth. Corolla clothed with silky hairs. Capsules lanceolate, pointed, beset with sharp tubercles towards the base." Sm. MSS. Leaves an inch or inch and a half long, bright green, always smooth, as well as the branches. Flowers white and silky. Capsules very different from the rest of the genus, being much more slender. This, like all the preceding, is found in the country about Port-Jackson, New South Wales. 7. *C. trifurcatum*. "Leaves cylindrical, three-cleft; sometimes dilated, simple, elliptical and flat. Corolla hairy." Sm. MSS. This most remarkable species, discovered by Mr. Archibald Menzies, F.L.S. at King George's Sound, on the west coast of New Holland, is distinguished by its three-forked leaves, but especially by their occasional variation from a cylindrical to a broad flat elliptical figure, on the same branch, and even in the same individual leaf. The flowers and their stalks are clothed with rough, shaggy, not silky, hairs. Fruit unknown. 8. *C. dactyloides*. Vent. Tard de la Malin. t. 112. (*C. nervosum*; Donn. Cant. 21. *Haëca dactyloides*; Cavan. Ic. v. 6. 25. t. 535. *Banksia dactyloides*; Gært. v. 1. 221. t. 47. 1. 2. *B. oleifolia*; Salisb. Prod. 51.) "Leaves obovate-oblong, with a small point, triply nerved, veiny. Capsules ovate, acute." Sm. MSS. Leaves various in length and breadth, flat, thick, rigid, smooth, entire, obovate, tapering towards the base, marked with three principal nerves united above the base, and connected upwards by interbranching veins, forming sometimes spurious nerves. The young leaves and branches are rusty and downy. Flowers numerous, small, white, smooth, on hairy stalks. Capsule ovate, acute, rugged, scarcely gibbous. Common about Port-Jackson, and not rare in our gardens, where the varieties to which it is subject in the leaves, afford the nurserymen an opportunity of furnishing their friends with many new species. 9. *C. ellipticum*. "Leaves elliptical, bluntish, pointless, with five nerves, reticulated with veins. Capsules ovate, obtuse." Sm. MSS. Allied to the last, but distinct. Leaves broad, exactly elliptical, somewhat glaucous, having five ribs, which all spring from the base, and delicate of any terminal point or spine. The spaces between the ribs or nerves are beautifully and copiously reticulated. Capsule more obtuse than in *C. dactyloides*, but otherwise much like it. Found by Mr. Menzies at King George's Sound, but not yet brought alive to Europe. Flowers not seen. 10. *C. oleifolium*. "Leaves elliptical-lanceolate, with a small point, single-nerved. Capsules ovate, gibbous, somewhat rugged." Sm. MSS. Brought by Mr. Menzies from the same country as the last. Full-grown leaves, scarcely an inch and half long, smooth, even and entire, with only one rib, tipped with a little spine. Veins few and obscure. Flowers spiked, smooth, as well as their partial stalks, though the common ones are hairy. Capsule ovate, gibbous on one side, very rugged all over. 11. *C. serotaphyllum*. "Leaves three-lobed, pinnatifid. Capsules ovate, compressed." Sm. MSS. Leaves very fine, large and divaricated, from two to four inches long, smooth, except when very young, hard and rigid, obscurely ribbed, lobes and teeth spinous. Flowers silky. Capsule narrow, ovate, compressed, smooth, apparently fusculent in its outer coat, which seems to be the case with the three preceding species. Gathered at King George's Sound, by Mr. Menzies. It is one of the handfomest of its genus. 12. *C. salignum*. Donn. Cant. 21. (*Embothrium salignum*. Andr. Repof. t. 215.) "Leaves linear-lanceolate, acute, without spine, single-nerved. Capsules ovate, gibbous, recurved." Sm. MSS. A tall elegant shrub, with the habit of a willow. Leaves five or six inches long, smooth and pliable, of

a narrow lanceolate form, entire, acute, but not spinous, with one nerve and a few lateral veins. Flowers copious, white, smooth, in smooth umbels, which, as in all the rest of the genus, are axillary. Capsule linearish, ovate, recurved, very gibbous, and somewhat rugged, at each side, tapering at the base, externally hard and not fusculent, each of its valves tipped with a lateral spine. A native of New South Wales, frequent in gardens.

Propagation and Culture. All the species are shrubby and perennial, easily raised from seeds brought in the capsules from their native country, and requiring with us only the usual shelter of a green-house or conservatory. These from King George's Sound are as yet strangers to our gardens. The others thrive in sandy peat earth, but require regular and rather copious supplies of water. They may be increased by cuttings. *C. salignum* ripens seeds in abundance when planted in the ground under glass, and rises to the height of 12 or 15 feet. S.

CONCHOID, or CONCHILIS, in *Geometry*, a curve line which always approaches nearer a straight line to which it is inclined, but never meets it. It was invented by Nicomedes, and much used by the ancients, as we learn from Pappus, in the construction of solid problems.

It is described thus: draw a right line BD (*Plate, Analysis, fig. 2.*) and another AC, perpendicular to it in E; draw any number of right lines, as CM, CM', cutting BD in Q; make QM = QN = AE = EF: the curve wherein the points, M, M', are found, is the *conchilis*, or *conchois prima*, so called by Nicomedes. The other, wherein the points, N, N', are found, is the *conchois secunda*; the right line BD the *rule*, or *directrix*, the point C the *pole*, or centre of the conchoid. In reality, they are both parts of the same curve, having the same pole C, and four infinite legs, to which the line BD is a common asymptote. The inventor also contrived an instrument, whereby the first conchoid may be described mechanically: thus, in the rule AD (*fig. 3.*) is a channel or groove cut, so that a smooth nail, firmly fixed in the moveable rule CB, in the point F, may slide freely within it: into the rule EG is fixed another nail in K, for the moveable rule CB to slide upon. If then the rule BC be so moved, as that the nail F passes along the canal AD; the style, or point in C, will describe the first conchoid.

Now let $AP = x$ (*fig. 2.*); $AE = a$; $PE = MR = a - x$; wherefore, as x increases, $a - x$, or MR will decrease; and therefore the curve continually approaches nearer to the rule BD.

In the same manner it appears, that the right line NO must continually decrease; and therefore that the second conchoid, also, must continually approach nearer the rule.

But inasmuch as between each conchoid and the right line BD, there will be the right line QM or QN, equal to AE; neither of the conchoids can concur with the right line BD: consequently BD is an asymptote of each conchoid. See ASYMPTOTE.

If from any point, A, of the curve (*fig. 4.*) AH and FTP be drawn perpendicular to the rule, or directrix, HT, and AL parallel to it; and if the quadrant, FGLK, be described intersecting AL in G; we shall have PL \times LG = TL \times LA. For the triangles, AHB, TLG, are similar and equal, as the angles at H and L are right; and $AB = TF = TG$, and $AH = TL$; therefore $BH = GL$. Also the triangles, AHB, ALP, are similar. Whence $AH : HB :: PL : AL$; that is, $TL : GL :: PL : AL$; therefore, $PL \times GL = TL \times AL$. Hence, the same things being supposed, we shall have $AG = BT$, and $GL = HB$. For $AL = HT$, and $GL = HB$.

= HB; therefore, by subtraction, we shall have AG = BT. This proposition is equally true in the inferior conchoid (fig. 5.). In the inferior conchoid $gl = b.b$. Moreover, in the superior conchoid (fig. 4.), if PTF and AH be perpendicular to the directrix HT, and AL parallel to it, $TL^2 : TF^2 = AH^2 : PL^2 = AL^2$. For, by the preceding proposition, $TL : GL :: PL : AL$, and $TL^2 : GL^2 :: PL^2 : AL^2$; but $GL^2 = GT^2 - TL^2 = TF^2 - AH^2$; therefore $TL^2 : TF^2 = AL^2 : PL^2 = AL^2$.

Hence, putting $FT = a$, $PT = b$, axis $TH = x$, ordinate $HA = y$; the equation of the superior conchoid will be $\frac{b+y\sqrt{aa-yy}}{y} = x = AL$, or, by reducing

it, we shall have $b+y\sqrt{a^2-y^2} = yx$, i. e. $\sqrt{b^2+2by+y^2-x^2} = yx$, or $\sqrt{a^2b^2+2a^2by+a^2y^2-b^2y^2-2b^2y^2-y^4} = yx$, and $a^2b^2+2a^2by+a^2y^2-b^2y^2-2b^2y^2-y^4 = y^2x^2$; whence, by transposition, we shall have $y^4+2by^3+b^2y^2-a^2y^2+x^2y^2-2a^2by = a^2b^2$, i. e. $y^4+2by^3+b^2-a^2+x^2y^2-2a^2by = a^2b^2$. Thus also, in the inferior conchoid (fig. 5.), if pf and ab be perpendicular to the directrix bt , and al parallel to it; we shall have $tP : tF^2 = a b^2 :: P P^2 : a l^2$. For $tl : gl :: Pl : al$; and $tP : gP^2 :: P P^2 : a l^2$; but $gP^2 = b b^2 - a b^2 = tF^2 - a b^2$; therefore $tP : tF^2 = a b^2 :: P P^2 : a l^2$.

Hence putting $tf = a$, $tP = b$, axis $tb = x$, ordinate $ha = y$, the equation of the inferior conchoid will be $\frac{b-y\sqrt{a^2-y^2}}{y} = x = al$. And, when reduced, $y^4 -$

$2by^3+bb-a^2+x^2y^2+2a^2by = a^2b^2$. Or, it may be had from the equation of the other curve by merely changing the sign of y , which in this case is negative.

Of the whole conchoid, excorsted by these two equations, or rather by one equation only, with different signs, there are three cases or species; as first, when EF is less than EC, as in fig. 2; when EF is equal to EC, as in fig. 6; and when EF is greater than EC, as in fig. 7, in which latter case the conchoid is called *nodated*. The same equation holds for this nodated conchoid, the whole difference being merely that a is here greater than b .

Sir Isaac Newton approves of the use of the conchoid for trifecting angles, or finding two mean proportionals, or for constructing other solid problems. To this purpose, he says, in the linear construction of equations towards the close of his "Universal Arithmetic:" "The ancients at first endeavoured in vain at the trifecting of an angle, and the finding of two mean proportionals by a right line and a circle. Afterwards they began to consider several other lines, as the conchoid, the cissoid, and the conic sections, and by some of these to solve these problems." Again, "Either, therefore, the trochoid is not to be admitted at all into geometry, or else, in the construction of problems, it is to be preferred to all lines of a more difficult description; and there is the same reason for other curves; for which reason we approve of the trifecting of an angle by a conchoid, which Archimedes in his Lemmas, and Pappus in his Collections, have offered to the inventions of all others in this case; because we ought either to exclude all lines, besides the circle and right line, out of geometry, or admit them according to the simplicity of their descriptions, in which case the conchoid yields to none, except the circle." Lastly, "that is arithmetically more simple which is determined by the more simple equations; but that is geometrically more simple which is determined by the more simple draw-

ing of lines; and in geometry, that ought to be reckoned best, which is geometrically most simple; whereas I ought not to be blamed, if, with that prince of mathematicians, Archimedes, and other ancients, I make use of the conchoid for the construction of problems."

There will be other kinds of conchoids produced, if CE : CQ :: QM : AE; or indefinitely, if CE^m : CQ^m :: QM^m : AE^m; wherefore, if CE = b, EA = a, CQ = x, QM = y; then $ab = xy$; and for infinite conchoids, $a^m b^m = x^m y^m$.

CONCHOLOGY. "The study of shells, or testaceous animals," it has been well observed by a plain, but ingenious writer, "is a branch of natural history, though not greatly useful in human economy, yet perhaps by the infinite beauties of the subjects it treats of, is adapted to recreate the senses, and infensibly lead the amazed admirer into the contemplation of the glory of the Divinity, in their creation." Or, in the more harmonious periods of the poet, we would say,

"Each shell, each crawling insect holds a rank
Important, in the plan of him who framed
This scale of beings;" — STILLINGFLEET.

Shells appear to form a part of the creation not immediately subservient to the purposes of human life. This is granted; but they are a link in the great chain of nature; they constitute a department of rational inquiry worthy the researches of the man of science; and when we consider the amazing diversity of singular and beautiful objects they embrace, are such, we are persuaded, as cannot fail to arrest in a particular degree the regard of every common observer.

A late writer, whose talents we respect, asserts, in undistinguished terms, that the pursuits of the conchologist are frivolous, and tend to no useful purpose. For the credit of the philosophical inquirer in this pleasing department of natural knowledge, we could wish to see this opinion controverted. We shall not indeed endeavour to support the pretensions of conchology to a distinguished rank among the more beneficial pursuits of science, but we do not fear to prove it in a pre-eminent degree entitled to the attention of every contemplative mind. In the present enlightened period, it is not, we should conceive, incumbent to offer any argument in its behalf, because we are unable to prove its utility in the common acceptance of the term. We are not, for this reason alone, to esteem it frivolous; or, in a word, to declare that our ideas are entirely absorbed in the contemplation of interested views and the love of wealth, or that we are studious only to gratify our immediate wants. Our untutored ancestors cultivated the oak, we are told, that they might eat acorns, regardless of the importance of the parent timber; but we are not to imitate their example, and deem it trifling to cultivate any branch of natural science, that is unlikely to afford us some direct benefit; nor are we to be content with ascertaining what may be merely useful as food for ourselves, or fodder for our cattle. How unworthy would this be of the refined conceptions and dignity of intellectual men? But we rest convinced that a more enlarged and liberal idea of this subject will be conceived on the slightest reflection by every intelligent mind; that the science of conchology will be hereafter more successfully pursued in this country than it has hitherto been; and that the observations we have to offer as we proceed, though less abstruse than the science may seem to demand, will to a certain extent facilitate this desirable object.

One clear and most important fact, the truth of which we would wish to impress on the mind of the reader, should be premised, that whatever opinion we may form on this subject,

æd, or however lightly we may be disposed to appreciate its merits, the science of conchology, or in more humble terms the study of shells, has in a greater or less degree attracted the attention of curious and contemplative minds throughout all ages; though, as may be naturally conceived, it has been cultivated with more success in some periods than in others. The beauties of this part of the creation did not escape the observation of philosophers in the first æra of learning, as appears obvious from the writings of Aristotle, of Pliny, and of Ælian, and we may also add of Athenæus and Cicero. The cultivation of this, like all other liberal studies, was neglected in the darker æra that succeeded, or at least no evidence to the contrary has survived to this period; but in after ages, as the mists of Gothic ignorance which had so long overhung the western world dispersed, and the light of science, like the morning twilight, dawned upon the horizon of the human mind, conchology revived, was countenanced, encouraged, and flourished. And if, in later times, it resigned a precedence to other sciences, in conformity to the example of the great Linnæus, who was perhaps less favourably inclined towards the study of shells than any other department of nature, it is pleasing to add, that since his time this subject has been most assiduously cultivated, and that by writers no less eminently qualified to exalt its character than to give stability to the science itself.

The term conchology comprehends the study of all animals which have a testaceous covering, whether inhabitants of the marine element, fresh water, or the land. Testaceous is a term synonymous with conchology, but is of later origin and application.

A precise distinction should be drawn between testaceous and crustaceus animals; they are essentially different; though both are protected by a hard exterior shell or crust, in which they are partially or entirely enveloped; and have been indiscriminately confounded together, for that reason, under the vague denomination of "shell-fish." Some of the old writers, and also Da Costa, distinguish the testacea as a kind of stone-like calcareous covering or habitation, in which the animal, otherwise naked, resides, and from which it can protrude its molluscous arms, or other naked parts of its body, at pleasure. The crustaceus animals of those authors, on the contrary, are not naked, but have every particular limb or part separately covered with the crust, which is thus divided into many joints, inasmuch that the whole animal assumes a loricated appearance, as if inclosed in a coat of mail. Among the crustaceus order, the *canceri*, or crabs and lobsters, were included, a tribe we have endeavoured to shew in another article, to be of a nature altogether distinct from testaceous animals. (See CANCER.) Klein, in his "Nat. Disp. Echinodermatum," sect. r. treats on this subject, and labours to prove that the echini, which are evidently crustaceous bodies, are of the same nature and quality as the testacea; but recent, and we think conclusive observations, testify the fallacy of his opinion. A better definition may be obtained by attending to the chemical properties of the two substances testaceous and crustaceous. Poli, in his work on the shells of the two Sicilies, demonstrates that testaceous bodies consist of calcareous earth united to a small portion of animal matter or gluten; and Mr. Hatchett, whose experiments on the chemical characters of those bodies are inserted in the Transactions of the Royal Society, draws a striking distinction from analysis between the testaceous and crustaceous bodies, ascertaining the shell to consist only of carbonate of lime mixed with gelatinous matter, while in the other the presence of phosphate of lime was detected. The crustaceous body analysed by Mr. Hatchett was the echinus.

All testaceous animals are composed of two parts; one of which, the animal itself, is soft and molluscous; the other is the shell, or habitation, which is hard, of a stony or calcareous nature, and either partially or entirely covers the animal. The animal is attached to the shell by means of ligaments or muscles.

It was long considered as a matter of dispute among naturalists, whether the arrangement of shells should be constituted from the animals or their habitation. No one can deny, that if we proceed on principles strictly scientific, we must regard them as a department of zoology, and should, on that account, dispose them according to the nature and structure of the animals. But the classification formed from the characters of the shells is universally followed, and we must confess too, is for many reasons preferable to any other. Neither is it, in the hands of the skillful conchologist, attended with so much indecision, as might be generally imagined.

In the first place among the vast variety of shells hitherto discovered, how small comparatively is the number of those, whose animal inhabitant is described or known. It is not of species only that we speak, but of whole natural families or genera, not a single species of which has been yet discovered with the animal appertaining, so little are we acquainted with the molluscous orders, or animals inhabiting the shells. Of the shells we daily see in collections few are filled up alive, the far greater number are found on shores, dead or empty. Neither, if they were otherwise, are accurate descriptions of animals whose parts are not easily seen, or anatomical investigations, which are in many cases necessary, within the capacity of every one. Many of their parts, and their respective functions, are not to be ascertained, except by comparative analogy, and which in itself presents an insurmountable difficulty, or a field of critical inquiry so extensive and complicated that few, even with the ability to pursue it with success, could be prevailed upon to devote that attention to the subject which it requires.

Hence it becomes impossible to arrange the far greater number of testaceous productions by the animals; the attempt must ever prove unsuccessful. Our arrangements would be partial, and three-fourths of the shells known must be either excluded from the system, or be placed at hazard; and of course without order or connection with those whose animals we are acquainted with. The latter are chiefly such as are confined to the coasts of the European seas, and some of the terrestrial and fresh water kinds, which, from their abundance and locality, have obtruded themselves upon the investigations of the naturalist. Even our knowledge of those is exceedingly imperfect. For those of the extra European species, we are indebted chiefly to Adanson, Rumphius, Argenville, and Favanne, and for the anatomical discussions on various European kinds to Valerini, De Heide, Lister, and Müller. The investigations of Poli on the shells of the two Sicilies are valuable, in this respect, as also are the observations of Lamarck and Cuvier, and we may also add Olivier; but what is the amount of all these discoveries, we would ask, in enabling us to form a system of conchology.

The best characters upon which to found all systems of natural history, must be those most obvious and accessible. All ranks of animals, as nearly as can be with convenience, should be arranged by apparent and external characters. While we study shells, without regarding the animal, we are aware they are but considered partially. The animals that inhabit them should guide us in our researches; they alone are the fabricators of the shell, and the shell is only their habitation, to which they give the form, the bulk, hardness,

hardness, colours, and all the peculiarities of elegance we admire. If we were to examine these new and almost unknown beings, we should discover a number of parts as remarkable for their structure as their functions, and an infinite variety of curious and interesting particulars relative to their general habits and manners of life. It is a subject worthy of the serious contemplation and attention of the naturalist, and should never be neglected when an opportunity offers. But a system of conchology, founded entirely on the structure of the animals, must, we cannot hesitate in asserting, ever remain one of the desiderata of natural science.

In the superficial arrangement taken from shells alone we are not exempt from difficulty. Shells vary exceedingly in form and colour in the different stages of their growth, and in this case we should sometimes derive material assistance from our knowledge of the animal. Young shells have been described as specifically distinct from the parent or older shells by many writers. It indeed requires a greater degree of caution in determining the species, nay even genera, of shells in the different periods of growth than may be imagined; of this we could adduce many very remarkable instances, a few of it may be necessary to mention to guard the common observer from forming hasty, and erroneous conclusions.

Many of the cyprææ, or cowries, when young, have the appearance of a volute, the thick denticulated fold of the exterior lip being wholly wanting, and the column being only partially plaited as in the true voluta. The young of the alated shells, in general, are destitute of that broad expansive, or furcated lip, called the wing. The spires in many of the turritid kinds of shells, when young, are blunt; obtuse, or terminated in a large globular head, exceeding the size of the whorl beneath, but as the shell advances in growth, it develops itself, extending in a spiral direction, and thus in the old shells the number of spires is greater than in the young ones. The variations in the growth of the patella tribe are often so considerable, as to almost defy the critical observer to determine them. Still however the conchologist by the dint of application, and nice discrimination, will be at last enabled to fix on certain characters peculiar to every species, and be, by that means, enabled to decide on the species of a shell under every stage of growth.

Linnaeus considers the structure of the animal as well as the shell in all his generical distinctions; the idea is excellent, and we should approve the design, but the object itself is unattainable; a lamentable proof of which presents itself to view, when we consider the number of those very animals which he describes that have been ascertained, by recent observations, to be of a very different nature and structure from what he conceived. This error may be easily accounted for when we reflect that the judgment of Linnaeus was guided in many instances by analogy, and the indifferent figures extant in various writers, without himself possessing the means of determining their accuracy, or imperfection. We intend nothing to the disparagement of Linnaeus in this respect; the structure of the animal was of too much importance in his mind to be omitted, and he availed himself of the best sources of authority within his power, some of which, it has since been proved, are not so accurate as we could wish, and others altogether erroneous.

From all that has been advanced on this topic, the result will be obvious, that testaceous bodies may be consistently arranged, or, in other words, can only be arranged by the organization of the shell; that the primary character must be

taken from the shell because this we are acquainted with, while the animal is oftentimes unknown to us. But that the structure of the animal should be regarded in the construction of genera, when it can be ascertained; as a secondary consideration to guide us in the formation of new genera, or in correcting the old, as opportunities of investigating them occur.

Having defined the meaning of a testaceous animal, and endeavoured to prove that the structure of the shell is the most material object to be regarded in a primary view, we shall proceed next to an elementary elucidation of the several parts of which it is composed.

In conchology, as in any other science, the student must necessarily acquire, in the first instance, a distinct knowledge of the terms employed. These, except such as relate to subordinate characters, or specific distinctions, and which require no explanation in this place, may be simplified and reduced to a small number. In the selection of these terms we can abide by no one particular authority; we must be general, deriving our terms from various sources, or inventing new ones. Hitherto in treating on the different articles of conchology, in the progress of this work, it has been our aim to adhere as nearly to the authority of Linnaeus as possible, reserving to ourselves an opportunity of expressing our own sentiments under the present article, and stating generally these points upon which we principally differ in opinion from that author. This will appear more fully in our review of his genera. Our attention is at this time confined to the terms employed in describing the several parts of shells, and as it is well known that Linnaeus laid down a series of terms for this purpose, it will be expected that we should not pass over them in silence. Upon this subject we shall however only trespass lightly. We would willingly adopt those established by Linnaeus, in his "Fundamenta Testaceologie," and other writings; but it must be confessed, with all our respect for the talents of that naturalist, his terms are inadmissible. The warmth of his admirers, and we must, on many occasions, profess ourselves of that number, will not peruse the definitions he has given of the bivalves, of his venus, and some other bivalve genera, of his venus dione, and also of several univalves, without admitting that much of the Linnaean phraseology on this subject is neither applicable to the parts intended, nor if it were, such as modesty would allow us to retain; and that to expunge them is only a necessary sacrifice which the exactness of science imperiously demands. Delicacy will pardon the allusion, and desire no further explanation.

All shells or testaceous bodies hitherto discovered, may be divided into three principal tribes, and which, after the Linnaean manner, may be denominated Multivalve, Bivalve, and Univalve.

Any external part of a shell being of a testaceous substance, and either itself, forming a shield or covering for the animal, as in univalves, or in union with another, or others connected by a ligament, cartilage, hinge, teeth, or other fastening, is denominated a valve. The shells therefore consisting of a single piece, are called univalves, those of two parts bivalves, and those of many parts multivalves. Between bivalve and multivalve no distinction is drawn, shells consisting of more than two such parts, being called multivalve, without any regard to the number. An amendment is proposed by some of the French writers, in a new order under the name of trivalve.

Shells of the simplest form are arranged by some naturalists in the first class, from which they proceed progressively to those possessing the greatest number of valves, and being of the most intricate structure. This is an ancient, and very simple

simple mode of arrangement, and has its advocates in the present day. Linnæus reverses this order by beginning with the chiton, lepas, and pholas, which are shells of the multivalve and most complex structure, and ending with those of the simplest form. We cannot avoid thinking the former preferable, and shall adopt it in the present instance.

Explanation of the Parts of Shells with Reference to the Elementary Plates of Conchology.

Univalve.

In the examination of a shell of this order, the contour, or outline, is the first particular to be regarded. By this the conchologist is guided in his definition of simple, spiral, or turbinated shells, (or as the Linnæan school divides shells, univalves with a regular spire, and univalves without a regular spire); discoid, flattened, or turritid shells; those with smooth or uneven *anfractus*; the ventricose, alated, labiated, rostrated, and many other distinctions, all which strike the eye at the first view. It is indeed, by attending to the contour, that the principal distinctions in shells of this kind are at once perceived, taking into consideration the back and front profile at the same time. Some few shells, as the nautilus pompilius, and others of the same family, have the spire revolving internally, in which the outline offers less assistance in the primary definitions, but the number of such shells is very small. Next to the profile of the shell, the structure of the mouth, the pillar, and expansion of the inner lip, the gutter or canalisation, and the umbilical opening, and operculum if any, are to be considered, and lastly the work on the outer surface, as well as the colours with which it is embellished.

The base or bottom of the shell we consider that part upon which it rests when supported in an erect position, with the summit or tip of the spire standing vertically. In such shells the tip is called the apex. The course of the spires or wreaths is from the left to right in most spiral shells, some few only being of the reversed or heterotrophous kind, the whorls of which are in a contrary direction. When speaking of the right and left sides of a shell, it should be understood as having the aperture downwards, and it will be then seen that in most shells the aperture or opening is on the left side, *i. e.* facing the right hand of the spectator.

Base, the tip of the salient end of the shell, at the extremity opposite the apex of the spire; in the rostrated kind of univalves it implies the tip of the beak. Some say the shell rests on its base when laid upon a flat surface, with the mouth downwards; this is not correct, except in the patella tribe, and some other univalves which have no regular spire, as the dentalium, &c. The base in several shells is denoted in the Plate, *Conchology*, fig. 1.

Apex, the summit of the shell. Fig. 2.

Front, the face of the shell with the aperture placed directly in front of the observer. Fig. 3.

Back, that part of the shell which is immediately opposed to the preceding. Fig. 4.

Sides, those parts seen longitudinally in profile, to the right and left when the shell is viewed either in a front or back position. Fig. 5.

Body, of the shell, (corpus) the first whorl of the spire at the base. Fig. 6.

Belly, is to be distinguished from the body as it implies only the convex or swollen part of the first whorl, formed by the convexity of the aperture near the lip. Fig. 7.

Whorl denotes one of the wreaths, turns, or volutions of the shell. Fig. 8.

Spire, comprehends, in a general sense, all the whorls of the shell, the first or body wreath excepted. Fig. 9.

The form of the spire is of great consideration in the definition of shells as it affords a prominent and distinguished character; it is in general flatish, somewhat depressed or elevated; sometimes convex and slightly pointed; or with the point obtuse; or much elevated and ending in a point; plano-concave, pyramidal, subulate, or truncated. Mr. Adanson observes that the disposition of the spires varies according to the plane they turn on, which is either horizontal, cylindrical, conic, or ovoid. These, he conceives to be the four principal dispositions of the spires, but admits there are many intermediate formations. The number and form of the spires vary in the same species, in their different growths. Young shells have commonly a less number than the old ones, neither have shells of the same age always the like number of spires, a circumstance attributable to the effects of sickness, or the difference of sex. Thus in some turbinated shells we perceive that the males have the spire less numerous, smaller, and of a more lengthened form than in the females.

Suture of the spire or whorls, is the spiral line which separates the whorls, and which is sometimes sulcated, crenulated, or somewhat projecting. Fig. 10.

Pillar or Columella, is the inner part of the left lip, or column, which runs through the shell, from the lower extremity to the tip of the spire, and from which all the spires take their origin; the columella being situated as nearly as possible in the axis of the shell, and serving as its basis and support throughout. It is generally either flat, grooved, folded, or truncated in that part which is visible at the opening. Fig. 11.

Aperture, called in familiar language, the mouth of the shell, is the entrance to the chamber in which the animal resides, and is applicable to the openings of univalve and multivalve shells. The aperture is either entirely open, or closed by the operculum attached to the body of the animal, when the animal retires into its dwelling. This aperture varies in form in different shells, being angular, rounded, semilunar, linear, or otherwise, and sometimes appears double, the inner margin being surrounded by an exterior one. Fig. 12.

Lip, the expansion of the exterior part of the aperture constitutes the lip in the labiated shells, and the wing in the alated kinds. Fig. 13.

Beak, or rostrum, is that part at the base which extends in a straight or slightly oblique direction from the bottom of the aperture, and is larger or smaller in different families. In *murex haustellum* this projection is very conspicuous. Fig. 14.

Canal, or gutter, an elongation of the aperture of the shell descending in a groove or gutter-like process. Some kinds of rostrated shells have the canal remarkably conspicuous, forming a sinus from the aperture throughout the whole length of the beak. Fig. 15.

Umbilicus is the opening, or perforation in the lower part of the body, or first whorl of many spiral univalves, and is very conspicuous in a number of the trochus and nerita genus in particular. This umbilical perforation runs in a straight line from the base to the summit of the shell, forming throughout a spiral groove or gutter, which is wide at the entrance, and tapers gradually towards the apex. In the Linnæan *nerita canrena*, the structure of the umbilicus is well displayed, but is still more obvious in the staircase shell, trochus *perpetuus*. This opening occurs in many shells at the base of the pillar. Fig. 17-

tudinal line is drawn from the beak to the opposite margin, the space on each side the line is distinguished by the appellation of the right and left side; and when the form of both those spaces correspond, the shell is equilateral, as in the scallops (*ostrea*, Linn.): the inequilateral valves are the reverse of this, a line drawn as above described, from the beak to the opposite margin, presenting two sides of a very different shape, as we see in most of the *mastra*, the *donax*, and *tellina* genera, and in the *mya truncata* especially. Sub-equilateral shells, or those having the valves nearly equal at both sides, are sufficiently elucidated by shells of the *cardium*, or *cockle* genus, which are strictly "bivalvis subæquilatera."

All bivalve shells do not completely close their shells, though most of those before mentioned do so, such as the scallop, the *donax*, *tellina*, and *cardium*: in several other tribes of bivalves, when the shells are shut as closely as their form will allow, they still exhibit a kind of hiatus or gaping, either at the anterior or posterior end, or at both; and in some, when the valves are shut, both the anterior and posterior parts are closed, but an opening appears on one side of the beak; this last-mentioned character is very obvious in *chama gigas*.

One of the first circumstances to be considered, is which part of a bivalve shell ought to be deemed the base, because when this is determined, every other part will fall progressively in their relative order under our observation. We name that part of the margin or limb which is situated in a direct line opposite the beak, the base of the shell. Linnæus, in order to establish the characters, and afford some apparent reason at least for the application of the terms he bestows on the different parts of bivalves, reverses this position of the shell, and describes the beaks as the base of the shell. But the fact is, the natural position of the shell is in immediate contradiction to his axiom, for the beaks are always uppermost, being either immediately vertical, or with a slight inclination obliquely, when the animal moves along with its tectaceous covering on the back. A solitary example will perhaps occur occasionally, in which the beaks may be considerably inclined when the animal crawls, but none, we believe, are known which open the valves upwards, and proceed with the beaks under the body. The beaks, if only for this reason, are to be considered as the summit, and the margin opposite as the base. Many of the bivalves are destitute of the locomotive power, or at least do not possess it in any material degree.

Base of bivalve shells, exemplified in *venus verrucosa*. Fig. 22.

Summit, a word applied in a general manner to the top or most elevated part of the two protuberances observable in the greater number of bivalves. Da Costa calls that part of the shell, in which the teeth or hinge is placed, the summit or apex; we regard it as the most elevated part of the beaks. Fig. 23.

Beak, the pointed termination, apex, or tip of the protuberances last-mentioned, and which, in many shells, turn spirally downwards, or obliquely, so that the beak itself is seldom the most elevated part of the shell: though it is so sometimes, as for instance in the *mytilus edulis*, or common *muscle*. Fig. 24.

Sides, the lateral parts of the valves distinguished by the epithet of right and left side; in common language, the two valves of a shell are called the sides, but it is not understood as a term in conchology in this view. Fig. 25.

Margin, or *limb*, the whole circumference or outline of the shell, when laid flat down on one valve. Fig. 26.

Dish, the convex centre of each valve, or exterior surface. Fig. 27.

Anterior slope, that part of the shell in which the ligament is situated; in the front view of the anterior slope, the beaks fall back, or behind. Fig. 28.

Posterior slope, that immediately opposed to the former, and in which the beaks of the shell turn forward. Fig. 29.

Lunule, the lunulated depression below the beaks, either on the anterior or posterior slope, and sometimes on both; they may be distinguished under the appellation of anterior or posterior lunules, according to the slope in which they are situated. Fig. 30, a, b.

Cartilage of the hinge, called also the ligament of the hinge, the substance of a flexible, fibrous, and somewhat horny nature, by means of which, the two valves are united near the beak. Fig. 31.

Ears, the lateral processes near the beaks, as in the scallop tribe: those occur either on one side, or on both. Fig. 32.

Ligament perforation, the opening, or aperture, through which the ligature of the animal passes in the anomia genus, by the assistance of which it fastens itself to the rocks, or other bodies; in some it is situated in the flat valve, in others at the beak of the gibbous valve. Fig. 33.

Length and breadth of the shell. The length is measured from the cartilage or beak to the margin below, the breadth is of course taken in the opposite direction. The breadth of many bivalve shells exceeds their length: some remarkable instances of which occur in the solen tribe. Fig. 34.

Inside of the valves exhibits the concave surface (*concauitas concharum*), fig. 35.

Hinge, the point of union between the two valves, formed by the connection or articulation of the teeth in both valves, or by the teeth in one valve, fitting into hollows or sockets in the valve opposite. The amazing variety of structure observable in the hinge of different tribes of shells renders this one of the most essential characters in the general definitions of shells. The teeth in some are small and numerous, in others thick, solid, and few in number, or sometimes single, long, spatuliform, laminiform, acicular, &c. the principal of which may be divided into *inarticulate* hinge, when only furnished with callosities, or having no visible teeth; *articulate*, when it has teeth, but only a small number; and *multarticulate*, when the teeth are numerous. These variations will be further explained under the respective genera.

Cicatrix, the impression on the inside of the valves indicating the point of connexion between the muscles of the animal, and its shell. In some kinds, as the common oyster for example, there is only one such muscular impression in each valve, in others there are two, and some have more. The cicatrix is not of the same figure in all shells, being either round, semi-ovate, lunate, or elongated, in different kinds. Fig. 37.

Byssus, the appendage called the beard; by means of which some bivalves fasten themselves to the rocks. Fig. 38.

The imbrications, furrows, spines, tubercles, reticulations, striations, or other peculiarities of the same nature, as well as the variations of colours, observable on the exterior surface of bivalves as before stated in speaking of univalves (and which is indeed equally applicable to the multivalves, and consequently to shells of every description), though they afford us the best specific distinctions possible, do not claim our regard as primary characters, and are therefore passed unnoticed in this place.

Multivalves.

The shells of this order are few, compared with either of the preceding; and the terms proposed for those, are applicable for the most part to the multivalves. The following require more explicit mention.

Base, that part of the shell upon which it rests: in the lepas tribe it implies the part immediately seated upon the stem or pedicle; in the balan, the base is generally larger than the summit, and is the bottom by means of which the shell is fixed upon the rocks, or other extraneous bodies. *Fig. 39.*

Ligament, the substance, whether membranaceous or tendinous, which serves to connect the valves together. The connexion of the valves in some multivalves is formed by the parts of one valve locking into another. *Fig. 40.*

Operculum. The balan has the aperture at the summit closed by means of four small pieces or valves, which are commonly called the operculum; these opercula of the balan are, however, very different from those of univalve shells. *Fig. 41.*

The various parts of which testaceous bodies consist being sufficiently considered and explained, our attention is next directed to the different modes of arrangement into which those bodies have been distributed by the principal writers on conchology, and a general inquiry into a variety of other particulars connected with the history of the science. In this investigation we shall avail ourselves in some measure of the method pointed out by the learned author of the "Classes Conchyliorum" (Bergen), the valuable "Bibliotheca Hist. Natur. Bankiana" of Mr. Dryander; "La Conchologie" of Favanne; the "Historical Account of Testaceous writers," by Dr. Maton and Mr. Rackett, inserted in the "Transactions of the Linnæan Society," and the labours of many others, in addition to our own, will appear in the course of the following observations.

The name of Aristotle stands high in the records of philosophy. He is emphatically called by Dr. Pultney, in speaking of testaceous writers, the father of natural science; and by Dr. Maton the inventor of system. Our respect for the Macedonian philosopher is great, nor would we willingly appear to detract from his distinguished merit; yet we must confess we never could conceive it possible, with all the ability this early writer possessed, that, rising as it were from primeval darkness, he could at once survey the multifarious objects of creation, and produce a system of natural objects so complete as that which we are disposed to acknowledge exclusively as his own. He must have derived considerable aid from sources then extant, and which are now for ever lost to the world. The history of mankind throughout all ages will testify beyond a doubt that the acquirement of human knowledge is slow and progressive; and the knowledge of Aristotle in natural science was in particular of that kind which in a great measure could be attained only from the observations of many. Under the patronage of Philip, the Macedonian monarch, and of his son Alexander, the hero of the world, no advantages which Aristotle could derive from the study of books would be denied him, and can it be imagined from so many hundred thousand volumes as were extant in his time, and at his immediate command, Aristotle was unable to obtain information; or that among this immense number there were none on the subject of Aristotle's inquiries? This writer would certainly avail himself of the recorded labours and discoveries of former ages, and especially would not neglect to cultivate an acquaintance with the sciences of the Egyptians, upon all which his own ideas might improve. Indeed, if we mistake not, however visionary it may appear, the latter was the genuine source

from whence his knowledge of natural philosophy was derived. Egypt, not Attica, was the cradle of science.

To the writings of Aristotle the learned world is certainly indebted for the first account we probably ever may possess of the state of natural science at the early period in which he lived; it is a fortunate circumstance for the cause of learning that his labours have survived the havoc of destructive time. This system is a production that would confer credit on any naturalist of the fourteenth century, much less of a period almost two thousand years before. The classification, or division of shells contained in the fourth book of "Aristotle's History of Animals," has stood the test of ages, and, with improvements, rendered necessary by recent discoveries, is in general adopted by very late writers. Linnæus was in a great measure himself indebted to his system for the outlines of his own, for many of his genera, and for the names under which those genera are retained, even in the most improved state of his "System of Testaceology."

The "Oltracodermata" of Aristotle, for such is the title of his conchological productions, present us with a valuable scheme of shells. He divides all shells into two principal classes, *Movibura* and *Δίβυρα*, or univalves and bivalves.

The univalves he separates into two parts; namely, those of the turbinated kind, as *Κοχλίας*, or *limaces*, *Καχλίας*, *cochalis*, the *purpura*, *Πορφύρα*, *buccina*, *Κόρυς*, &c.; and such as are less turbinated, as *Δεπας*, the sea-ears, or haliotis, and *Νηπύρα*, *nerite*. Among the latter, he includes several families of the echinus, or sea-eggs, *Εχμυς*, a tribe of crustaceous animals retained by almost every writer among the shells, till they were separated by Linnæus. He also speaks of the animals inhabiting the coccolia, *purpura*, and *buccina*.

The bivalves he distributes into several families; he has *Κλινας*, or *pelecines*, *Σακμυς*, *solene*, and *Πλωα*, *pinna* or sea-hams, all of which genera have been retained by Linnæus, and later authors.

Aristotle commits one remarkable error, however, in placing the opercula of some turbinated univalves as a genuine tribe of shells. This error, which indeed we think excusable considering the age in which that philosopher lived, is mentioned by several authors as an objection to his accuracy of discrimination, and is commented on by Bergen in the following observation.

"Ex umbilicis *βίς κήχρας* videtur Aristoteles peculiare conchyliorum genus perperam constituisse, sunt enim proprie opercula quorundam turbinatorum, quæ certo anni tempore foribus cochlæarum quasi instar claustris, agglutinata inveniuntur quæque postea decidunt & nullius amplius usus pro ipso animalculo." Aristotle flourished 322 years before Christ.

C. S. Pliny wrote largely upon conchology; the ninth book of his "History of Animals" is very copious: it is more diffuse than that of Aristotle, and the arrangement is unmethodical, but this is still an useful work, and may be consulted with advantage. Many of the terms employed by modern conchologists are to be found in his work. Pliny constitutes thirty-three families, which are distinguished chiefly by the form and superficies of the shell, as *plana*, *convexa*, *longa*, and *lunata*, *levis*, and *rugata*; by the shape of the margin, as *marginè in mucronem emisso*; *marginè fortis effuso*; and *marginè intus replicato*. The sinuosities, or projections of the shell, the connexion of the valves, and other similar characters, were also taken as distinctions of the different families.

In Pliny's time the Romans are supposed to have possessed considerable opportunities of acquiring a knowledge of shells, as their navigation was extensive, at least in the Mediterranean and the Red Sea.

The conchological writings of Ælian are held in less repute than either of the preceding; he dedicates some conchic chapters to this subject in his work entitled, "Ἱστορία Ζῴων ἁδυστησίων."

After the dark ages which succeeded, Vincentius Bellouacensis was one of the earliest writers on this subject. His "Speculum naturale," published in folio, in the year 1494, contains a description of the murex, purpura, ostrea, and a few other remarkable shells, extracted chiefly from the works of Aristotle and Pliny, and intermingled with the absurd and superstitious notions of the times. The works of Albertus Magnus, entitled "De Animalibus," which appeared in folio in 1497, contains descriptions of some shells; and so likewise does that of Adam Lonicerus, "Historia naturalis opus novum," published in 1551.

The first writers who distinguished themselves by any attention to the study of conchology, after the revival of letters in Europe, were Belon, Rondeletius, and Gesner. Belon is celebrated for his travels in the East, and he was perhaps one of the first learned men who travelled principally with a view to natural science; on his return to Paris, in 1553, he published, besides other works, an octavo volume, entitled "De Aquatilibus." The part appropriated to conchology is not extensive, it is rather elementary and philological than descriptive; but contains figures of a few shells engraven on wood. The work of Rondeletius (professor of physic at Montpelier) appeared two years after, A. D. 1555; this bears the title of "Uniuersa Aquatiliu Historia," and contains upwards of one hundred species of testaceous animals. His residence on the coast of the Mediterranean afforded him abundant opportunity of investigating the shells of that sea, and their animal inhabitants, a subject of inquiry to which he paid some attention. This author received much assistance from the labours of Aristotle and Pliny. The "Commentaries" of Matthiolus, embellished with a few cuts of shells, contain nothing of material interest, except what has been collected from former writers; several editions of this work appeared between the years 1506 and 1683, in Spain, Italy, France, and the Venetian States. In 1558, the work of Conrad Gesner, "De Piscium et Aquatiliu Animantium Historia," made its appearance, and acquired much reputation. Dr. Paltney pays a high compliment to Gesner for his unparalleled industry, and ardent love of natural history, and observes, that he not only collected all the philological, historic, and descriptive erudition of the ancients on this subject; but besides his own copious comment on their writings availed himself of what Belon and Rondeletius, his contemporaries, had done, to which he added much original matter of his own, having described and figured many of the Mediterranean shells and several of those discovered in the Indian and Arabian seas. This comment is correct, but of the system proposed by Gesner for the classification of shells, we must speak more fully. This author divides all shells into four classes, *univalvia*, *bivalvia*, *turbinata*, and *anomala*. The first contains only two genera, *lepas* and *auris marina*; or the *Ear*s, and *sea ears* (*lepas* derived from the Greeks, and synonymous with *patella*, being the name applied by old conchologists to the limpets, since called *patella* by Linnæus). His *bivalvia* class contains many genera, as *ostrea*, *spondyli*, *mytili*, *tellines*, *chame*, *pinne*, *solenes*, and eight others. In the third class *turbinata* he has ten genera, as *tr*mbi, *murex*, *buccinum*, *turbo*, *trochus*, *serices*, &c. all which names will be recognized by the Linnæan student as those employed by Linnæus. His fourth class *anomala*, is exceptional, as it contains, besides the *balani*, *penicilla marina*, *tubuli marini*, and *echini*, the *stellæ marinæ*, or

star-fish, and *caput medusæ*, neither of which have ever been considered by other naturalists as appertaining to conchology. Bergen admits this as a material objection to his system, "Peculiarem classem anomalorum condidit, ad quam, ut mihi videtur, adnumerandæ. Idem valet de capite medusæ." His separation of the *balani* from the two first classes is countenanced by all late writers.

Geoffrey Linnœier, in his "Histoire des Poissons," published at Paris in the year 1558, gives an account only of a small number of shells; the work not being devoted to the subject of conchology; neither is that of Imperato, published at Naples in 1599; though it contains an account of some species, this production relating chiefly to fishes; it bears the title of "Dell'Historia di Ferrate Imperato Napolitana."

The work "De Molibus Crustaceis, Testaceis, et Zöophytis," of Aldrovandus, appeared in folio, in 1606, and is well known. His arrangement consists of three classes, *turbinata*, *bivalvia*, and *univalvia*. Among the *turbinata* he includes the *nautilus*, and also the *buccinum*, and other spiral shells, together with the *echini*. The *bivalvia* class is the same with that of all other writers, as *ostrea*, *tellina*, and *pinna*, but besides these includes the multivalve shells of late authors, such as the *balani* and *pholades*. The third class, or *univalvia*, contains the *lepas*, *patellæ*, *auris marina*, *concha veneræ*, *concha perficæ*, and *penicillus marinus*. The figures consist of cuts on wood, and are rudely executed.

Fabius Columna, in 1616, published a treatise on shells, or rather a monograph on the purpura, entitled "De Purpura ab animali testaceo fusa, de hoc ipso animali, aliisque varioribus testaceis quibusdam." A new edition of this work, with annotations, appeared in 1675, by John Daniel Major.

In the year 1616, a work entitled "Fasciculus rariorum et aspectu dignorum varii generis, quæ collegit et suis impensis æri ad vivum incidit curavit," from the pen of Basil Bessler, apothecary at Nuremberg, made its appearance; it is in Latin and German, and two of the plates are appropriated to the subject of shells.

Chiocco, the describer of the "Museum Calceolarium," published at Verona, in 1622, gives a full account of the shells contained in that collection, with specific characters in the Latin language, borrowed for the most part from other authors. This museum was begun by Benedicte Ceruto, a physician, and afterwards enlarged by Calcolari. The figures of the shells occupy six plates. It appears to be the first work that was written professedly as a description of a museum of natural curiosities, the account of the same museum by J. P. Olivier, published in 1584, alone excepted.

A physician of Hamburg, Schonvelde, was author of an account of aquatic animals, both of the marine and fresh water kinds, found in the duchies of Sleswick and Holstein, which contains separate chapters on oysters and murexes. The observations relate chiefly to the culinary uses of the animals. This book bears date 1628.

The work of Nierembergus, "Historia Naturæ," contains an account of a number of shells, but does not present us with any figures. It was published at Antwerp, in 1635.

In the first edition of the "Gazophylacium Rerum Naturalium" of M. P. Bessler, the brother of Basil Bessler before-mentioned, are twenty-four plates, containing, among a variety of other subjects, natural and artificial, a few figures of shells, with a concise description in Latin of each, under the respective figures. The second edition comprises six

ix additional plates and a preface in German. The first was published in 1642, the latter not till the year 1733.

The fynoptical catalogue of Seger, "Synopsis Methodica rariorum tum Naturalium tum Artificialium quæ in Musæo D. Olei Wormiis afferantur," was printed at Copenhagen in 1653; and, as the title informs us, describes both the natural and artificial curiosities in the museum of Wormius. This was succeeded in 1655; by a more ample account of the museum by Olaus Wormius, from which it appears to have contained many of the testaceous tribe, one only of which is however figured; this is the Linnæan *lepas anatifera*, to which is attached the whole of the absurd tale related by credulous writers of that day respecting the bernacle goose, which was supposed to be engendered, and hatched in those shells! The sixth, seventh, and eighth chapters of this work are descriptive of shells; these he divides into univalvia, bivalvia, and turbinata.

In 1672, the "Museum Moscardianum," or "An account of the collection of natural curiosities belonging to an Italian nobleman, Conte Lodovico Moscardo," appeared at Padua. The shells are comprised in twelve plates, and the subjects are noticed specifically. Another edition of this work made its appearance in 1672, at Verona, the city where that noble collector resided, which, besides the twelve plates above-mentioned (and which are engraven on copper) contains some cuts on wood.

The work "Historia Naturalis de Exanguibus Aquaticis" of Jonston, is an extensive production, a compilation for the most part from others, and is embellished with a number of engravings, comprehending altogether twenty copper plates of mollusca and testacea. Like Aldrovandus, he distributes all shells into three principal classes, turbinata, bivalvia, and univalvia. His turbinata are subdivided into two sections, "* in anfractu torta;" and "** in orbem circumacta." In the first of these, we find the nautilus, purpura, buccinum, marex, conchylium, and blatta byzantina; and in the other, turbines, trochi, nerites, cochlæa, and echini. Except the multivalves balani, and pholades, which he includes in his class bivalvia, the bivalves are those of later authors; the class univalvia contains two genera, the *lepas* or patella, and *concha venerca*. This work was published at Amsterdã in 1657. Eight-years after which (1665) the same author described a few of the more remarkable shells in his "Thaumatographia Naturalis."

About this time De Rochfort published an account of the shells of the Caribbee Isles, illustrated with a plate of five species, which he considered most remarkable for shape and beauty. This work bears the title of "Histoire Naturelle et Morale des Isles Antilles." Jean Baptiste du Tertre, also, published on the same subject, "Histoire generale des Antilles habitees par les François." Paris 1667.

The "Museum Gortorpiamum," or "Museum of the Duke of Holstein-Gottorp," was described by Adam Olearius, in 1666. This is in quarto, and of thirty-six plates which it contains, five consist of shells, all which are referred to by Linnæus in various parts of his Systema. Another edition came out in 1674.

In the "Pinax Rerum Naturalium Britannicarum," published in London in the year 1667, by Merret, we are presented with the earliest catalogue of the natural productions of Great Britain, extant. This is in octavo. The conchological part, which he calls "Testacei," occupies about half a page, and contains references to the voluminous works of Rondeletius, Gesner, Aldrovandus, and Jonston.

Charleton, a physician of considerable celebrity, published, in London, in the year 1668, his "Onomasticon Zo-

cum," in which a new arrangement appears. This author divides all shells after the manner of Aldrovandus and Jonston, into turbinata, univalvia, and bivalvia, from whence it will be perceived, he inverts the order of the two last classes. His turbinated genera are literally transcribed from Jonston. The univalves contain ten genera, five corresponding with those of Aldrovandus, *lepas*, *auris marina*, *concha venerca*, *concha perlica*, and *penicillus marinus*, to which are added *tubuli testacei*, *balani*, *conchæ anatifera*, *dentalia* and *entalia*. His bivalve genera are less happily defined: in addition to those established by Jonston, he forms others in imitation of Pliny, taken solely from the scaly aperities, spines, or smooth exterior surface of the shells, after previously dividing the whole class of bivalves into two orders "conchæ aspera, and conchæ læves."

Nothing appeared from this time of material consequence on the subject, till the re-publication of the treatise of Fabius Columna, by Dr. Major. In the interval, Steno published a work, entitled, "De solido intra solidum naturaliter contento Dissertationis Prodrômus," which contains some pages devoted to an explanation of the fabric and texture of testaceous bodies. Boyle described some experiments on the phenomena of shell-fish, particularly of the oyster, under an exhausted receiver, in the Philosophical Transactions of the year 1675; and Willis, in 1672, the anatomy of the oyster, in his "Exercitationes de Anima Brutorum;" but these are only physiological dissertations. The work of Dr. Major includes a new system annexed to the history of the purpura previously published by Fabius Columna, and likewise a "Dictionarium Otracologicum;" and is besides illustrated with a number of wood-cuts. All shells are divided by this system into two classes, univalvia and plurivalvia, the first of which are subdivided into several orders, the characters of which are taken from the form and structure of the opening of the shell, its turbination, ventricosity, protuberances, or general figure. The genera constituted of those shells are few, as *penicillus marinus*, pyramidaliter dentata, *lepas* vel *patella*, *auris marina*, *conchæ natatiles*, *concha venerca*, *nautilus*, *murice*, *turbo*, *turbines terrestres*, and *buccina*. His class plurivalvia is separated into two orders, bivalvia and plurivalvia, the first of which consists of his *conchæ striatæ*, *conchæ verrucosæ*, *conchæ rugosæ*, *pectines*, *ostrea*, and *conchæ anomæ*; the plurivalvia only two genera, *conchæ anatifera* and *balani*, or *glandes*. The two latter genera are those united by Linnæus, under the name of *lepas*, and which, before the time of Major, had been improperly arranged, either among the bivalves, or univalves, except by Gesner, who, aware of this impropriety, places the *balani* at the head of his class anomala. This production of Major's appeared in 1675.

Legati was author of the "Museo Cospiano," printed at Bologna in 1677. The basis of this collection was laid by the celebrated Aldrovandus, whose hand-writing still remains affixed to many specimens that formed the subjects of Legati's description. Ferdinando Cospi, a Bolognese patrician, afterwards augmented it so considerably, that his name became attached to it; and the university of Bologna, to which it was at length presented, considered it one of their most valuable acquisitions. There are not many figures of shells in the "Museo Cospiano," but the descriptions of this tribe are numerous, and very ample.

In the twelfth volume of the Philosophical Transactions, is a "Relation concerning Barnacles," by sir Robert Moray. This credulous observer gives a description illustrated by a rough outline of *lepas anatifera*, from which he asserts, that young geese may actually be seen to emerge.

Harderus,

Harderus, in a dissertation entitled, "Examen anatomica Cochleæ terrestris domiportæ," affords an anatomical description of helix lucorum. This appeared at Basil in 1679. Two years after Grew published his "Museum Regalis Societatis," or "Catalogue and description of the natural and artificial rarities belonging to the Royal Society, and preserved in Gresham college, London." This was the earliest work of its kind that appeared in the English language. The shells are described in two chapters, the first comprehending univalves, the second bivalves and multivalves, illustrated with about forty figures, to which the current English names are annexed.

Buonanni was contemporary with Grew, and in the same year (1681) published at Rome his "Ricreazione dell' Occhio, e della Mente nell' osservatione delle Chiocciolle," a work of very superior merit, and esteemed the first professedly written, at any considerable length, upon the subject of conchology. This was originally printed in Italian; but was three years afterwards re-published, with additions, in Latin, under the title of "Recreatione Mentis et Oculi in Observacione Animalium testaceorum." The first work contains a series of 450 figures, the number of which is augmented to 550 in the Latin re-publication. These are valuable for reference, as being constantly mentioned in the Linnean Systema Naturæ; their greatest fault (and it is certainly a material objection), is that many of the shells are reversed by the inaccuracy of the engraver, so that the apertures of the spiral or turbinated shells turn to the left instead of the right. The subjects were obtained chiefly from the celebrated museum of Kircher; a description of which was afterwards given by Buonanni under the title of "Museum Kircherianum."

The descriptions are not entirely approved by late writers; they are considered too loose and desultory, or too concise and uninformative. His distribution of shells comprehends *univalvia non turbinata*, *bivalvia*, and *turbinata*. In the inferior divisions, this author, Dr. Maton observes, "has strangely separated species naturally allied to each other, as, for instance, the serpule, dentalia, &c. are left out of the first class, and, as well as the porcellanæ, distributed under the third; and, with equal want of consistency, the haliotis and nautilus (genera manifestly turbinated) are placed among those which he terms "univalvia non turbinata." The same objection is urged by Bergen against the system of Buonanni. "Hic A. tres condidit conchyliorum classes; univalvium, non turbinatorum, bivalvium et non turbinatorum, sed partim aliena immiscuit, partim necessaria omisit. Sic in prima classe merito desiderantur penicilli marini et porcellanæ, quas perperam ad turbinatas refert. Sic malo consilio aurem marinum, et nautilium huic primæ sociavit classis, cum manifeste ex turbinatorum gente sint." Buonanni is blamed also for admitting the pholades and conchæ anatifere into his second, or bivalve class; but it should be remembered, in this respect he only imitated the example of most systematic writers; Gesner places the pholades among the bivalves; Aldrovandus gives both the pholades and concha anatifera in that class; and Jonston the former. Linneus, we are to recollect, like the latter, considers the pholades as bivalves in all the early editions of the Systema; even so lately as the tenth edition, they stand under the "bivalvia conchæ." We may still further advert to Charleton, who yet more absurdly arranges the concha anatifera with the univalves, at the same time that he refers the pholades to the bivalve tribe. Major was the only writer before the time of Buonanni who disposed of the conchæ anatifere in their natural order, which he certainly did, by arranging it in his class plurivalvia. In the work of Buonanni will be found many philosophical observa-

tions upon the origin, nature, formation, properties, and other curious particulars relative to testaceous bodies.

The "Scotia Illustrata" of Sir Robert Sibbald, published at Edinburgh in 1684, offers an outline of another system. The author divides shells into two parts, the land and aquatic kinds, or "cochleæ terrestres," and "cochleæ aquatiles." The aquatiles are divided into two sections, the first containing the fresh-water shells, the other those peculiar to the marine element. The shells of both kinds are distributed into three families, turbinatæ, bivalves, and univalves. The subdivisions of those families are rudely defined, but upon the whole there is method in the classification; the genera are selected from the writings of former naturalists, but too sparingly. Sibbald places the echini among the turbinated shells; yet this is even more excusable than his introduction of both the pholades and balani among the univalves.

Marigli's small work on the ova of testaceous animals, appeared at Bologna, in 1683, under the title of "Relazione del Ritrovamento dell' uova di Chiocciolle;" a new edition of which was published at Rome in 1695. Some additional observations on the same subject, by Fulberti, "Riflessioni sopra il medesimo Soggetto," usually accompany this work.

Among the "Osservazioni Naturali" of Paolo Boccone, published at Bologna in 1684, are some remarks not altogether uninteresting on the subject of conchology. He was the first writer who described the pediculus ceti (lepas diadema of late authors) with accuracy.

In the same year Dettelde gave an anatomical description of the common muscle in the Leipzig Commentaries, and which was afterwards re-published in Valentini's "Amphitheatrum Zootomicum."

An elaborate paper on the purple-fish (buccinum lapillus) by Mr. William Cole, pointing out the mode of obtaining, and the nature of this celebrated dye, or Tyrian purple, was inserted shortly after in the Transactions of the Royal Society. This tract was re-printed in quarto in 1689.

A production of very uncommon merit about this period made its appearance before the public, the great conchological work of Dr. Lister, entitled "Historia five Synopsis methodica Conchyliorum;" the publication of which commenced in 1685. The author had previously distinguished himself by some excellent dissertations on the same subject; but our attention is principally directed to this, as his most extensive, if not most valuable, undertaking. It was published in folio progressively from the year 1685 to 1692.

Lister divides his work into four books. 1. "De turbinibus terrestribus." 2. "De Turbi. aquæ dulcis et Bivalvibus aquæ dulcis." 3. "De Bivalv. marinis, et conchis anatifereis." 4. "De Patellis Dentalibus, &c. et de Buccinis marinis."

There is no text to this work, the whole consisting of engravings, with a concise description of the shells, and reference to their native country, where that could be ascertained, in the Latin tongue; and sometimes their current names in English. The plates, which are of various dimensions, are executed with great force and strength of colour by the hands of the author's two daughters, Susanna and Ann Lister. It is an extraordinary circumstance, that no two copies of this work are found alike, which renders it very complex, and ill suited for general reference. The plates in the most perfect copies vary in number from 1050, to 1057, or 1067, the different copies having been augmented or diminished, and the plates transposed or corrected at various times, according to the fancy of the author, or his subsequent discoveries. The most perfect of all the copies extant was that

that presented by Dr. Lister himself to the royal library at Paris. This is ascertained by the observations of Davila and M. de Bure, who have taken considerable pains in the collation of different copies of this work. Da Costa names that in the library of the College of Physicians as the most complete copy in London. This last-mentioned writer appears also to have collated many of the early copies of Lister; he treats on this topic at some length; and, considering the importance of Lister's work to the conchological student, it may not be improper to repeat the result of his observations.

"I do not think it unentertaining (says this writer) to relate some circumstances relative to this useful and costly work, which have occurred to me, on the collation of many copies of the old editions of Lister, and on a collation of numbers of his proof prints dispersed among the curious by Dr. Lister himself before the names and numbers on the plates were added to complete the work; these proof prints, which are what the print collectors style variations, will lead us to some curious particulars that would otherwise be unknown. Dr. Lister in 1678 published his "Hist. Anim. Angl." in which he treats of English shells, and gives excellent figures of them, and good descriptions; he therefore designed this work, (his "Hist. Conchyl.") only for exotic or foreign shells, as evidently appears from the proof head plates of the first book. N. 8, 25, 33, 40, 43, 63, 74, 83, 99, 108, 125, and 136, which are entitled cochleæ, buccina, &c. exotica; but the word exotica was erased when he changed his mind to have a general history of shells, which probably was at the second book, and the erasure of the word exotica is even now plainly seen in all the quoted plates. Dr. Lister, to complete his intended work, carried home all the shells singly to his daughters to engrave on single or detached copper plates, (as is seen by the work) reserving their arrangement till he had a sufficient number, some not being done to his approbation, or getting better specimens afterwards, he had them re-engraved, and therefore many shells appear twice in his work, and in some only the first engraving, while in others only the second engraving is found; this circumstance is also evident from the proof plates, or variations." Da Costa further states it to be a mistaken supposition that there was only one edition of this work; there were, he says, certainly two, and he concludes with these observations in support of his assertion. "However, there are marks by which these editions may be distinguished by an accurate critic, viz. 1. The second edition has seventy-five shells more than the first. 2. In the preface, plate IV. the third paragraph begins "Septuaginta autem, &c." 3. In plate VII. which specifies the places where they are found, the first edition has only one column of names, whereas the second edition has a name, viz. Fret Magel, in a second column. 4. The title and all the head plates, as 1, 2, 3, 100, 106, 139, 140, &c. are printed partly in black and partly in red letters; whereas in the second edition only the title, plate I., is printed in red and black letters, all the others being printed only in black letters."

The plates of this work were bequeathed to the university of Oxford, and were re-published in 1770, under the direction of the Rev. Wm. Huddesford, keeper of the Ashmolean museum, who subjoined two indices, one according to Lister's distribution of the shells, the other after that of Linnæus. This edition differs from the former principally in containing several plates on one page, the whole amount is 1085, comprehending altogether 1153 shells, exclusive of the fossils and anatomical subjects; seven of the plates,

however, which appeared in the original work are omitted in this edition.

After this period, and previous to the work of Rumphius, the first edition of which appeared in 1705, the names of Feir, Norman, Schelhammer, and others, are recorded as contributors to the elucidation of conchology, yet their productions are to be regarded only as subservient to more extensive and important investigations. Fehr wrote a dissertation on the argonauta argo, which was printed in "Eph. Acad. Nat. Cur." A. D. 1686. Normann, in the same year, gave an anatomical dissertation on the purpura, which was published at Upsal. The observations of Schelhammer, published in "Eph. Acad. Nat. Cur.," relate to the subject of fresh water shells. Brachus also treats of the ova of some species of ostra. "Le Cabinet de la Bibliotheque de Saint Genevieve," of Du Molinet contains a few figures of shells. In the Philosophical Transactions, vol. xvii. is a communication on the subject of shells, addressed to Dr. Lister, by Mr. Banister who resided many years in Virginia, and in the same volume is a description of certain shells found in the East Indies by Witzen, but these are confessedly too imperfect to merit further mention. Sir Robert Sibbald also published some curious papers on testaceology about this time, but his system, and best production, on this subject, have been already noticed. Ericus, in a dissertation entitled "Conchæ anatifere vindicatae," refutes the absurd tale of the Bernacle geese hatching in those shells as related by sir Robert Moray. Leeuwenhoek published several treatises on the anatomy or internal structure of shells. Leigh notices a few of the British shells in his "Natural History of Lancashire;" and Wallace an inconsiderable number in his "Account of the islands of Orkney." The works of Petiver, which are dispersed in the 22d, 23d, and 24th volumes of the Philosophical Transactions, and his "Gazophylacium Naturæ et Artis," may be consulted with advantage, being referred to by Linnæus and other late conchologists. This brings us to the time of Rumphius.

The popular work ushered into the world under the immediate patronage of the liberal collector last mentioned, claims particular notice. This valuable acquisition, for so it must be considered, bears the title of "Amboinse Rarite it Kamer," the "Rarity Chamber of Amboyna;" and contains an account of the more remarkable natural curiosities in his museum, the productions of Amboyna, where they had been collected chiefly by Rumphius himself. The descriptive matter is from the pen of M. Schein Voet, and the plates are engraven in a bold style from the designs of Madame Merian. Of sixty plates with which this work is embellished, no less than thirty-three are devoted to the subject of shells, the total number of which amounts to about four hundred subjects, and many of these were of great rarity and price in those days. The passion for collecting and filling cabinets and museums began at this period to be very prevalent in Holland, from whence it afterwards extended over the other parts of Europe. The collection of Rumphius was an object worthy of emulation, and many wealthy individuals endeavoured to excel in this pursuit. The forming a collection of rarities at that period was considered a serious undertaking. Articles of rarity of this description will always obtain a considerable price. It is related as a matter of astonishment that Rumphius himself informs us a shell described in his work cost no less than five hundred florins. The sum is great, yet there are few cabinets of any note that do not include articles of equal or much superior value.

Lyonet

Lvoret estimated the price of his famous "ceño nulli" far higher, namely, 100*l.* sterling; and many instances of great prices being paid for such objects might be adduced. There are two editions of the work of Rumphius, the first written in the Dutch, the other in the German language.

Levin Vincent was one of the most distinguished Dutch collectors. Contemporary with Rumphius, he has left us a description of his museum, dated 1706, and bearing the title of "Waarheitonnel der Nature." This work was printed at Amsterdam entirely in the Dutch language; the various objects are represented as they were placed in cases, drawers, or boxes, in a confined manner in the museum; among which we recognize a pretty considerable number of shells. An abridged account of the museum, with impressions of the same plates, was published afterwards.

The paper of Reaumur, inserted in the memoirs of the French academy between the years 1709 and 1717, deserves the attention of the conchologist; they relate, for the most part, to the formation, growth, and motive powers of testaceous animals. The natural history of the pinnæ, and the formation of pearls, are amply treated of in a memoir which appeared in the volume for 1717.

In 1710 Fredericus Ruyfch published a description of his museum at Amsterdam, entitled "Theaurus Animalium primum;" it relates only in a partial degree to shells, the figures of which are grouped with coral and other substances as they stood in his museum.

Morton, the natural historian of Northamptonshire, describes many shells, for the figures of which he refers to Litter. This work was published in folio in 1712.

Among the plates illustrative of various curious subjects, contained in the museum of Gottwald of Deutzie, dated 1714, forty-three are appropriated to shells. Few of the original copies are complete; that possessed by sir Joseph Banks is perfect.

Three plates of shells are to be found in the botanical work of Barrelier, edited by the elder Jusseu, which appeared in 1714; and the like number in the "Rariora Musei Belliniani" of J. H. Lochner, published two years after. The "Amphitheatrum Zootomicum" of M. B. Valentini, brought forward at Frankfort in 1720, includes many extracts from foregoing authors, and some plates relative to shells, but which are not considered to possess any merit of originality, or execution. Bradley, in his philosophical account of the works of nature, touches on the subject of testaceology though in a superficial manner.

The valuable work of Car. Nic. Langius, "Methodus nova Testacea Marina in suas Classes, Genera, et Species distribuendi," was published in quarto at Lucerne, in 1721. To the writings of this able naturalist Linneus stands highly indebted. "He is an author (says Dr. Maton) not understanding the title of a scientific one, and whose system, so far as marine testacea are concerned, and of these alone he treats, certainly glances at the great clue to simplicity, which was afterwards so successfully and admirably seized by the great reformer of natural history in general."—"He is the first whose generic characters are founded on commodious distinctions; the aperture of univalves, and the hinge of bivalves, being particularly considered. These distinctions are not allowed their due importance throughout, for the contour of the shell is, in many instances, made the exclusive basis of the definition, and the adoption of this naturally led, as in other systems, to a most inconvenient and perplexed multiplication of genera. The parts, classes, and sections, also are far from being well conceived, and em-

barrafs rather than assist the investigation of the other divisions." After perusing these general strictures the curious reader may be desirous of acquiring some knowledge of this author's system. We are inclined to think it entitled to rather higher praise.

Langius divides shells into three parts. 1. Testacea marina univalvia, non turbinata. 2. Cochleæ marinae. 3. Concha marina.

His first part is subdivided into two classes. Class 1. Testacea marina univalvia non turbinata, et in fe non contorta. Class 2. Testacea marina univalvia, non turbinata in fe contorta, ita, ut eorum spiræ non promineant. His cochleæ marinae, or part. 2. consists of six classes, *viz.* 1. Cochleæ marinae longæ. 2. Cochleæ canaliculatae. 3. Cochleæ marinae ore et mucrone simul elongatis, prima spiræ notabiliter ventricosa. Buccina. 4. Cochleæ marinae ore, et mucrone elongatis, prima spiræ notabiliter angustior quam in Buccinis. Strombi. 5. Cochleæ marinae ore admodum brevi mucrone insigniter elongato. Turbines. Trochi. 6. Cochleæ marinae breviores ore et mucrone contractis. The third part, or conchæ marinae, consists of three classes. 1. Conchæ æquilatere. 2. Conchæ inæquilatere. 3. Conchæ anomale s. Valvis inæqualibus. The classes are divided into sections, the distinguishing characters of which are taken from the most prominent features of the various tribes of shells, as the form of the shell itself, the structure of the aperture, the canalication, or lip, &c. in univalves; and the shape of the valves, their dissimilarity, the beaks, hinge, teeth, &c. in bivalves. The sections are divided into many genera, the first class containing seventeen, the second fifty, and the third forty-three. Many of the genera of old writers are divided, and oftentimes not judiciously, into two or more genera, to which new names are assigned, that Linneus and later writers have adopted. We cannot further digress on the merits of this work, but as a system recommend it to the attention of the curious conchologist.

In the work, entitled "Ond en Nieuw Oost-Indien," by Valentyn, are sixteen plates of East Indian, or Amboyna shells. This bears date Amsterdam 1724 and 1726, having been published in folio parts. Those plates were afterwards fold separately with descriptions; the new edition of the plates appeared in 1734.

"Sloane's History of Jamaica" is a valuable work, and relates to conchology, among a miscellaneous variety of other departments of natural history. He was the first person who visited the West India islands for the sole purpose of investigating their natural productions, and his plates and descriptions relate of course to many subjects not before known. His discoveries were submitted to the public in 1725.

In the following year, John Christ. Kundmann published his "Promptuarium rerum naturalium et artificialium," &c. in quarto. He proposes three principal classes for the arrangement of shells. Class 1. Testacea univalvia non turbinata. Class 2. Testacea bivalvia. Class 3. Testacea univalvia turbinata; each of which is divided into a number of genera, somewhat after the method of Buonanni.

A new arrangement of shells, by John Ernst Hebenstreit, appeared at Leipzig in 1728: "Dissertatio de Ordibus Conchyliorum methodica Ratione institutendis." The limits of our observations will not permit us to enter minutely into this methodus testaceorum. The system of this author comprehends several principal classes: namely, Class 1. Univalvia irregularia. Class 2. Univalvia regularia, quæ spiræ carent. Class 3. Univalvia regularia, quæ spiræ gaudent magis turbinata, turbine per totum excurrente. Class 4. De

De vertice tantum turbinata, ore per totum hiant*, turbini-
bus obliquè flexis. Classis 5. Univalvia, vertice tantum tur-
binata, ore per totum hiant, spiris circa centrum flexis.
Classis 6. Minus turbinata spirâ unica brevi. Classis 7.
Bivalvia valvis per ginglynum connexis. Classis 8. Bi-
valvia per ginglynum coherentia. The outline of his
arrangement may be collected from his definition of the
classes. His families, or subdivisions, and genera are nume-
rous, and are characterized by the figure of the shell, the
aperture, hinge, and other remarkable particulars. Dr.
Morton accuses this writer of having introduced an useless,
if not unphilosophical distinction, between testacea and con-
chylia. Bergen previously makes the same objection. "Cl.
auctor distinguit inter testacea et conchylia, et notionem ge-
neraliorum tribuit prioribus, quia et malacollitri, et ostracoderma-
ta; conchylia vero sola ostracodermata sub se se com-
prehendunt, sed non magni momenti mihi videtur hæc distinctio,
si vicissim considero et perpendo sub nozione testæ et duram
et mollem testam intelligi posse."

The "Dissertatio Physica de Polythalamis, nova testa-
ceorum classe," of Breynius, comprehends an arrangement
of recent and fossil shells, but the chief merit of the work
is allowed to consist in the more exact definition this writer
affords of the *belemnites*, *ammonites*, and *orthoceratites*, than
had before appeared. Of the *orthoceras* tribe, he describes
eight distinct species, the two others are treated less copiously.
His classification of recent shells is far from perspi-
cuous. This was published in quarto in 1732.

About this period, the attention of many ingenious writ-
ers was directed to the investigation of the teredo, or ship-
worm, then, as it was believed, very recently imported from
warm climates into Europe; it was first observed in Holland.
The first alarm was given by the persons appointed to take
care of the dykes, who perceived, that the piles which were
of the hardest oak, and had been placed to defend the low
countries from the incursions of the sea, were eaten through
in a few months. The damage occasioned was immense, and
the people of Holland thrown into the utmost consternation,
till remedies were discovered to prevent the evil. Among
the writers on the subject, are Velliscieri, Roussel,
Patonius, Belkmeer, Massuet, and Sellius, the last of
whom particularly distinguished himself by his work en-
titled, "Historia Naturalis Terecinis seu Xylophagi Ma-
rini."

Du Hamel, in a paper inserted in the "Memoirs of the
French Academy," in 1736, treats on the purpura of the
ancients. The work of Swammerdam, "Biblia Naturæ,"
appeared in 1737, and will be found to contain much curi-
ous matter, and anatomical research into the nature of
testaceous animals. In 1739, the work of James Plancus,
"De Conchis Ariminensibus minus notis," appeared in
Venice. This relates principally to the minute shells
found at Rimini in the Adriatic sea. Some of the mi-
croscopic shells described by this author, very much resemble
the cornu ammonis. A second edition was published in
1748, and another at Rome in 1750.

Gualtieri's work on shells is a standard book of reference,
and as such is well known. This is entitled "Index Testa-
rum Conchyliorum quæ adseruantur in Museo Nicolai
Cassini," &c. &c. It was published in Latin at Florence, in
1741, and contains 110 plates of shells; the figures of the
naurales in which are singularly placed on their summit;
they are notwithstanding tolerably correct: the descriptive
matter is less interesting. This author exhibits a system of
shells composed by Tournefort, the celebrated botanist, long
before this time, from manuscripts on the subject that had

been presented to him by professor Targioni. This arrange-
ment is valuable, and highly worthy the perusal of the in-
quisitive conchologist. The Linnaean student, in particular,
will perceive that to Tournefort, as to Linnæus, he is in-
debted for some of the latest amendments of the Linnaean
system, and for many of the subdivisions and terms in pre-
sent use.

"La Conchyliologie" of D'Argenville is a voluminous
work, and contains a vast number of excellent descriptions,
and many figures. The first edition of this work appeared
anonymously, under the title of "L'Histoire Naturelle
éclaircie dans deux de ses parties principales, la Lithologie,
et la Conchyliologie," &c. in 1742; and a second edition,
considerably augmented, in 1754. The last edition was
published in the year 1780, with many additions, correc-
tions, improvements, and a series of plates containing
about 2000 figures, by M. Favanne de Moncervelle and his
son.

The name of Bartram occurs to a paper in the Phi-
losophical Transactions, vol. xliii. A.D. 1743, entitled
"Observations concerning the Salt-marsh Mussels, the Oy-
ster-banks, and Fresh-water Muscles of Pennsylvana," illus-
trated with figures. A copious account was also given
about this time by Needham, of the lepus anatifera. The
"Testaceo-Theologia" of Lefter, is embellished with 137
figures of shells, and abounds with physiological and ana-
tomical observations on the structure of these testaceous
animals.

Some mention is made of shells in Dr. Charles Smith's
"History of the Counties of Waterford, Cork, and Kerry,"
A.D. 1745—1756. Two papers, one relating to mytilus
lithophagus, and the other to pholas pusilla, are inserted in
vol. xlv. and vol. lv. of the Philosophical Transactions. In
sir John Hill's "History of Animals," are an arrangement
of shells, and some figures; it appeared in folio in 1752.

The first work of Klein's that claims mention in this
place is his "Descriptiones Tubulorum Marmorum," con-
taining nine plates, which chiefly represent different species
of belemnites, with various kinds of recent shells, as solenes,
dentalia, &c., and are introduced in order to complete his
arrangement of the tubular coverings of animals. But the
principal production of this writer is his "Tentamen Me-
thodi Ostracologicæ, sive Dispositio Naturalis Cochlidium
& Concharum, in suas classes, genera, & species," &c.,
printed at Leyden in 1753. It has been objected against
this work that the general divisions forming parts, sections,
classes, and genera, are too numerous; and what is worse,
that species are constituted, in some instances, without being
referable to any genus, and that, in one of the parts, there is
a solitary genus without any class. (Dr. Marten)—"Classes,
genera, & species nimium, ut mihi videtur, multiplicavit:
quæ sæpe sunt variationes specierum, species vocavit; quæ
sunt species, generum nomine insigniuit; & ex generibus
quibusdam classes condidit," &c. Bergen.

The outline of an arrangement formed by a naturalist so
eminent as Klein should not be passed over unnoticed. All
shells are divided by this writer into four principal parts, in
the following manner:

Par 1. *Cochlides*, canales testacei, circa principium tenes
& clausi, in gyros gradatim valiores constanti ratione cir-
cumnacti.

Par 2. *Conchæ*. Testæ vasculorum iustar explanatæ & con-
cavæ, variorum animalium exfanguium habitacula, testarum
numero a se invicem differentes.

Par 3. *Polyconchæ*, quæ pluribus valvulis quam duabus
gaudent.

Part 4. *Niduli testacei*, testacea animalium domicilia in forma niduli fœssis catervatim plerumque corporibus marinis superstructa.

The *cochleides* comprehend two sections, "cochlis simplex, ad cochlis composita:" these are again subdivided into families, and lastly into genera. Among the shells included in the first of these, we find the nautilus, cornu ammonis, neritæ, auris marina, trochus, Strombi, turbines, and the buccinum; and in the section cochlis composita, the bulla, porcellana, and murex. The second part, *conchæ*, of this author is comprised in three sections "monocoenchæ, discoenchæ æquales, and discoenchæ inæquales." Among the first of these, we observe the patella, in the second, the ostrea and spondylus, and in the third, the terebratula. Part 3, or *polyconchæ*, consists of "concha anatifera," Part 4, comprehends the baani under the title of "monolopos and polylopus;" and as an appendix to part 4, and as a fifth part, the "echinus marinus, and tubulus marinus."

Although the distribution of shells after the manner of Klein does not meet our ideas of a correct methodical arrangement, it is but candid to say, that many of the genera he proposes have been rejected by later writers without sufficient consideration, and others derived from his labours without acknowledgment. Let us pause and candidly examine this arrangement, and we shall perceive that not only Linnaeus himself derived very considerable assistance from his work, in the latter editions of the "Systema," but that many of the supposed new genera of the French writers, in the present day, are drawn from this very source. This work contains twelve plates, and besides the system above noticed, comprehends a dissertation on the form, growth, and colour of shells "De Formatione, Cremento et Coloribus Testarum."

The "Compectus Sciographicus Testaceorum" of J. H. Cochausen, was printed at Frankfort about the year 1750.

In 1755, a work of considerable importance, the production of Nicholas George Geve, an eminent painter, appeared in quarto at Hamburg, under the title of "Monatliche beschreibungen in reiche der Natur, an Conchylien und Seeegewächsen," or "The monthly arrangement of Shells and Sea Productions." This publication came out in parts, and was favourably received, but being pirated was discontinued. The total number of plates published appears to be 33, the figures in which amount to 434.

The memoirs of the French Academy for 1756, contain a curious paper on the characters of shells, in which fourteen genera are described, founded on the nature of the animal inhabitants; this bears the title of "Observations qui peuvent servir à former quelques caractères des coquillages," and is from the pen of Guettard; another paper also on the subject of conchology, "Sur le Rapport qu'il y a entre les Coraux et les Tuyaux marins, et entre ceux-ci et les Coquilles;" from the same writer appears, in the Memoirs of that Academy for 1760, to which five plates of serpule, dentarie, &c. are annexed. Guettard was besides these the author of two or three ingenious treatises on the same subject, the titles of which do not immediately occur to us. The "Dissertationcula de Cornu Ammonis nativo Littoris Bergenensis in Norvegia," produced in 1757, and "De Tubulis verrucularibus cornu ammonis referentibus" bearing date 1761. are both the performances of J. F. Hoffmann, and appeared originally in the Transactions of the Electoral Academy of Mentz. These, as their titles imply, relate to a supposed discovery of some recent shells of the cornu ammonis tribe, but which, in reality, are only of the nautilus kind, though bearing a remote resemblance to the fossils known by the title of ammonitæ. Shells similar

to those had been before observed by Plancus. Another paper in the same volume as that last mentioned is from this writer, and bears the title of "De Concha Sphærica sphaerulæ, alata ex badio et nigro colore variegata."

"The Civil and Natural History of Jamaica," published in London in 1756, by Dr. Patrick Browne, contains a scheme of shells, which, considering the state of the science of conchology at that period, is less satisfactory than might be expected. Shells are divided by this author into three classes, *univalvia*, *bivalvia*, and *plurivalvia*. The characters of his orders are taken, in the univalves from the hollow of the shell being non-spiral, or spiral, and the situation, and form of the aperture, and the lip; in the bivalves from the ligament of the hinge, and the teeth; and in the plurivalves from the connecting ligament of the valves.

The "Opere Postume" of count Joseph Ginanni of Ravenna, contains a description of the maritime, marsh, and terrestrial shells of the territory of Ravenna, after a system somewhat similar to that of Buonanni. The first of these tribes is illustrated by thirty-one plates, the second by four, and the third by three. The descriptive matter is in the Italian language. It was published in folio, in 1757.

Adanson's "Histoire Naturelle du Senegal," was published at Paris in 1757. This useful work contains a new arrangement of conchology, and a series of about four hundred figures of shells, with the animals appertaining to the principal families. This production of Adanson's is in much esteem with the continental naturalists.

The books of Baister, "Opuscula subseciva, observationes miscellaneæ de animalculis," &c. dated Harlemi, 1759, 1760, 1761, 1762, and two 1756, afford the curious reader much information relative to the anatomical, and physiological nature of testaceous as well as crustaceous animals. In these we find the propagation, and ovaria of shell fish in general, treated of in an ample manner. A translation of the author's dissertation on the teredo navalis appears in the Philosophical Transactions.

A monographie on helix decollata, entitled "Observations sur une espèce de Limacon terrestre dont le femmet de la Coquille se trouve cassé sans que l'Animal en souffre," by M. Brisson, is inserted in the memoirs of the French Academy for 1759.

The testaceological labours of the celebrated Linnaeus should be particularly adverted to in this place. One of the earliest of his productions on this subject is the "Fauna Suecica," the first edition of which was published in 1746, and contains an account of sixty different species of Swedish shells. His travels in Gotland, "Wälgöta resa, föättad år 1746," appeared at Stockholm the year after, and though testaceology had only partially interested the remarks of Linnaeus, we are here presented with a description of several shells observed in his journey, and likewise a plate including a number of figures, rude indeed in the execution, and still more defective in representing all the univalves as heterostrophous shells, but valuable as a plate of reference to conchologists even at this day. (vide Donov. Brit. Shells, murex defectus). The "Museum Tessinianum," published in 1753, and "Museum Adolphi Frid. Suecicæ Regis," in the year following, scarcely demand mention as they contain only three species of the shell tribe. In the description of another museum, that of the queen of Sweden, "Museum Ludovicæ Altricæ Reginae;" Linnaeus possessed a more favourable opportunity of treating on testaceology, as her majesty's collection was particularly rich in shells; this work describes 433 species of shells, and some do not scruple to affirm that it is the best of the Linnaean

Linnæan productions on the subject of testacea; it appeared in 1794. In the interval between the times in which the two last mentioned works were published, Linnæus brought out a second edition of the "Fauna Suecica," in which the number of shells described was augmented from sixty to eighty-nine species.

The "Mantilla Altera" contains thirty-five species not described in the other works already mentioned. The "Fundamenta Testaceologia" is one of his latest tracts, and is to be found among the "Dissertationes Academicæ."

These are valuable books in a limited view, but the classification of shells in the "Systema Naturæ" from the nature of the undertaking is to be considered the most general of all the Linnæan writings on the testacea. Between the year 1735, in which that work first appeared, and 1767, the Systema passed through no less than twelve editions, in all which a progressive improvement, and nearer approach to perfection are manifested, and in no one department is this more unequivocally shewn than in the methodical distribution of the shells.

An opinion is pretty generally prevalent that less attention was devoted by Linnæus to the history and arrangement of the testacea, than any other order of nature; and that he even thought them unworthy of becoming objects of scientific arrangement. These points have been contested. The truth however still appears to be, that Linnæus had not really bestowed much critical attention on this subject. We can easily imagine that the mind of Linnæus might fluctuate between the propriety of establishing his conchological system upon the characters of the animals, and the difficulty, if not impossibility, of accomplishing it, and that in this state of indecision the shells themselves were, in a great measure, disregarded by him. When therefore the completion of the Systema required that some attention should be paid to testaceology, he was unprepared, and resorting to the authorities of others, comprised this department in the smallest compass possible, more with the view of filling up a chasm, which the omission of a tribe so generally admired would occasion, than from any idea of elucidating the subject.—A similar reason is well known to have operated on the mind of Linnæus, with respect to his system of mineralogy, which was added principally, in order that this work should comprehend the three kingdoms of nature.

Whether this conclusion be correct or otherwise, one fact inferred is very obvious, that the early attempts at the classification of shells, which the Systema presents, do not afford that happy result to be expected from the industry, and superior genius, of Linnæus.—It is time we should lay aside the trammels of servile adherence, and speak decidedly:—those early attempts of this celebrated writer we do not scruple to say, if examined with candour, will be found only a slight and ill conceived compendium of what has been handed down to us by antecedent writers; and which, if he had more closely imitated in the outset, as he afterwards found it incumbent upon him to do, would have rescued his reputation as a conchologist from considerable blame. Can we for a moment, dazzled with the splendor of a name, however dignified, deny that merit which is so conspicuously prominent in the classifications of preceding writers, and attribute all the credit of reducing shells into method and order to the genius of Linnæus? or can we, after duly estimating the testaceological labours, even of Gesner, Aldrovandus, and Major, we would almost say of Aristotle, be disposed to commend this naturalist for overwhelming their arrangements in one common ruin; abolishing at the least forty excellent genera

established by the different writers, and in lieu of those presenting us with eight genera for the reception of the whole testaceous tribe! Yet such is the fact, the only genera of shells, included in the first editions of the Systema, are *cochlea*, *nautius*, *cypræa*, *halotus*, *dentalium*, *concha*, and *lepas*.

Linnæus was himself embarrassed in the distribution of shells into such a small number of genera; he even found it impracticable, and hence we perceive, in the later editions of that work, their number progressively augmenting till, in the last publication of the Systema, they were multiplied to thirty-five. Thus from time to time, as his acquaintance with shells became more general, we see him deriving new strength and support, in the aid of his own system, from those very sources which, in the first instance, he too incautiously attempted to subvert; the genera afterwards admitted into the Systema, even to those last adopted, being with scarcely an exception to the contrary, drawn from the labours of naturalists who wrote in the century preceding, or much before.

It is an opinion likewise founded in error, that we are indebted for the outline of this testaceological system (considered in its most improved state) to the native genius of Linnæus. No one will hazard the assertion, we should conceive, who is in the slightest degree acquainted with the writings before-mentioned. His primary divisions were ready formed to his hands. Let us examine further: in the outline of his system, he divides all testaceous bodies into three principal orders, *multivalvæ*, *bivalvæ*, and *univalvæ*. If we take the univalves of Aristotle (retained by later writers under the title of turbinata), the bivalves of all writers, from the time of Aristotle inclusively, and the plurivalves of Major, invert their order, and we at once possess the complete outline of the system attributed to Linnæus. Or we may refer with equal certainty to the principles of Major's system alone, published sixty years before the first edition of the Systema made its appearance, in which this inverted arrangement occurs precisely, univalvia, bivalvia, and plurivalvia. Linnæus, therefore, it may be fairly inferred, was not the inventor of the systematic outline ascribed to him, for it was long in use before his time.

If we next descend from the primary divisions, or orders of the Linnæan system to his genera, these still are to be found in the same, or other early writers, perhaps a solitary transposition (as in *conus* and *strombus*) excepted, and furthermore even under the very names he assigns to them. His obligations to the labours of Langius are too obvious to be concealed. But although, in this particular, Linnæus has only the more moderate merit of adopting, instead of inventing the outlines of his system, he is to be applauded for having condescended to select what it appears he thought, on mature deliberation, superior to his own. And this, in our idea, was so far commendable, that we regret he had not been influenced by the same opinion in his first views of a testaceological classification. Linnæus had assuredly much diffuse and ambiguous matter to wade through in his investigations of former systems in general, and his selections were at length both clear and judicious, though still susceptible of much improvement. We are also to give the celebrated naturalist his full share of credit for having ultimately improved, and more accurately defined, the characters of the respective genera which he has adopted, than any of his predecessors; the characters of his species also, generally speaking, are not to be excelled for expressive simplicity and conciseness. He may be truly said to have reformed the language of natural science, before much too vague, by the introduction of that peculiar brevity of style, so extreme-

ly useful in the nice discrimination of natural objects, and which he seldom fails to apply with the happiest possible effect.

The merits of Linnæus, as a great naturalist, will shine with undiminished splendour, divested of its meteorous lustre; the world feels grateful to his genius. But nothing less than an acquiescence unworthy of his character, and of ourselves, can lead us to conclude he was equally successful in all his endeavours to develope the mysteries of nature. For our own part, attached to no particular system, we would rather "stem the torrent alone, than glide down the stream with many," in contradiction to the evidence of our own mind; we are the friends of Linnæus,—and of truth. We are persuaded, furthermore, that what the result of calm investigation approves, must redound more to the credit of Linnæus than that impetuous obedience which bows down our reason, and rejects inquiry. The celebrity to deservedly acquired by his writings in general, has stamped his system of teleology with respect. Its reputation induces us to examine it with more than ordinary attention. It is in England, what that of Lamarck's is in France, and some others in different parts of Europe; the system best known, and the most admired. We shall for this reason take a comprehensive view of the whole, regarding every genus separately in the same order as Linnæus places them; and offering, as we proceed, a few cursory remarks on each, with a view to enable the common reader to form his own opinion, and judge for himself of the comparative excellence or superiority of the Linnæan system of teleology.

The primary divisions of this system, in the latest edition of the "Systema Naturæ," as before observed, consist of three orders, *multivalves*, *bivalves*, and *univalves*, each of which is subdivided into genera. The *multivalves* contain the chiton, lepas, and pholas; the *bivalves*, mya, solen, tellina, cardium, mastra, donax, venus, bandedylus, chama, arca, ostrea, anomia, mytilus, and pecten; and the *univalves*, argonauta, nautilus, conus, cyprea, bulla, voluta, buccinum, Strombus, murex, trochus, turbo, helix, verita, halotis, patella, dentalium, serpula, teredo, and sabella.

Genera.

CHITON. Animal a doris. Shell consisting of several transverse incumbent valves, disposed in a longitudinal series down the back.

Our knowledge of this genus was very confined till within the last few years; so lately as the period in which the tenth edition of the Linnæan "Systema Naturæ" appeared, only four of its species were known, at least no greater number is described by that writer. To the valuable work of Cuvier, we are indebted for the addition of thirteen other species; to Schuëtter, for three or four; and to Pennant for nearly an equal number; all of which are included in the last edition of the "Systema Naturæ à Gmelin," with a few others, amounting altogether to twenty-eight species. Though we are pleased to see such a number of this curious genus, concentrated in one point of view, we cannot avoid expressing a wish that some few of the species at least were better explained, those especially which are confined to the continental museums; one, if not more of the species described by Pennant, is confessedly erroneous.

LEPAS. Animal a triton. Shell affixed at the base, and consisting of many unequal valves. Linn.

The propriety of separating the balani, or acorn shells, from the anatifera, or as vulgarly denominated the "goose bearing shells," has never yet been questioned by any well-

informed naturalist, although from motives of caution we, have, with others, submitted to the genus established by Linnæus, till our reasons for dissenting from his authority (and which the Linnæan student might deem an innovation) could be explained in its proper place.

We were always at a loss to see the true reason that could induce Linnæus to place these two very opposite natural families together; the only justification seems to be, that the animals of the two genera (for so we shall denominate them) are of the same kind, and that no other multivalve shells are inhabited by this kind of animal, that of chiton being a doris, and of pholas an ascidia. At the same time, it will be remembered, that animals of the same kind inhabit shells of very different genera, and that it is therefore no argument, because all of the Linnæan genus lepas are inhabited by the triton, that they must be of the same genus. We cannot surely infer this from any similitude in the structure of the two kinds of shells. What, for instance, can be more dissimilar than the first very essential particular in which these shells disagree, namely, the manner in which they are affixed; the balani cemented immovably by its base to the rocks, loose stones, or any other extraneous substances, while the anatifera are connected to, and supported at their base by a tendinous tube, which being of a flexible nature, allows the animal an opportunity of writhing or turning in any direction in quest of food. Again, the very striking circumstance, which Linnæus had always himself regarded as of the first consequence in an arrangement of shells, the presence and absence of the operculum; in the anatifera, there is no operculum whatever; while, in the balani, that part constitutes one of the principal features of the shell; it is even the structure, rugosity, or other peculiar circumstances observable in this part, that afforded Linnæus the best of his characters, in defining the species of this family. This operculum or lid of the balani consists of four or six valves. The above characters are so obviously distinct, that it may be almost considered needless to advert to the form of the two shells, though in this also they differ most essentially; the anatifera are wedge-formed, and consist of five or more unequal valves; the balani of six valves, and the general form of the shell is sub-cosmic.

PHOLAS. Animal an ascidia. Shell bivalve, divaricated, with several lesser, differently shaped, accessory ones at the hinge; hinges recurved, and united by a cartilage; an incurvated tooth is the inside beneath the hinge.

These shells were formerly called piddocks by the English; they are found below high-water mark burrowed in hard clay, lime-stone, or sometimes free-stone, and also wood; which they perforate in their younger state, and as they increase in size enlarge their habitations. The animal is somewhat cylindrical in form, and is furnished with two orifices or openings, capable of elongation in the manner of a proboscis; from one of which, supposed to be the mouth, it has the faculty of squirting water. The phosphorescent properties of the pholade are very remarkable; it contains a liquor which shines with uncommon splendor in the dark, and illuminates whatever it touches, or happens to fall upon. This is noticed by Pley, lib. ix. c. 61, and M. Reaumur has also written copiously on this subject, in the Memoirs of the French Academy, for the year 1712.

Only twelve species of this genus are described in the Gmelinian Syst. Nat. The pholades were placed by Linnæus among the bivalves.

MYA. Animal an ascidia. Shell bivalve generally gaping at one end; hinge, with a fold, thick, patulous tooth, or fold on two, and not inserted in the opposite valve.

Many of the shells in this genus were arranged with the muscles till Linnæus separated them; Gmelin in the last edition of the *Systēma Naturæ* describes twenty-one species of the mya tribe.

The Linnæan myæ constitute three distinct genera, in the latest arrangements of the continental writers, as mya, glycymeris, and vullella. The mya is distinguished by a transverse shell gaping at the two ends, and having the ligament within; and one valve furnished with a single, compressed, roundish tooth in the beak, perpendicular to the valve, and having the ligament attached to it. The Linnæan mya truncata is of this kind. In the genus glycymeris the shell is also transverse, and gaping at both extremities, but the hinge is callous and toothless, and the ligament situated on the outside. Vullella has the shell long and somewhat equi-valve; hinge callous, depressed, without teeth, and forming a straight line in both valves; the ligament attached to a roundish cone hollow; beaks bent and very short. This last genus is closely allied in many respects to the oyster.

SOLEN. Animal an ascidea. Shell bivalve, oblong, open at both ends; hinge with a subulate raised tooth, often double, and not inserted into the opposite valve.

Gmelin describes twenty-three species of this genus, several of which are natives of Europe, where they frequent sandy shores. The Greeks were acquainted with some shells of this genus, as were also the Romans, both of whom valued the fish of the inhabiting animal as a dainty. In England they are occasionally eaten either boiled or fried with eggs, but are not found in sufficient plenty to be considered as an article of food. They are called snaths or razor-shells in this country.

The Linnæan solens are divided by late writers on the continent into three different genera, two of which comprehend the recent kinds, the third is established chiefly for the reception of some fossil shells, supposed to be of this Linnæan family. Those genera are solen, sanguinolaria, and corbula.

The solens, according to those writers, have the shells transverse, with the upper and lower margins almost straight, with beaks not projecting and gaping at both extremities; and the two valves together furnish either two or three teeth in the hinge; the ligament of the hinge in this family is placed on the outside. Sanguinolaria differs in having the upper margin curved, the extrinsecus a little gaping, and two approximate teeth in each valve, which lock into each other when the shell is closed. Corbula has the valves unequal, sub-transverse, and regular; with a concave curved tooth in each valve; the ligament of the hinge within, and the inside of the shell marked with two muscular impressions.

TELLINA. Animal a tethys. Shell bivalve, generally sloping on one side; in the fore part of one valve a convex, of the other a concave fold; hinge with usually three teeth, the lateral ones smooth in one shell.

In the Linnæan system the tellinæ are divided into three families, namely, *ovate and thickish, **ovate and compressed, ***lab-orbicular.

A late writer (Dr. Pultney) observes, in his "Catalogue of Shells found on the Coast of Dorsetshire," that the tellinæ genus is one of those of which the species are yet very imperfectly defined, arising from the great similitude among them; and from the insufficient descriptions of authors before Linnæus wrote, who, by deducing their characters of the genus, if indeed such they might be called, almost wholly from figures, were necessarily led to throw together shells entirely different, when examined by the characters Linnæus assigned. Those of this great master, adds

this writer, are yet very imperfect, and since the great additions that have been made to conchological science, by later discoveries, the whole system again wants a total reformation; and the construction of many new genera. The observation of this naturalist is very just; the writers before the time of Linnæus have, with too little caution, derived their characters from figures rather than from the shells, a fault we could have wished Linnæus himself had more frequently avoided; the tellina of Linnæus is a good genus, but requires to be recast; some of the shells included by this genus have certainly no natural affinity whatever with the others, and the character of the genus itself is not laid down with sufficient precision.

Lister is one of the first conchologists who describes the tellens with any degree of accuracy; he defines them to be "shells shaped like wedges," and places them after the pinna, (lib. iii. h. 2. sect. 8.) Woodward says they have a few teeth on the hinge, and are oblong shells, or with the files lengthened. Davila comprehends the tellens as a very large family, and includes the solens as a genus of them. Da Costa, in his "Elements of Conchology," attempts to establish a family of tellens under the character of the shells being more broad than long, rather flat, and the hinge having two teeth left close together. This constitutes his ninth family of bivalve shells; and which he again divides into two genera, the first of which he still calls tellina, and the second corbi; his telline are thus defined. "shells with similar files, whole beak and hinge are central;" his corbi "shells with dissimilar or unequal files, whose beak and hinge are placed near to, or quite at one end."

There is much method, but very little accuracy, or attention to genera, founded on natural affinities and characters, in the arrangements proposed. It was reserved for later writers, by a more strict inquiry into the nature and habits of the animals, as well as the nice discrimination of characters in the shells themselves, to fix upon decisive general distinctions. It has been discovered by Poli, and others of the continental writers, that the animals inhabiting some of the tellen tribe are of a different nature from the others; and another objection to the tellenæ, as they now stand in that genus, is the dissimilitude observable in the hinge, teeth, and other parts of the shell, which Linnæus has himself thought essential to be regarded in constituting genera. The principal of the new genera established by the break of the French writers are *Cyclas* (cyclade) of Lamarck, and *Pandora* (pandore) of Latreille, the animal of which was previously discovered by Poli; the shell is also described by Linnæus under the name of *Tellina inæquivalvis*.

The tellina genus, as now defined, consists of those bivalve shells which are orbicular, or transverse, having a regular fold or rumpie at the anterior end of the shell, with one or two teeth pointed to the beaks; and remote lateral teeth. This will comprehend the true tellinæ. The cyclas is of the Linnæan tellenæ, and is exemplified in the *Tellina cornua* of Linnæus and Pennant. This genus is of a lab-orbicular form, without a regular fold or rumpie at the anterior end; the ligament of the hinge is inflated, and projects out; it has either two or three teeth pointing to the beak, and lengthened lamelliform, or plate-like lateral teeth, which are received into sockets in the opposite valve. The genus pandora, as above intimated, is formed principally of that singular shell the tellina inæquivalvis. This genus is univalve and unequal-lamell, one valve being convex, the other flat, with flattened front; two unequal diverging teeth at the hinge, pointing to the beak in the upper valve, and two hollows in the lower; ligament within, and the inside of the shell marked with two muscular impressions.

CARDIUM. Animal a tethys. Shell bivalve, nearly equi-lateral, equivalve, generally convex, longitudinally ribbed, striated, or fuscated, with the margin denticated. Hinge with two alternate teeth in the middle near the beak. In most incurved; lateral teeth remote, and inserted or locking into the opposite.

Forty-nine species of this genus are described in the last edition of the *Syſtema Naturæ*.

Da Coſta, in his "Elements of Conchology," propoſes to eſtabliſh a new family of cockles, under the title of *pectuncululus*, whoſe character is a curved or ſemilunar hinge ſet with either two or four teeth. Theſe he divides into three genera. Genus 1. *Pectuncululi*, or cockles, with a convex or flatfiſh ſhell, of a roundiſh ſhape, with ſimilar or diſſimilar ſides, whoſe beaks are not very prominent, and curve much upwards towards the hinge; they are the *Chama* of Argenville and Guaiteri; and do not belong to any particular genus in the Linnæan ſyſtem, but are diſperſed throughout his bivalves, and are only mentioned here to introduce the two next genera. Genus 2. *Cordiformes*, or heart-shaped cockles, whoſe beaks are not very prominent, and curve up greatly towards the hinge, thereby forming a figure perfectly like a heart as vulgarly painted. Theſe are ranked by Linnæus in the *cardium* genus, and are thoſe, ſtrictly ſpeaking, of which his genus is chiefly compoſed. Genus 3. *Truncati*, or flat-sided cockles. Theſe laſt are ſuch cockles as are flattened, or have a truncated appearance on one ſide, as we ſee exemplified in *cardium* medium.

The *cardium* genus, as laid down by Linnæus, is far from exceſſionable. It is adopted by the belt continental writers, under the title of *Cardium bucarde*, *Cœvus*, *Conche cordiformes*, and other ſignificant appellations, alluding to the heart-shaped appearance which the ſhells exhibit, in a greater or leſs degree, when viewed ſideways. Theſe ſhells are of a ſomewhat cordiform ſhape, with the valves denticulated or folded at the margin; beaks contiguous; hinge with two oblique teeth in each valve near the beak, locking into each other; lateral teeth remote, and fitting alſo into each other.

MACTRA. Animal a tethys. Shell bivalve, unquilateral; valves equal; middle tooth of the hinge complicated, with a ſmall hollow on each ſide, and lateral remote teeth inserted into each other.

Twenty-seven ſpecies of this genus are deſcribed by Linnæus and Gmelin. Lamarck propoſes to divide the Linnæan *maetra* into two genera, *maetra* and *lutraria*; both ſhells are unquilateral, and gaping at the ends, but the conſtruction and ſituation of the teeth are very different, as we ſee elucidated moſt completely by comparing the *maetra* ſul-torium of Linnæus with the *maetra* *lutraria* of the ſame author.

DONAX. Animal a tethys. Shell bivalve, with the margin in general crenulated, the anterior end very obtuſe; hinge with two teeth, a ſolitary one ſomewhat remote (the latter rarely double, triple, or none). Linn.

This genus, in the Linnæan ſyſtem, contains nineteen ſpecies. The *donax* of the modern continental naturaliſts is rather differently defined; they deſcribe it as a tranſverſe ſhell, with the ſides unequal, a little gaping at both ends, and having two muſcular impreſſions on the inſide of the ſhell; two teeth pointed towards the beaks in one valve, and a ſingle biſid tooth diſpoſed in a ſimilar manner in the other; and the ligament of the hinge on the outside. This character agrees with the *Donax rugoſa* of Gmelin. Another genus is eſtabliſhed under the name of *petricola*, the character of which is exemplified in the Linnæan *Donax irus*, and *Venus lupicida* of Chemnitz. The ſhells of this new genus

are unquilateral, a little gaping at both ſides, and having two muſcular impreſſions in the inſide of the ſhell: two teeth pointing towards the beaks in one valve, and a ſingle biſid tooth in the other; with the ligament of the hinge on the outside.

VENUS. Animal a tethys. Shell bivalve, anterior margin with incumbent lips; hinge with three teeth, all which are approximate, the lateral ones divergent at the tip; "valva et anus diſtincta." Linn.

Theſe are divided by Linnæus into two ſections; * pubentes, and ** impubes, the laſt of which is ſubdivided into three families. † ſubcordata, †† orbiculata, and ††† ovales, ſupra rimam ſubangulate. The total number of ſpecies deſcribed in the "Gmelinian Syſtema," amounts to one hundred and forty-five. It is chiefly in the deſcriptions of the ſhells of this genus that Linnæus has adopted terms which we do not feel at liberty to render into common language for the peruſal of the general reader.

Many of the ſhells of this genus were arranged by writers previous to the time of Linnæus under the title of *chama*. The animal is deſcribed as a tethys differing from that of the *cardium*, chiefly, in having the foot of the animal when protruded lamina-formed, inſtead of hooked, and as a molluſcous animal, taking a variety of forms when the creature moves. It ſhould however be obſerved that we are yet very imperfectly acquainted with the animals inhabiting this extenſive tribe of ſhells.

SPONDYLUS. Animal a tethys. Shell with unequal valves, hard, and rigid; hinge with two recurved teeth, and a ſmall hollow between.

The Linnæan ſpondyli are few in number, the laſt edition of the "Syſtema Naturæ" comprehending no more than four ſpecies. The ſpondyli have been by ſome called thorny oysters. Rumphius, Argenville, Seba, and Davila, rank them as oysters; while Liller, Woodward, Guaiteri, Linnæus, Meuschen and Da Coſta conſider them as a diſtinct genus, under the name of ſpondylus. The ſpondyli are either earleſs or furniſhed with ears; the valves uneven, thick, and rude or uncouth, and forming in their general exterior an intermediate natural family between the oyster and a deſcallop. Lamarck, and other late French writers, divide the Linnæan ſpondyli into two genera, *ſpondylus* and *plicatula*. One eſſential diſtinction between theſe ſhells conſiſts in the ſpondylus having ears, and the *plicatula* being without; but this is not the only difference, a ſtriking character is drawn from the ſtructure and appearance of the beak of the lower valve, which projects beyond the beak of the upper one, and in ſpondylus exhibits a plain triangular flat ſpace, divided by a furrow: while in the genus *plicatula* the beak has no ſuch characteristic ſpace or flat ſurface, and the edges are rumpled or ſolded. Theſe new genera are well exemplified in the two Linnæan ſhells, *ſpondylus gaedareopus*, and *ſpondylus plicatulus*.

CHAMA. Animal a tethys. Shell bivalve, rather coarſe; hinge with a calous gibboſity, obliquely inserted into an oblique hollow; anterior ſlope cloſed (valva clauſa abſque nymphis, Linn.)

In Da Coſta's "Scheme of Shells," the Linnæan *chamae* are divided into two genera, *tridacnae* or baſon conques, and *chamae* or gapers. The *tridacnae* are ſhells of equal valves, and diſſimilar ſides, in hinge and appearance like the heart cockles, but on the longeſt ſide from the beak to near the extreme margin the two valves are open, leaving a large oval or heart-shaped gap, the lips of which are very broad, and turn upon the edges. The *chamae* *gigas* of Linnæus is of this family, and is the largeſt and heaviſt ſhell at preſent known, weighing from ſix to ſeven hundred pounds. The

chamae,

chamæ, or gapers, also called purrs, have a broad, thick, and large tooth at their hinge, and are abruptly cut off on one side, which side is always open or gaping.

The genus *tridacna* is retained by the latest French writers, with some amendment in the definition of the character. They describe it as an equilateral and subtransverse shell, with two compressed teeth in the hinge, and the lunule at the posterior slope gaping. The chamæ of these authors are adherent to other bodies, and have the valves unequal, and the inside of each marked with two muscular impressions; and the hinge consisting of a single thick oblique tooth. *Hippopus*, *cardita*, and *isocardia*, are also new genera formed of the Linnæan chamæ; the last is an excellent genus, founded on the peculiar structure of the *chama cor* of Linnæus: this shell is heart-shaped, with the valve unequal at the sides; the beaks diverging somewhat spirally and remote; in one valve under the beak a flat tooth, locking horizontally between two in the valve opposite, and a single distant tooth in the anterior part, below the ligament.

ARCA. Animal a tethys. Shell bivalve, equivalve; hinge with numerous sharp teeth alternately inserted between each other.

This genus is divided into two principal families, those having the margin entire, and those with the margin crenated; and both families are again subdivided into two sections, the first distinguished by having the beaks recurved, the other inflected; the species described altogether amount to forty-two.

This genus derives its name of *arca*, *ark*, or Noah's ark-shell, from the similitude which most of the species bear when the valves are closed to a boat, or hull of a ship, "*concha rhomboidalis naviculam exprimens.*" Lister places some of these shells among the multarticulate cockles, and the rest with the muscles, under the title of many-toothed muscles. Woodward ranks them among his "*polyginglymi formâ oblongâ;*" Argenville as a family of heart-cockles, and Davila and Gualtieri as a distinct genus: the first under the title of *arca*, the latter as "*concha rhomboidalis.*" These writers were succeeded by Linnæus, who considered these shells as a distinct genus, and called them *arca*.

The principal alteration in the Linnæan classification of the genus *arca* proposed by late writers, is to retain only such shells under the title of *arca* as are unequalvalved, with the beaks remote; and have the line of the hinge simple and straight throughout, with numerous teeth placed parallel to each other, and fitting or locking between those on the opposite valve. Admitting this as the character of the *arca*, and it exactly corresponds with the *arca* *nox*, and most others the title silvery ark; *arca nucleus* of Linnæus, with its analogous species, is excluded. To comprehend the latter, a new genus is recently established by the French writers under the name of *nucule*, or *nucula*, the character of which is remarkably decisive: it is described as a triangular or oblong shell, with the sides unequal; the hinge consisting of an angulated, or broken line beset with numerous teeth, which are transverse and parallel, and a single oblique tooth placed under the beak, and out of the range of parallel teeth before mentioned. The beaks also, instead of being remote, as in *arca* *nox*, are placed close together, and turn backwards.

OSTREA. Animal a tethys. Shell bivalve, generally with unequal valves, and slightly eared; hinge without teeth, furnished with an ovate hollow, and mostly lateral, transverse furrows. "*Vulva anisue nullus.*" Linn.

These are divided into three families, * valves radiated and eared, as in the scallops, ** regged, or rough, as in

the oyster, *** hinge with a perpendicular furrowed line, as in the species *perna* and *isognomum*. The scallops are again subdivided into three sections, namely, those with the valves equilateral, and the ears equal; those with the ears unequal, and having one of them generally ciliated with spines within; and those with the valves gibbous on one side. The two other families are not subdivided.

The difference between the oyster and the peecten tribe is so obviously impressed by the kind of nature on the respective shells which compose them, that few writers on this subject have passed silently over the impropriety of placing them together. If, however, we examine a number of the other shells included by Linnæus in the extensive genus *ostrea*, many will be found, which though less dissimilar at the first view, equally deserving of being considered generically distinct, as well as the two tribes before-mentioned. The form of the shell is sufficient to guide us in an arrangement professedly of shells; but when the peculiar structure of the animal confirms the propriety of constituting new genera, no doubt can remain that such amendment was requisite. With respect to the *ostrea*, the animals of several of its natural families are unknown; some of the oyster and peecten tribe are, on the contrary, well ascertained, and these are proved to be very distinct.

As Linnæus considers these animals the same, and describes them as a tethys, it may not be improper to speak more fully on this subject. The scallop differs from the oyster in being endowed with a higher locomotive power: the animal is different in having the branchiæ ciliated, or fringed; in being furnished with a kind of foot, which it protrudes from the shell near the auricle of the hinge; and in throwing out a byllus like the pinna and the muscle, by which it affixes itself to other bodies. Aristotle, and other ancient writers, attribute to the scallop the power of springing from place to place, a fact pretty correctly ascertained by the observations of the moderns. Argenville describes the process of its movements both in the water and out; he relates, that when left dry, by a sudden and violent closing of its valves, assisted by the foot, it has the power of springing four or five inches at a jerk, repeating this motion in order to regain its element. In the water, it is assisted by this writer, the scallop has the power of rising and sustaining itself near the surface, turning about in various directions, and on any alarm suddenly closing the valves and sinking to the bottom. The oyster has the branchiæ simple, and not fringed, and is unfurnished either with a foot, or with byllus; and its powers of motion consist in turning either the flat or convex side upwards or downwards, and even to effect this, the animal takes advantage of the force of the ebbing or flowing of the water to assist it. Vide Dr. Pultney's Cat.—Lister on Scallop, in Phil. Trans. &c.

Before the time of Linnæus, most writers considered the scallops and oysters as distinct. Gualtieri describes the scallops as a particular family, and divides them into two genera, or those with equal, and those with unequal valves; the first of which he calls *pecten*, the latter *concha pectinata*; and the scallops with unequal or single ears, he calls *pectunculi*. The *ostrea* is ranked as a distinct family by most authors. Da Costa observes that the "head or essential character of the scallop family is a trigonal sinus, and an elastic cartilage for its hinge in the very centre of the top of the shell." "The oysters have unequal valves, though there are some species that have equal valves, but none are eared. The hinge of this family has not any teeth, but consists of one large inarticulate gutter, running the length of the top of the shell, in both shells alike, and is covered and filled with a strong cartilage." We should add, that in the

the felcme of shells proposed by the writer, the spondylus forms an intermediate genus between the pecten and oyster.

In Lamarck's arrangement, the two genera, *huitre*, of *strea*, and *peigne*, pecten, are retained; but four other genera are conflated, under the names of *malcus*, *forma*, *lima*, and *pedum*, into which the Linnaean ostreae are distributed. Latreille forms another genus under the name of *gryphus*, the ostrea gryphus of Linnaeus, a shell fish, and only in a fossil state. We are not exclusively indebted, however, to Latreille for the establishment of this genus. Vide "Donov. Tour South Wales and Monmouthshire," in which the course of an immense stratum of these antediluvian shells is particularly described, with remarks on the genus *ostrea* and *gryphus*.

ANOMIA. Animal, a ciliated strap-shaped body, with bristles or fringe affixed to the upper valve; arms two, linear, longer than the body, connivent, projecting, alternate on the valve, and ciliated each side, the fringe affixed to each valve. Shell inequivalve, one of the valves flatish; the other gibbous at the base with the beak produced, and generally curved over the hinge; one of the valves often perforated near the base; hinge with a linear prominent cicatrix, and a lateral tooth placed within, but in the flat valve on the very margin. Two bony rays for the base of the animal.

Many of the Linnaean species of anomia are found in a fossil state only, and rarely afford an opportunity of inspecting their internal structure; neither is it reasonable to imagine we shall ever become acquainted with the animals by which they were inhabited. Our observations on these points must be confined to the recent kinds only, which, so far as they have been attentively examined, are found to comprehend shells extremely dissimilar in structure, and to be inhabited by animals differing in many essential particulars. It is remarked by Dr. Pultney, that the animal of the anomia is different from that of any other shell-fish, and is not reducible to any of those in a molluscous state hitherto known. Hence, probably, the name Linnaeus imposed upon it, *Anomia*, "quasi irregularis dissimilis a lege discrepans." The animal of the anomia cepa is figured by Murray, in his "Elementa Testaceologiae," t. 2. f. 23; and that of another species, by Forster, in his "Icones Animalium," t. 6. 45. B. under the name of anomia tridentata. The dissimilarity of these two renders it highly probable, that in the different shells which come under the appellation of this genus, the inhabitant animal is various. Linnaeus describes that of the anomia patuliformis as extending from its body a tongue-like process fringed with fine hairs, and furnished with two extensive ciliated arms, by which it is enabled to open and shut the shell. In the anomia tridentata, the animal is furnished with two flat, wedge-shaped, trilobated arms, placed opposite to each other; these it protrudes out of the shell when it moves, and they are the organs by means of which it swims in the sea. Some other kinds of anomia are inhabited by animals which, it is supposed from the structure of the shell, cannot open the valves to stretch forth arms, but are furnished with processes of a different nature, which they protrude through the aperture or perforations at the beak; and other kinds again, instead of arms, have only a ligament passing through the perforations of the shell, by means of which it is firmly fixed to other bodies.

Columna is the first writer who speaks of shells of this kind; he describes some few of the fossil tribe (the only species known in his time) under the title of "Conchæ rarioris anomiae." Hence the term anomia was afterwards

employed by other writers, and has since become the universal name for this family of shells. Lister figures several species of the fossil kinds in his "Appendix de Conchitis" to his "Historia Conchyliorum." Woodward forms an arrangement of them under the name of anomia, ranking them with the shells of unequal valves, not eared, both valves convex, and one of them beaked, and these he divides into three families, the smooth, striated, and fucated. Gualtieri figures some few of the recent kinds as a new genus under the title of terebratula. Argenville places some of the anomia among his heart cockles. Davila treats them as a genus of his oysters; Da Costa as a genus of bivalves with unequal eared valves, the beak of the larger or under valve greatly produced, and rising or curving over the beak of the smaller or upper valve, which is pierced through like a tube; the hinge is in articulation toothless, and they have always a remarkable interior structure. These are the terebratulae of some late writers, and comprehend only part of the Linnaean anomia.

Those shells of the recent kinds among the anomia of Linnaeus, which are most dissimilar in structure, are the species terebratula, placenta, and ephippium; each of which stands at the head of a natural family, and offers characters which may be adapted with facility as distinctions of so many genera. We are persuaded the genera formed by the subdivision of the Linnaean anomia might be extended with much propriety to a greater number still, but we are unwilling to increase them without the most absolute necessity. With respect to the fossil kind, of Linnaean anomia, some may be referred to the genera above mentioned, others are in no manner applicable to them, and for the arrangement of such it is requisite to form new genera. Lamarck proposes one, calcicola, derived from the characters of the anomia sandalium of Linnaeus, and his genus crania formed of the Linnaean anomia cranialaris may be considered as in a great measure appertaining to the fossil shells only. These genera are laid down with pertinacity, but Lamarck we are persuaded might have proceeded farther. We consider Linnaeus sometimes blameable for intermixing the recent and fossil shells promiscuously together, and may be therefore ourselves excused sometimes at least for abating from his example. Lamarck thinks differently; he approves this method, and having ventured from the boundaries of the present into the labyrinths of the antediluvian creation, much was expected; a greater number of new genera might have been established, those at present formed being altogether inadequate to the reception of those numerous remains of the testacea which are admitted among the anomia of the Linnaean conchologist.

Put to return to the recent anomia:—What, we would inquire, could possibly induce Linnaeus to place that singular bivalve, called from its transparency by the English collector "the Chinese glass window" among the anomia?—Or what again can be more remote than the essential character of his anomia ephippium and terebratula?—In the first, which is to be found in his Systema under the name of anomia placenta, both valves are of an equal size and form; in ephippium the valves are unequal, one being flat, and the other convex, as in the oyster; in ephippium the flat valve is perforated with a round hole in the disk near the hinge through which a ligament passes, and by this means affixed it to stones and other bodies; the A. placenta has no such perforation. In A. terebratula there is a perforation; but instead of being situated in the flatter valve it appears at the tip of the long beak into which the head of the convex valve is elongated. Near the hinge in one valve of A. placenta are two longitudinal lamelli-

lamelliform processes, which approach near the beaks, and thence diverge obliquely so as to resemble the letter V, and upon the valve opposite two corresponding processes longitudinally cleft, in which, when the shell is closed, two lamelliform teeth repose. An internal structure of longitudinal processes occurs in the species *terestrata*, but very different from the preceding, and no such internal structure occurs in the *anomia epiplium*. These characters denote sufficiently that they are not only essentially different in the conformation of their shell, but that they are inhabited by animals distinct from each other.

MYTILUS. Animal an ascidia? Shell bivalve, rough, usually affixed by a beard or byssus of silky filaments: hinge in general without teeth, and except in a few species with a fubulate excavated, longitudinal line. Linn.

The Linnæan *mytili* are by no means inconsiderable in number, and as they comprehend many shells very distinct in appearance, and some essential particulars, are necessarily distributed into several sections, or families, such as * parasitic, those affixed by claws, exemplified in *mytilus crista galli*; ** *plani*, &c. flat, or compressed into a flattened form, and slightly eared, as in *mytilus margariferus*; or *** *ventricosuli*, *ventricose*, as in *mytilus edulis*. The older writers appear to be perfectly agreed as to the *mytilus* genus, but the moderns think it necessary to divide them into two or more genera. Lamarck separates them into *mytilus* (*monle*), *modiolus* (*modiole*), and *anodonta* (*anodonte*). In defining the *mytili* he notices in particular the unguiculated, or claw-like termination of the shell at the narrowest end as a peculiar character. We do not perceive the absolute utility of his second genus, *modiole*, though we think it admissible, but we perfectly agree in the adoption of the latter *anodonta*. This last mentioned genus consists of what are vulgarly called the river, or fresh water mussels, shells which we have always conceived it improper to refer to the same genus as the marine *mytili*. In the colour of the valves, and form and situation of the beaks, the most obvious dissimilitude prevails, and a distinction still more evident resulting from the different conformation of the animal occurs in the inside of the shell, which exhibits three impressions of muscles or ligaments by means of which the animal is attached to the shells, while the shells of the common mussel, and its congenères, have only one such impression.

PINNA. Animal limax. Shell sub-bivalve, fragile, erect, gaping, and furnished with a byssus, or beard; hinge without teeth, the valves uniting into one. Linn.

This genus is well defined; the shells of which it consists are wedge-shaped, or of a somewhat triangular form, widening from a pointed or narrow top to a very broad end. The hinge is articulate, the two valves being united in that by part, and thus forming, what Linnæus truly terms it, a sub-bivalve, for it is not strictly of two valves, being thus connected. The *pinnae* are known by different writers under the various appellations of sea-hams, sea-wings, and *pinnae marinae*, or by others silk-worms of the sea, which last they obtain from the quantity of fine strong brown byssus, which the animals produce, and by means of which they affix themselves to the rocks; the byssus consists of fine silky fibres of a brown colour, and which is easily woven into stuff or small articles of dress. Among the ancient Romans this kind of silk was held in considerable esteem: it is even said that there are still manufactories of it at Naples, Messina, and Palermo.

Eighteen species of this genus are described in the last edition of the *Systema Naturæ*.

VOL. IX.

ARGONAUTA. Animal sepia, or clio. Shell univalve, spiral, involute, membranaceous, and unilocular, or consisting of a single cell. Linn.

The principal species in this genus of shells is the Linnæan *argonauta argo*, the celebrated nautilus of Piny, lib. ix. 29, the animal supposed to have taught men the use of sails, and art of navigation in the early ages of society. The ancients knew this species by the name of *nautilus*, as appears sufficiently obvious from many passages to be found in their writings. Linnæus, however, in conformity with Rumpfius, applies the name of *nautilus* to a chambered shell of a very different kind, (see *NAUTILUS*), and retains the *nautili* of the ancients, under the title of *argonauta*, with the essential character above-mentioned.

In the Gmelinian edition of the *Systema Naturæ*, the number of species described under the genus *argonauta* amount to five, *argo*, *vitreus*, *cymbium*, *cornu*, and *arctica*. But the minute observer of nature disposed to descend to the investigation of the microscopic kinds of shells will be able to add considerably to this number; a work published in Germany in 1798, the united labours of our friend L. A. Fichtell, and C. A. Moll, and entitled "Tertacea Microspica aliæque minuta ex generibus Argonauta et Nautilus ad naturam picta et descripta," contains in particular, a number of new species in this curious genus, and a few others are known to us which we have reason to apprehend have not been noticed by any other writers. By the accession of these latter species the genus becomes materially enlarged; but we have, at the same time, to observe that the whole of the Gmelinian shells, described under this generic title, are not strictly admissible among the *argonautæ*, and that the removal of these will occasion a slight reduction of the species already mentioned.

That very rare shell known among collectors by the name of glassy nautilus, the *argonauta vitreus* of Gmelin, is separated by Lamarck from *argonautæ*, and constituted a new genus under the name of *carinaria*. In the Linnæan system it would be difficult to refer it with certainty to any genus. Linnæus was himself in doubt where to place it, and at length referred it to the limpet tribe, under the name of *patella cristata*, but it cannot surely belong to this genus. In the last edition of the *Systema Naturæ*, we see it transferred from thence to the *argonautæ* with more propriety, but we are still persuaded it cannot claim a place in this genus, though it is more closely allied to it than any other of the Linnæan genera; it is certainly of a new genus as Lamarck describes it. The principal distinction between those two genera, the *argonauta* and *carinaria*, is very striking; in the true *argonauta*, (or *nautilus* of the ancients) the spiral involution turns into the opening of the shell, whereas in *carinaria*, the spire is situated at the summit of the shell and the mouth is entire. This character we think alone sufficiently decisive in defining the essential characters of the two genera. The *carinaria* is further distinguished by the shell being conic, and flattened at the sides, the spiral whorl very small, the back furnished with a single denticulated keel, and the mouth, or aperture of the shell, of an oval-oblong form, narrower nearest the angle of the keel. The *argonauta* shell, instead of being conic, is somewhat boat-shaped, and has from this very circumstance been named *cymbium*, both by Gualtieri and Tæstin; and the dorsal carination which is single and denticulated in *carinaria*, is uniformly double and tuberculated in *argonauta*.

In conclusion of our remarks on this genus, it will be proper to observe that the glassy nautilus, or *carinaria vitrea*, is one of the most choice and uncommon of the testaceous tribe;

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it is not, however, unique, for we know of three specimens, one of which is in the cabinet of Mr. Jennings in England, and the two others in the Museum of Natural History in Paris, one of which was obtained from Lyonet's cabinet. A large fossil shell of the argonauta genus, a singular species, and the only one we are acquainted with, occurs in the London Museum.

NAUTILUS. Shell univalve, divided into several departments, communicating with each other by an aperture or siphunculus.

The Linnæan nautili consist of two principal families, those which are spiral and rounded, and such as are elongated and straight. Of the spiral kinds there are two distinct sections, the first of which have the whorls contiguous, the other the whorls separated; the nautili of a straight form are comprehended in one section only.

Under the general title of nautilus, Linnæus includes the three genera of modern naturalists, nautilus, spirula, and orthocera, with some others which may hereafter, on accurate investigation, be found generically distinct likewise. The nautilus is a spiral rounded shell, having the last whorl very large, and enveloping the others, which are numerous, and divided internally into many chambers by transverse partitions, the disk of which is perforated by a siphunculus or tube. This character is drawn from the nautilus pompilius of Linnæus, a shell admitted by the latest authorities as an amplification of the nautilus genus; of the modern school only we would observe, for it has been previously shewn, under the genus argonauta, that it is not the nautilus of the ancients. The character of the new genus spirula, is derived from the nautilus spirula of Linnæus, (erroneously rendered spicula in Gmel. Syst.) or what we call the ram's horn. This shell is truly of the limax or erozier family, being of a spiral structure with the whorls separated, and the last chamber at the aperture elongated into a straight cylindrical stem. Linnæus describes only the spiral termination of the shell, which being of a concamerated or chambered structure, and perforated with a siphunculus, induced that naturalist to place it with the nautili, notwithstanding the striking dissimilarity of the disposition of the spiral involutions. This shell, when perfect, affords an essential character which at once removes it from the genus nautilus, in which Linnæus places it; namely the last or cylindrical chamber, which is alone sufficient to distinguish it. We may easily presume that no blame attaches to Linnæus in this particular respect, for it is pretty certain that naturalist never saw the perfect shell. In collections we have at various times seen some thousands of the spiral terminations, (for it is a very common West Indian shell,) scarcely one of which has retained the slightest vestige of this chamber, though all appear rudely broken, and different from a natural termination or aperture. This chamber of the shell is extremely thin and brittle, in such a manner that the slightest agitation of the waves will destroy it, and as those shells inhabit the deep waters, and are collected by the curious only from the *rejetments* of the sea cast upon the beach in storms, it is natural to conclude that it is rarely seen complete. It was not till of late years that the true form of the perfect shell appears to have been ascertained. The orthocera is the orthoceros of Gualtieri and Breynius revived. This shell is straight or arched, and a little conic, with distinct chambers formed by transverse simple divisions perforated by a tube, which is sometimes placed centrally and sometimes laterally. We are of opinion this amendment would be improved by forming two genera of the orthocera, one containing the straight and the other the arcuated kinds; and indeed we conceive

still further that those, with the siphunculus placed on one side, should form a distinct genus from those having the siphunculus in the centre. The Linnæan character of the nautilus confounds all these distinctions; they are all nautili of that writer.

Among the testaceous remains of the antediluvian world, are many singular spiral shells, allied to, or of the same genera with the foregoing, and others which, though spiral and concamerated, cannot possibly be reduced to these tribes; such as the ammonites, the orbulites of Lamarck, *helicite* of Guettard, baculites of Faujas, and the belemnites, or "thunder-bolts," of most authors. See article FOSSILS.

CONUS. Animal a limax. Shell univalve, convoluted, and turbinated; aperture or opening effuse, longitudinal, linear, toothless, with the base entire; pillar smooth.

This genus is divided into five distinct families. * *Truncati*, having the spire nearly truncated. ** *Pyriformes*, with the base rotundate and sub-cylindrical; the cylinder half as long again as the spire. *** *Elongati*, with the base rotundate, cylinder twice the length of the spire. **** *Ventricose*, in the middle, and narrow at each end. ***** *Ventricose*; emits a tinkling sound, when thrown on its back upon a board or table. The total number of species included in this genus, in the last edition of the *Systema Naturæ*, amounts to seventy-one. Many of the conus, or cone tribe, are beautiful shells, and bear a high price on account of their rarity; the *cedo nulli* of Lyonet, valued at one hundred guineas, is of this genus. We have no species of this genus upon the English coasts. Some very curious kinds have been discovered in a fossil state in England, chiefly in the chalk cliffs of Hampshire.

CYPRÆA. Animal a limax. Shell univalve, involuted, sub-ovate, obtuse, and smooth; aperture effuse at each end, linear, dentated at both sides and longitudinal.

Linnæus forms several distinct families of the cypræa genus, one of which is distinguished by being obtuse, and without any manifest spire; such, for example, as the species *caput serpentinus* and *tigris*, the last of which is well known by the name of tiger cowry; another kind is perforated, or furnished with an umbilicus, as in *cypræa ziczac*; and a third sort is margined like the common West India cowry, vulgarly called "blackmoor's teeth," *cypræa moneta* of Linnæus. In the young state, the cyprææ have much the appearance of a volute, and are entirely destitute of the thick denticulated lip or margin, so obvious in the adult shells. Writers have been even so far misled by this specious appearance, as to describe the young of several kinds for shells of the volute genus. The *voluta jonesii* of Pennant's British Zoology, is clearly nothing more than the young of the common English cowry, *cypræa pediculus*, which that writer mistakes for a perfect shell.

BULLA. Animal a limax. Shell univalve, convoluted, and unarmed with teeth; aperture somewhat straightened, oblong, longitudinal, and very entire at the base; pillar lip oblique and smooth.

The arrangement of the bulla family is very confused in the works of the old writers. Lister makes them a genus of the cowry, and calls it *concha veneris basi umbilicatâ*. Grew and Bonanni place it with the snails; Argenville and Davila with the cochleæ globosæ; and Gualtieri as a genus between the paper nautili (argonauta) and the cowries. The term bulla implying the bubble-like form, or swollen appearance of the shell, was applied by Rumphius to the bulla ampulla, from whom it was adopted by Klein, and afterwards by Linnæus as a generic appellation. The shells

included by this last-mentioned writer under the name of bulla, are more than commonly anomalous in habit and form; few instances can be adduced of greater dissimilarity than is observable between the bulla ovum, ficus, terebellum, and virginea. The species ovum has the habit of a cowry, the ficus that of a murex, the terebellum that of a cone, or a baccinum, and the virginea of a turbinated helix. The bulla achatina and the bulla cylindrica likewise offer characteristic differences, which may, without any impropriety, constitute generic distinctions.

According to Linnæus, the animal of the bulla is a limax; but if it be such, as Dr. Pultney observes, in any particular species examined by that author, it does not hold throughout the whole genus; nor even in those which were primarily and eminently distinguished by the name of bulla. In some species the animal appears more to resemble an ascidia. The animal of bulla aperta forms a new genus in Lamarck's arrangement, under the title of bullæa. The animal of bulla lignaria is furnished with masticatory organs, consisting of three testaceous bodies placed within the stomach or gizzard, by the help of which it is enabled to break small shells and hard substances. This instrument was first discovered by Plancus in the bulla aperta, in which we have ourselves observed it. An account of that in the gizzard of the bulla lignaria, by Mr. G. Humphreys, is inserted in the Linnæan Transactions. These latter mentioned testaceous bodies were first introduced among conchologists as a new genus of shells by M. Gioèni, a Sicilian naturalist, after whom it was named gioenia, by Bruguière. Retzius also describes it, but under the name of tricola. An account of the discovery of this important error, was published by Draparnaud, in the Bulletin des Sciences, p. 39.

VOLUTA. Animal a limax. Shell single-celled and spiral; aperture without a beak, somewhat effuse; pillar folded or plaited, and generally without lips or perforations.

This extensive genus is dispersed by Linnæus into the following principal families. * Aperture or opening entire. ** Somewhat cylindrical and emarginate. *** Obovate, effuse, and emarginate. **** Puffin. ***** Ventricose; spine papillary at the tip. The whole includes one hundred and forty-two species.

Linnæus has deservedly incurred some blame for having too often transposed long established names from objects to which they were before assigned, and imposed them on others without any apparent or sufficient reason, which were never understood among his predecessors by those terms. An instance of this kind of innovation occurs to us at present. The term voluta, derived "a volendo forte revolutione spirali," was always applied to the cone tribe, and is very expressive of the peculiar rolled, or involuted structure of those shells; Linnæus deprived them of that name, called them conus, and gave the title of voluta to the shells of which we are about to treat. The voluta genus, furthermore, as now laid down, is highly objectionable. Linnæus, in the establishment of this new genus, has been less attentive to the natural families of shells than could have been wished, and has, by that means, brought promiscuously together shells which scarcely agree in any one individual respect, except in having plait or folds upon the pillar.

This error does not rest, however, entirely with Linnæus, for he was not the original projector of the genus; he only adopted it, and gave it the name it now bears, when he might with more propriety have expunged it, or dispersed the shells contained into other genera. In Lister's work, section II. lb. 4, we find a class of shells entitled, "buccina columella dentata," in which that author arranges the buccina and other shells which have the pillar plaited. Lin-

næus, by the adoption of this genus, under the title of voluta, comprehends a number of shells possessing very distinct generic characters, and which had been distinguished by his predecessors under the various names of oliva, rhombus, cylindricus, turricula, mitra, musica, and others applicable either to their figure, or to the essential characteristics of their respective natural families. It is a singular corroboration of the accuracy of the ideas entertained by those writers, that the animals inhabiting the shells above-mentioned, have been recently ascertained to be as dissimilar in structure as the shells. Linnæus considered the animal of all the volutes as a limax or slug; but from the investigation of Adanson and Argenville, and since the time of Müller, Poli, Lamarck, and many others, it appears that no opinion was ever more unfounded; the animal of each family being differently formed, and adapted to the peculiar shape or structure of the shell.

Da Costa, in his "Elements of Conchology," abolishes the Linnæan voluta genus altogether, but the shells are not restored according to his method to their proper or natural families; his definitions want precision, and his scheme is confused and uncouth. But notwithstanding, the scheme of classification laid down by Da Costa was never acceded to by conchologists, and certainly never will now; from the circumstance of its being the only elementary work in the English language (Barbut's Gen. Verm. excepted) it has answered one useful purpose, that of directing the general collector to dispose their shells into particular families, in a more comprehensive manner than could have been accomplished by attending to the Linnæan arrangement. Thus, in the Linnæan volute, the families are distinguished by the title of papal crowns, Persian crowns, melons, olives, midas's ears, mitres, musics, and other trivial appellations, by which they are known even to this day among English collectors. As Da Costa derived his principal distinctions of these families from writers who flourished before Linnæus, so also it has happened with the French conchologists; they disapprove of the Linnæan arrangement, but retain most of the original families described by those earlier writers, and thus we see at the present time the genera olive, turbinelle, mitre, harpe, &c. retain and adopted with some improvements, by the best informed conchologists of that country.

BUCINUM. Animal a limax. Shell univalve, spiral, gibbous; aperture ovate, terminating in a short canal, leaning to the right, with a retuse beak, or tip; inner lip expanded.

The buccina are separated into sections, in the following order: * ampullacea, &c. inflated, rounded, thin, and sub-diaphanous, and brittle. ** Cassidea, caudata, &c.; tail short, exerted, and reflected; lip unarmed outwardly. *** Cassidea, unguiculata, &c. lip aculeated on the outside of the posterior part, otherwise resembling the last division. **** Callosa, &c. pillar lip dilated and thickened. ***** Detrita, &c. pillar lip appearing as if worn flat. ***** Laevigata, &c. smooth, not enumerated in the former divisions.

Linnæus has occasioned strange confusion in his classification of the shells which he denominated buccinum: in the indefinite latitude which his character of this genus admits, he embraces shell every little, if at all, allied to each other, in any other respect than according with his character. Thus the cochleæ globosæ of Rumphius and Argenville, the cochleæ pyriformes of Gualtieri, and other distinct natural families of writers, prior, as well as subsequent, are confounded altogether in this most copious genus. It is not sufficient that these be kept apart by being referred to different families, they should certainly constitute distinct ge-

nera. The French have long distinguished these different shells, by the appellations on tonne, casque, harpe, pourpre, &c.; the English collector will better conceive, perhaps, what is meant by the trivial distinctions of tuns, partridges, harps, and whelks. In Lamarck's arrangement, they assume a more classic form, and are defined generically, under the title of *dolum*, *harpa*, *caffis*, *tebrera*, *purpura*, *buccinum*, and *nassa*, as will be more accurately explained hereafter.

STROMBUS. Animal a limax. Shell univalve and spiral; lip of the aperture often much dilated, and produced into a groove leaning to the left.

Previous to the time of Linnæus, the term *strombi* was applied to shells of a different description from those at present understood by that name. Under the title of *strombi*, the Greeks originally designated all kinds of turbinated shells. Among the older writers, the term *strombi* was indiscriminately employed as synonymous with *turbo*, *trochus*, and sometimes with *murex*. *Strombi* was then a term indefinite, but rather applicable to the slender kinds, *murices*, or *rhombi*.

Linnæus was the first who limited the application of the word *strombus* to those univalve shells, which have the canal or gutter directed to the left, and the lip expanded. He was not, however, the first to establish the genus. Lister describes the shells of this family which have the lip entire, under the title of *purpura seu buccina bilingua*, and classes them in the twelfth section of his fourth book. Rumphius, and after him Meuschen, make a distinct genus of them, under the title of *alatus*; and by this name *alatus*, they are pretty generally known to this day, it being well known that Solander intended to have established such a genus under this name. Davila ranks these winged slate among his *murices*, but independently, and as a distinct genus, consisting of simple or entire winged shells; placing immediately after them another genus, comprehending those which have the expanded lip digitated, or elongated into prong-like processes. Linnæus rejects this arrangement of Davila, including in his genus *strombus*, the whole of those winged or alated shells; not in a promiscuous manner, but in sections or families, as * *Digitati*, *labio in laciniis linearis exeunte*. ** *Lobati*. *** *Ampliati*. The French writers to this time, on the contrary, follow the example of Davila, and form two distinct genera of these shells under the title of *strombus*, and *pteroera*, and to these another has been lately added after our countryman Lister, under the name of *rostellaria*.

On this arrangement, the genus *strombus* is described as being a ventricose shell, terminated at the base by a short canal, sloping off or truncated: the right margin or lip dilating or expanding with age into a simple or entire wing-like lobe, and having a sinus beneath, distinct from the slope of the base, or in the Latin language, the beak. This genus is sufficiently explained by the shell called among English collectors the "pugilist's fist," *strombus pugilis* of Linnæus. The genus *pteroera*, has the shell ventricose, terminated below by a long canal; the right margin, or lip expanding with age into a digitated wing, and having a sinus near the base. The Linnæan *strombus lambis* is of this genus. The generic character of *rostellaria* is drawn from the *strombus fufus* of Linnæus, described by Lister, t. 854. f. 11.; and Martini, t. 159, f. 1500. The shell is fusiform, terminated beneath in a canal, ending in a subulated or pointed beak; right margin entire or dentated more or less dilated into a wing-like process with age, and having a sinus contiguous to the canal or gutter.

We may lastly add, that the young shells of the *strombus* genus do not possess the striking peculiarity of the ample dilated lip before-mentioned, and that in consequence, such shells have been sometimes referred to very different genera, an error committed by some of the best among the early writers.

MUREX. Animal a limax. Shell inequivalve, spiral, rough, with membranaceous futures; aperture ending in an entire canal; either straight, or somewhat ascending.

The Linnæan genus *murex* is very extensive; in the last edition of the *Systema Naturæ* a hundred and sixty three species are described under the following sections. * *Spinosi*, spinous, with the tail (or beak) produced. ** *Frondosi*, futures expanding into crisped foliations; tail (or beak) abbreviated (vulgarly called *purpura*). *** *Varicosi*, futures rounded, protuberant, and thick. **** *Ecaudati*, without tail (or beak) and somewhat spinous. ***** *Caudigeri*, tail (or beak) subulate, clofed, straight and elongated; unarmed with spines. ***** *Turriti*, tapering, subulate, with the tail very short.

The *murices* of the elder writers consisted for the most part of such shells of the whelk or *buccina* kind as exhibited any considerable degree of asperity or ruggedness on the exterior surface, the Latins having employed the word *murex* to express the roughness of rude stones or walls. Many of the Linnæan *murices* are of that kind described by his predecessors under the name of *purpura*, the animals of which are spoken of by the ancients as being furnished with a tongue-like process, by means of which they are enabled to perforate other shells, and derive subsistence from the inclosed animal. The English call the *murices* rocks, and the French in imitation, *rocher*.

Three genera of shells formed of the Linnæan *murices* by the continental writers, claim particular attention; these are *fasciaria*, *pleurotoma*, and a genus, retained under the title of *murex*. The first of these consists of such shells as like the *murex tulipa* of Linnæus are of a somewhat fusiform, or spindle shape; smooth or without rugosities, and having upon the pillar two or three very oblique folds or plicæ. *Pleurotoma* is also of a spindle form, with the aperture terminating below in a long gutter or canal, and has the lip cleft or cut off in a slope near the summit. The third or *murex* genus is of an oval or oblong form, canalculated at the base, and having the outside of the shell constantly beset with prominent longitudinal ridges, and for the most part with tuberculations, spines, or fringes. We cannot refrain observing that this, and perhaps some further amendments in the Linnæan *murices*, were requisite to reduce them to lucid order; it will not we think admit of any doubt that the two first genera before mentioned, ought not to be arranged in the same genus with the *murices*, admitting the Linnæan character of that genus as it stands in the *Systema Naturæ*. Linnæus, it is true, included shells of both these families among the *murices*, but surely without sufficient attention to the generic character he had himself proposed for the *murex* tribe.

TROCHUS. Animal a limax. Shell univalve, spiral, and subconic; aperture somewhat angular, or rounded; upper file transverse and contracted; pillar placed obliquely.

The *trochi* Linnæus divides into three families; * *umbilicati*, &c.; umbilical, erect, and with the pillar perforated; as in the species *nitoticus* and *perpectivus*. ** *Imperforati*, &c.; erect, with the umbilicus clofed; as in *labio*. *** *Turriti*, &c. turritid, with the pillar exerted; shell falling on one side when placed on the base.

This is a long established genus of shells, having been adopted by the principal conchological writers a considerable

time before the *Systema Naturæ* of Linnæus appeared. Notwithstanding this, we perceive no small degree of difficulty arising in a general arrangement of shells from too strict an adherence to this genus as the character is proposed by Linnæus. We do not object to the trochus genus altogether; it is an excellent genus in itself, so far as relates to the greater number of the conic species, which may be readily distinguished by their outline, but we cannot, it must be acknowledged, so easily reconcile our ideas to the propriety of including with these the turritid or tapering trochi of this writer: such as, for example, in the species *telefcopium*, and others in that family. Furthermore, it may be added that some amendment in the distribution of these shells is rendered the more necessary for the sake of perpetuity in the arrangement of a number of new species not strictly according even with the former, and which have been discovered since the time of Linnæus.

Lamarck, and after him Latreille, constitute a new genus of the turritid kinds of the Linnæan trochi, under the title of *pyramidella*, and which they define generically, as being a turritid shell, with the opening entire, and femioval; pillar projecting, raised, with three transverse folds, and perforated at the base. This genus is fully illustrated by the Linnæan *trochus delabratus*.

The new genus *pyramidella* was certainly necessary; but besides this, the continental naturalists above mentioned, have instituted some other genera from the Linnæan trochi, as *solarium*, and *monodonta*. The Linnæan trochus perspective elucidates the character of the first of these three genera, which consists in being of a depressed conic form, with an umbilical opening in the base, crenulated along the inner margin of the spiral volutions, and the opening or aperture almost quadrangular. This is the shell known among English collectors by the name of staircase trochi, from a fancied resemblance of the internal view of the umbilical opening to a well, or spiral staircase. These shells are comprehended by Linnæus in his first family of trochi; but we should rather incline to admit them as a genus distinct from that tribe; the depressed contour of the shell, and singular structure of the umbilical opening, forming an excellent generic distinction. The Linnæan *trochus labio*, and its analogous species, being of an oval or conoid shape, with the opening roundish and entire, but furnished with a projecting tooth, are the description of shells of which the genus *monodonta* consists.

TURBO. Animal a limax. Shell univalve, spiral, and folioid; aperture contracted, orbicular, and entire.

The shells of this genus are divided into five families; *neritoides, &c. having the pillar-margin of the aperture flat, or dilated and imperforate; **solidi, solid and imperforate; ***foliidi, &c. folioid and umbilicated, or perforated; ****cancellati, cancellated; *****turriti proprie dicti, turritid, or tapering.

The turbo genus, as it stands in the Linnæan *Systema*, is much too diffuse, and comprehends shells so very remote from each other in various essential circumstances, that the Linnæan student will find some difficulty in retaining it under its present form. So nearly indeed do the Linnæan turbines, and buccina approach, that the ablest Linnæan is sometimes unable to decide exactly to which of the two genera particular species ought to be referred. The diffusibility, in general appearance, is also very remarkable in the turbo genus. The conoid, and the tapering turbines of this writer, are altogether distinct, and should certainly be assigned to different genera; and a dissimilitude equally striking prevails between those which have a sinus at the margin, and such as have that part entire. In addition to

these, we would mention the Linnæan turbines which have equidistant longitudinal ridges disposed on the outside of the shell, as in *turbo scalaris* and *clathratus*, as affording such a very prominent distinction, that we cannot hesitate to consider them as a genus of themselves.

HELIX. Animal a limax. Shell univalve, spiral, subdiaphanous, and brittle; aperture contracted, femilunar, or roundish.

This genus is divided into several families; as **ancipites*, &c. angulated on both sides, ***carinata*, margin of the whorls acute, ****rotundata*, whorls rounded, and umbilicated, *****rounded* and imperforate, ******turritæ*, tapering, ******ovate*, &c. ovate and imperforate. The whole genus comprehends, according to the last edition of the *Syst. Nat.* two hundred and fifty-two described species.

The animal of the helices seems to be endowed with a more perfect and lively power of motion than most others of the tellacea tribe; this we have abundant opportunity of observing in the common land and garden snail which is of this genus. Before the time of Linnæus the helices were known under the more indefinite title of *cochleæ*, to which family the *neritæ* and several other natural families were also referred.

Late writers divide the Linnæan helices into a number of new genera, as *jauchina*, *bulimus*, *lymnaea*, *melania*, *planorbis*, and *helix*. See LATREILLE, OLIVIER, &c.

NERITA. Animal a limax. Shell univalve, spiral, gibbous, flattish at bottom; aperture semi-orbicular, or femilunar; pillar lip transversely truncated and flattish.

The Linnæan *neritæ* are divided into three families, **umbilicate*, ***imperforate*, with the lips toothless, ****imperforate*, with the lips. No less than seventy-two species are described in the *Systema Naturæ* under these three families.

The *nerita* genus of Lamarck, Latreille, and other late writers, consists of those Linnæan species, which are femiglobule, flattened at the base, and not umbilicated; with the opening entire and semi-circular; and the pillar somewhat transverse, truncated, and often denticulated. *Nerita exuvia* of Linnæus is of this kind. The genus *natica* (notice) of those writers, comprehend the umbilicated *neritæ*, such as the species *caarena*, and its analogous kinds. The *naticæ* are subglobose, umbilicated, with the left margin callous near the umbilicus: mouth or opening of the shell entire; pillar oblique, and not denticulate.

HALIOTIS. Animal limax. Shell ear-shaped, dilated, spire lateral, and nearly concealed, and a longitudinal row of orifices along the disk or surface.

Few species of this genus were known to Linnæus, and in the reference of these, he was peculiarly attentive to the characteristic longitudinal series of orifices so conspicuous in this genus. It was for this reason he referred the *helix halioidea* to the helices, rather than the *haliotis* tribe; the shell being destitute of this striking character, though, in every other respect, it appertains more strictly to this *haliotis* than the *helix* genus. After this we cannot think Gmelin advisable for having admitted the imperforate shells, his *haliotis imperforata* and *perforata*, into this genus. It would have been perhaps better, even in that system, to have constituted a new family for their reception; he conceived the introduction of a new genus an innovation. Chemnitz indeed calls the first of these an *haliotis*, but its impropriety is not lessened by that circumstance.

One of the imperforate kinds, the *haliotis imperforata* of Gmelin, was previously described by Heblins, under the new generic title of *stomatia*, a genus adopted since by Lamarck,

marck, Latreille, and various other writers, and which we cannot hesitate to admit as highly necessary. The distinctions between these two genera are sufficiently characteristic. Stomatia has the shell of an oval form, and ear-shaped, with the spire prominent; the aperture ample, entire, and longer than its breadth; disk imperforate, or without orifice. Halotis shell flat, ear-shaped, with the spire very low, and almost lateral; aperture very ample, and longer than its breadth, and entire; and the disk pierced with orifices disposed in a line parallel with the left margin.

Lillier, in his "Histoire Conchyliorum," places the halotis, or sea-ear tube, among the tubinated shells, between the nerita and trochus; the same mode of arrangement is observed in his work "De Animalibus Angliæ," where he says it is spiral at the clavicle, in the same manner as other tubinated shells, and is therefore placed erroneously by some among the simple shells. Gualtieri ranks them among snails with depressed or flattened spires; Adanson, in the first family of spiral shells; Da Costa immediately after the patella, his first genus of simple shells, and Lamarck between the testacelle, which follows the helices and nerita, and the vermiculaire or serpula.

Some writers admit it as a collateral character of the halotis, that the inside is always of the finest pearl, and pearls are oftentimes produced in these shells. The perforations vary in number in different species. It has been observed, that the animal always closes one of those holes towards the spire, whenever he opens another towards the head as he grows bigger, and by that means that the number of openings are invariably the same in different individuals of the same species. Shells of this genus are very rarely discovered fossil; we much question if any of those described by writers are truly of this genus.

PATHELLA. Animal a limax. Shell univalve, sub-conic, and without spire. Linn.

These are the limpets, and are so named from their resemblance to a little plate, or patella, and are more or less conic without, and concave within. Some have the apex or top entire; others perforated: the chambered limpets are distinguished by a peculiar kind of projecting process, or lip within; most have the margins entire, but some have an indent or fissure in that part; and again others are so completely spiral or wreathed in their exterior appearance that they resemble rather the trochi, or top shells, than the limpet. Linnæus, in order to comprise shells so very dissimilar in appearance under one genus, found it necessary to constitute no less than five distinct sections or families for their reception. These he arranges in the following order.

* **Labiata**, &c. furnished with an internal lip; shell entire.

** **Dentata**, &c. with the margin angulated, and toothed.

*** **Mucronata**, &c. with the pointed tip recurved.

**** **Integerrima**, &c. very entire, and not pointed at the tip.

***** **Perforata**, &c. with the crown perforated.

Lamarck, as being one of the latest writers on this subject, deserves particular attention; he divides the Linnæan patella into six distinct genera, which he calls patella, fissurella, emarginula, concholepas, crepidula, and calyptræza.

The shells retained under the old name of patella (patelle) are defined generically as being univalve, without spire, oval, or suborbicular, shield-form, or bonnet-shaped, concave and simple beneath, with the summit entire, and margin without fissure, as exemplified in patella testudinaria, in the fourth Linnæan family. Fissurella (fissurelle) has the shell shield-form, without any kind of spire, concave be-

neath, and at the summit an oval or oblong aperture. The fissurellæ correspond with the fifth of the Linnæan families perforatæ, and with the genus formed by Da Costa under the name of pierced limpets or molks, in his "Elements of Conchology." The little slit limpet, patella fissura of Linnæus, very clearly illustrates the genus emarginula (emarginule), of Lamarck; the genus is distinguished by the shell being of a conic form, concave beneath, and having the posterior margin cleft. The concholepas has the shell univalve, oval, convex above with the summit obliquely inclined upon the left margin; the cavity within simple; and two teeth and a sinusity at the base of the right margin. This genus is exemplified in the concholepas peruviana of Favanne, and buccinum lepas of Bruguiere. Some other writers admit it as a family of the limpets which they distinguish simply by having the beak produced and somewhat twisted or crooked. The crepidula (crepidule) of Lamarck is of an oval, or oblong form; with the summit inclined upon the margin, and a partial simple diaphragm or division in the cavity. The Linnæan patella porcellana is of this genus. The calyptræza (calyptrée) is of the chambered kind, appertaining to the first of the Linnæan families, and is sufficiently explained by the Linnæan patella questris. The shells of this kind are of a conoid form with the summit vertical, entire, and pointed, and the cavity furnished with a thin pate, or tongue-like process in the centre, which is either detached or connected to one side of the shell, and runs in a spiral direction.

DENTALIUM. Animal a terrella. Shell univalve, tubular, straight, or slightly curved, with the cavity open at both ends, and undivided. Linn.

The simplicity and precision of the generic character of dentalium merits commendation, and, although some late writers on the continent seem too fastidious to admit it, we deem it unexceptionable. The shells of this kind are known in England by the name of tooth shell. (Donov. Brit. Shells.) We have few species, and those are principally of the minuter kinds, in this country. Gmelin enumerates altogether twenty-one species of this genus, some of which are found only in a fossil state.

SERPULA. Animal a terrella. Shell univalve, tubular, and adhering. Often separated internally by divisions at uncertain distances.

By the introduction of a few particular shells the Linnæan serpulæ are rendered altogether incongruous. The genus, as now retained, is extremely vague; and which, indeed, is necessary in order to comprise the whole of the species described by Linnæus under this general head. Nothing absolutely certain is established for its character, except its being an univalve shell, a circumstance common to the greater part of the shell tribe, and its being tubular without a regular spire, which is no less applicable to the dentalia, the terredines, and if, like Linnæus, we admit the genus to be really of the testaceous tribe, the labellæ also. What then remains to fix the character of a serpula? that it adheres to other bodies, but even this is not always the case; and beyond this we are again left in doubt, its character being confessedly indecisive and local, "sæpe illius integris passim intercepta," Linn. There are sometimes internal divisions at uncertain distances in these shells, but what can we infer from these in constituting a generic character: these divisions are in the first place concealed within the shells when entire, and are only to be discovered by destroying them! and can this be considered as a character well calculated to afford a generic criterion? Nor is this all, these internal divisions are by no means constant; they are not as in the nautilus and other regularly formed

formed chambered shells placed at equal intervals, neither are they pierced by a siphunculus, or pipe-like receptacle communicating from chamber to chamber for the reception of the linear body of the animal inhabitant; the creature must remain in the single chamber or enclosure, having no means of extending itself into the rest of the shell. And besides this, the concenterations above-mentioned do not seem conlittant to any particular species, but depend on the age of the shell, and appear to be formed progressively at various intervals as the animal from various causes or its increase of growth finds it necessary to form a larger dwelling. In this case the deserted chamber last occupied being no longer useful is closed up, to render its new habitation more compact. We now advert only to particular shells; there are many species which do not exhibit such a concenterated structure.

One of the first writers upon this subject, after the time of Linnæus, was Da Costa, who in his "Elements of Conchology" takes occasion to notice the manifest impropriety of uniting in the same genus the shell known by the Linnæan student under the name of *serpula penis*, and the simple *vermiculi*.

He proposes to obviate the difficulty by constituting two genera, the *vermiculi*, or tubular worm shells, which have no fixed or regular form, as the common *vermiculi*, (*serpula vermicularis*, Linn.); and *penicilli*, or those worm-shells which, in the whole, or any especial or particular part, have a determinate regular shape or structure. Of this last genus, he observes there are few species; the watering pot (*serpula pluis*, Linn.) from the East Indies is the chief kind, and when perfect is much valued. The propriety of dividing these families of shells is well conceived, but the distinctions are less happily defined than might be expected. The suggestion, however, of this writer has been improved upon by the later French naturalists. The genus *arrofoir* or *penicillus* of Lamarck is the *penicilli* of Da Costa; and yet, in truth, we should add, that though the genus was laid down by Da Costa, we may trace it to Argenville, who had previously, nay, even before the time of Linnæus, described the watering-pot shell under the title of *penicillus marinus*. The genus *arrofoir*, or *penicillus*, as defined by Lamarck, is a good one, and the same may be truly said of the *siliquaria* of Davila, a genus exemplified in the Linnæan *serpula anguina*, which is distinguished by having a longitudinal subarticulated opening or cleft, extending throughout the whole length of the shell. The concenterated *serpulae*, we have seen, are not to be regarded as generically different from the rest.

The *vermiculi* of Gualtieri include the Linnæan *turbo scalaris*, a rare spiral shell, better known in England by the name of winkletrap, and which is esteemed of considerable value on account of its rarity. This writer places it with the *vermiculi*, because, as he observes, the spires of the shell are not produced from or supported by a pillar, as is constantly the case in turbinated shells, but possess, on the contrary, the true character of the spiral worm shells; and there is certainly much truth in the ideas of Gualtieri, though we do not at the same time perceive the absolute necessity of removing it to this genus, and we should anxiously and most scrupulously avoid any needless innovation. Lastly, we shall mention that the author of the "Pellæcia Britannica" proposes as an amendment in the *serpula*, to divide them into two distinct genera; the *serpula* he retains under the old Linnæan character, "shell univalve, tubular, adhering, or affixed to other bodies; in some species divided into celis." The other he calls *vermiculum*, and defines

"shell univalve, shape various; not attached, or adhering to other bodies." This we believe must in candour be admitted as more vague and indefinite than even the Linnæan distinction, and by the laxity of expression may as well apply to the whole tribe of univalve shells, the adherent *serpulae* excepted, as to the particular family called *vermiculum*. But though we disapprove of the character assigned, we perfectly agree with the ingenious author as to the propriety of separating the adhering kinds of *serpula* from those species which constantly occur detached.

TEREDO. Animal a terebella, furnished with two calcareous, hemispherical valves, or maxillæ, truncated before, and two others of a lanceolate form; shell tapering, flexuous, and penetrating wood.

The animal inhabiting this shell is a terebella of a particular kind; the body being of a soft and gelatinous nature, but having the head provided with an instrument of a calcareous substance, which performs the office of an augre, and enables the worm to penetrate the hardest oak. The most destructive of the animals of this genus is the teredo navalis, which penetrates the bottoms of ships. It was originally imported from India into Europe about seventy years ago. Sellus, in the year 1733, published a treatise on this subject under the title of "Historia Naturalis Terebinis, seu Xylophagi marini Tubulo-conchoidis." It was afterwards described and figured by several writers, and among others by Bailler, in the Philosophical Transactions, vol. lxi. It is now too well known by the name of *ship-worm*. See Donovan. Brit. Shells.

Three species only of this singular genus have been yet discovered, and which are named *navalis*, *uricularis*, and *clava*. Favanne and Guettard divide these shells into two genera, *teredo* (*taret*) and *siliularia*; the shell of *teredo* is distinguished as being tubular, cylindrical, and open at both ends, lower orifice furnished with two lozenge-shaped valves, and the upper with two spatulous opercules. *Siliularia* is a genus composed of a single species, *teredo clava*, Gmel.: the shell is tubular, elevated at one end, open at the slender extremity, and containing in the cavity two non-adherent valves. This last is called by Favanne, *siliularia cornicula*, and *siliularia gregata* by Guettard.

SABELLA. Animal a nereis, with ringent mouth, and two thicker tentacula behind the head: shell tubular, composed of particles of sand, broken shells, and vegetable substances, united to a membrane by a glutinous cement.

The *sabella*, according to Linnæus, is inhabited by an animal of the nereis kind. Some of these animals were known among the old writers under the name of sea scolopendæ. Since the time of Linnæus, the number of species has been greatly augmented by the discoveries of Pallas, Fabricius, Müller, and others, and the nature of those animals become better understood; in consequence of which, they have been discovered to be the habitations not only of the nereis, but likewise of the amphitrite and terebella genera. We speak of the marine kinds: with respect to several of the supposed species of *sabella* found in fresh water, it is accurately determined they are not of this race of animals, but the larvae of ephemæra, phryganea, and other insects, which construct cylindrical cells of extraneous matter, in which they reside while they remain in that state in the water. Some naturalists, in order to avoid confounding these larvae with the true *sabella*, have cautiously omitted the whole; and we indeed suspect, that although they may continue to be retained by the Linnæan student among the shell tribe, they will be expunged, or many of the species at least, by future systematists. The Gmelinian system comprehends 25

Species of fabella, the fresh-water kinds, described by Schroetter, included.

The marine fabellæ shells are composed chiefly of sand and the fragments of shells; those of the supposed fabella found in fresh water, either of small fragments of vegetables, or the broken shells of testaceous vermes, those of the helix tribe especially.

Having presented the reader with a detailed view of the Linnæan system of conchology, we shall next proceed as before to speak of the other principal writers on the subject, as nearly in chronological order as circumstances will permit.

The third volume of the extensive and costly work of Seba ("Descriptio Thesauri Rerum Naturalium," was produced at Amsterdam in 1758. This part treats on marine subjects generally, as crustaceans and testaceous animals, corals, &c.; and contains, besides plates in other departments, sixty-one elucidatory of conchology. As a book of reference to the more striking and well known kinds of shells, the work of Seba possesses merit: it has been observed, and with much truth, that this valuable publication might however have been rendered less expensive by the omission of a number of figures, which consist merely of repetitions, and also the specimens of art absurdly introduced, such as the fanciful decorations on the shells of the nautilus, and the examples of "shell work," on which a profusion of engraving is unnecessarily expended.

In the "History of Cornwall," Dr. Borlase presents us with a plate of shells containing about thirty species; the descriptive matter is slight, and is principally copied from some of the oldest writers on the subject. This was published in folio in London, A.D. 1758.

The magnificent work of Francois Michael Regenfus, "Choix de coquillages et de crustacés," appeared at Copenhagen, under the patronage of the king of Denmark, in the same year as the preceding. The work comprises twelve coloured plates in imperial folio, and each plate comprehends twelve shells. The descriptions, which are written both in the French and Danish language, are the joint labour of professor Kratzenstein and Dr. Afcenius. It has been lamented that the talents of this artist were not employed on subjects better deserving of elucidation, as those which are figured by Regenfus fall daily under the notice of the most humble collectors. A second volume was begun, and considerable progress made in it before the year 1776; but as the artist is no more, the undertaking is in all probability relinquished. Twelve plates designed for the second volume are possessed by sir Joseph Banks, and which include shells of greater rarity than those inserted in the first volume.

We have already adverted to the "Class's Conchyliorum" of Carolo Augusto de Bergen, published at Nuremberg in 1760. This little treatise contains a compendious view of the principal systems of conchology which had then appeared, under the heads of "Methodi Universales," and "Methodi Particulares," with concise prefatory dissertations on each. These remarks of Bergen have evidently furnished later writers with many useful criticisms on the several works that fall within the compass of his view, and may, upon the whole, be thought far preferable to many more elaborate observations that have since appeared on the same subject.

The "Amusement Microscopique" of L. d'ermuller relates to minute shells, and contains many figures. The first part was published at Nuremberg in 1764, and in 1766 and 1768 two other parts of the same work.

Davila's "Catalogue Systematique et Raisonné des Conchies de son Cabinet" was printed at Paris, in 1767, in three volumes octavo, preparatory to the dispersion of his collection in the following year. The first volume treats entirely of shells, and contains twenty-two plates of the rarer specimens in his cabinet, many of which are scarce even at this day. This work affords much interesting information, though it is to be considered only as a sale catalogue. The same year a similar production, "Catalogue Systematique des Coquillages de Arnold Leers, de Rotterdam," appeared at Amsterdam, as an announcement of the sale of his valuable collection. This was written by Mr. F. C. Meuschen, German envoy at the Hague, and contains a sheet system of shells.

The work of Geoffroy, "Traité des Coquilles, tant fluviatiles que Terrestres, que se trouvent aux Environs de Paris," was printed in 1767, and forms a valuable acquisition in this department of science. Three plates engraven by Duchesne, contain figures of forty-six shells described by Geoffroy.

A curious and interesting paper by Herissant, occurs in the Mem. de l'Acad. des Sciences, for 1768, entitled, "Eclaircissements sur l'Organization jusqu'ici inconnue d'une Quantité considérable de Productions Animales, principalement de Coquilles des Animaux," with eight illustrative plates, three of which relate to shells. In the same year the "Mémoire sur le Coquillage appelé Datte en Provence" of A. D. Fourgeroux de Bondaroy, was inserted in Mem. Etrang. de l'Acad. Roy. de Sc. together with a plate elucidatory of the subject, which is the Linnæan mytilus lithophagus.

Cotte's observations on the physiology, &c. of the snail tribe, occur in the "Journal de Scavans" for 1770, and in the "Journal de Physique les Découvertes de Yeux, et de l'Esprit" of Knorr, completed in 1773, consist of six parts, and altogether contain 978 figures of shells. The author was a painter at Nuremberg, and his publication commenced in 1760; but not living to finish the undertaking, the last part was brought forward by his executors. Knorr had collected materials for another testaceological work, his "Delicie Nature selectæ," which was afterwards prepared for public view under the direction of Müller and De la Blaquière.

Another conchological work, of still greater extent, "Neues systematisches Conchylien-cabinet," was in a progressive course of publication at Nuremberg, about the same period. The first part appeared in 1769, another in 1771, and a third in 1777. These constitute the first three volumes, which were all its author, Martini, lived to complete. Seven volumes have been since added by F. H. Chemnitz. The body of the work is written in the German language; the embellishments consist of 366 plates, and exhibit a number of figures on each plate. It is highly probable this work will never be extended beyond its present limits; Chemnitz being dead, and his collection of shells, which was very copious, having been dispersed within the last four years by public sale. The catalogue of folio bears date Feb. 7, 1803, it was drawn up by H. S. Holten, in a small duodecimo, entitled, "Enumeratio systematica Conchyliorum J. H. Chemnitzii," &c.

Schöter is the author of many treatises on the subject of shells, and which appear to be little known. He has in particular distinguished himself by his observations on the river shells of Thuringia; the source from whence Gmelin has obtained many of the new-species described in his edition of the Systema; the labellæ of this writer are very numerous. See his "Die geschichte der Flussconchylien, mit vorzüglicher rücksichte auf diejenigen welche in den Thüringischen

gischen wassern leben," 1779. This was preceded by a small publication on the land shells found chiefly in the neighbourhood of Thangelstadt, "Versuch einer systematischen abhandlung über die Erdkonchylien um Thangelstadt." A later production of this writer's is the "Einleitung in die Conchylien kenntnis nach Linné," published in three volumes octavo, 1783—1786. and which to the German scholar forms a valuable introduction to the study of conchology.

The "Zoologiæ fundamenta" of Martinus Thrane Brunnich, was published in 1772, and relates in a partial degree to shells.

In the "Vermium terrestrium et fluviatiliium Historia" of Müller, we are presented with an arrangement of land and river testaceous animals disposed according to the characters of the animals themselves instead of their shells. The first volume was begun in 1773, and the second in the year following. The testaceological productions of Denmark are described in the "Zoolozia Danica" of this author.

The "Viaggia in Dalmazia," or travels in Dalmatia, by Albert Fortis published at Venice in 1774. contains a few figures elucidatory of those shells which he found in the Porto di Dua.

The "Elements of Conchology," by Da Costa, was published in 1776. This work presents us with a new arrangement of shells, and besides contains some judicious observations on the classification of Linnæus, and some other writers; which latter, in our opinion, deserve more attention than his system of shells. The "Elements" of this writer is one of the most inferior of this author's works. His "British Conchology," published in 1775, is more valuable, though it does not take a sufficiently extensive view of the British testacea. Da Costa had intended to publish a second edition of these with considerable improvements; the collection of materials, and the MS. for which are in the possession of Mr. Donovan, and have been in part incorporated into his "Natural History of British Shells." The great forte of Da Costa appears to be in the antediluvian race of shells, and other extraneous fossils, and in the more useful departments of mineralogy, or what he denominated native fossils. Upon these subjects alone, no less than ten folio volumes of unpublished manuscripts are preserved at this time in the extensive collection of original MS., &c. formed by Mr. Donovan, and which are intended to be placed in the library of his museum.

Among the few testaceological works noticed by Da Costa, in the introduction to his "Elements," he speaks of "a new and anonymous conchology, began to be published in this metropolis, in 1750, in folio, illustrated with copper plates." "It was intended (he observes) to be a general natural history of shells, and to include figures of all the known species, common as well as rare, beautiful or otherwise, and some copies were designed to be accurately coloured for the use of the curious. This anonymous production was, to our knowledge, written by Da Costa, and was the joint undertaking of himself and Mr. George Humphrey, by the latter of whom most of the shells were furnished that are described in this work. The numbers of this work that were published comprehend the first three families of his system, limpet, sea-ear, and serpula.

The publication of Ignaz Edler von Born, the celebrated mineralogist entitled "Index Rerum Naturalium Musæi Cæsarei Vindobonensis" presented the public in 1778 with the description of the shells preserved in the museum of the empress queen at Vienna; and was undertaken at the express command of her imperial majesty. Two years after the baron published his "Testacea Musæi Cæsarei Vindobonensis." as a

splendid illustration of his former work; this contains about two hundred coloured figures delineated in eighteen folio engravings.

The early editions of the "British Zoology," as it is entitled by Mr. Pennant, though in reality it embraces only an inconsiderable portion of the zoological productions of Britain, include none of the testaceous tribe: these were added, in a fourth volume published in 1778. This volume contains an enumeration of 163 species of shells with concise descriptions, and 56 plates exhibiting figures of nearly all that are described. Dr. Maton observes in his comments on this work that "most of the plates are valuable for reference, but some of them are executed less carefully than could have been wished. In the descriptive part (says the doctor) the author has translated pretty closely the specific characters, given by Linnæus, whenever they could be had, but there are several species of which the former is to be looked upon as the first describer. It is very remarkable, however, that he should have wholly omitted others which had been noticed by Lister and Pater, and which are unquestionably natives of our island." The number of British species of testacea known to us at present amount altogether to several hundreds more than Mr. Pennant was acquainted with, and it is our knowledge of these which renders his catalogue of little moment. But we ought in candour to allow that considering the very low ebb of natural science in this country at the period Mr. Pennant wrote, his work is a respectable performance: we mean with regard to the number of species contained. The descriptive matter certainly betrays great want of information, as well as science: many of the synonyms are misapplied, and the names erroneous.

The "Observations sur les moules" in the "Journal de Physique," 1779, is from the pen of a lady, Mafoule Coltt, and relates to the reproduction of parts of mussels. Dreuquemare treats upon the locomotive faculty of oysters in the same volume of this journal "Sur la Faculté locomotive des huîtres," p. 241. tom. 28.

In 1780 the "Fauna Gronolandica," of Otho Fabricius was printed at Leipzig. This work contains the description of fifty seven species of shells found in Greenland, among which are a number not previously observed by writers. Fabricius pays considerable attention to the structure and habits of the animal as well as the shell.

The "Zoophylacium Gronovianum," a description of the rich museum of L. T. Gronovius senator at Leyden was published in 1781. There are in this work a scientific description of 589 species of shells, and among the plates, two appropriated to the illustration of the rarer kinds.

Molina's "Saggio sulla storia naturale del Chili," or natural history of Chili, comprehends descriptions of the shells observed by this writer in that part of South America. The work was printed in octavo, at Bologna in 1782.

A small octavo tract was published at Naples in 1784 entitled "Descrizione di una nuova famiglia, e di un nuovo genere di Testacei, trovati nel litorale di Catania, con qualche osservazione sopra una specie di ostriche," by M. Gioeni. The supposed new genus of shells which occurred to the notice of Gioeni on the shores of Catania was no other than the hard testaceous substance found in the gizzard of bulla lignaria, a similar organ to which we have ourselves found in the gizzard of bulla aperta. Some years passed before this misconception was detected: it had been really considered as a shell by professor Ruzizius from whom it obtained the name of triola Gioeni; and it is arranged also in the system of Bruguiere under the name of gioenia

ficula. M. Draparnaud claims the merit of having first ascertained the real nature of this testaceous substance, an account of which he inserted in the *Nouv. Journ. de Physique*. We should add that the same article is described and illustrated with figures in the second volume of the *Linnæan Society* by Mr. G. Humphrey, associate.

A variety of new and very curious experiments by the indefatigable Spallanzani on the reproduction of the head of the common snail is recorded in two memoirs, the first of which was published in 1782, the other in 1784. See "Rifultati di Esperienze sopra la Reproduzione della Testa nelle Lumache Terrestri," *Mem. della Soc. Ital.* t. 1. p. 581.—t. 2. p. 506

The splendid work on shells by Martyn entitled the "Universal Conchologist" was begun in the year 1784, and continued to be published at uncertain intervals till 176 plates appeared, when its progress was finally impeded. This work commenced with the nondescript shells collected in the different voyages of the English circumnavigators in the South Seas; many of which are still esteemed valuable, while others, as may be imagined from our more habitual intercourse at this time with the southern hemisphere, are become common. As a scientific work, this performance will be found altogether defective, and it is besides too barren of general particulars, to render the subject pleasing to the common reader. Much greater praise is due to the plates, which are the productions of Grozier, and many other artists, and are for the most part well executed; it may be indeed added that they are the representations of objects in themselves so beautiful as to afford the artist every facility in the display of talent. A number of the original specimens are in the cabinets of Mr. Wood, apothecary, Mrs. Foster, and others in London.

A small quarto treatise embellished with three plates, the joint labour of Mr. W. Boys, and Mr. G. Walker, appeared in London in 1784. The work treats only of microscopic shells, and the researches of its authors were confined to the sandy shores of Sandwich as the title indicates "Testacea minuta rariora nuperime detecta in arena litoris Sandvicensis." It is dedicated to the late duchess of Portland.

In the *Philosophical Transactions* for 1786 is "an account of some minute shells, either not duly observed, or totally unnoticed by authors." This is illustrated with three plates and is the production of the rev. Mr. Lightfoot, the learned author of the "Flora Scotica," to whom the world is so highly indebted for his indefatigable inquiries respecting the British luci and coniferæ.

In 1786, C. L. Kämmerer described the collection of the hereditary prince of Schwarzburg-Rudolstadt. This catalogue is in the German language, and is embellished with twelve plates: it bears the title of "Die Conchylien in Cabinette der Herrn. Erb.—Prinzen von Schwarzburg-Rudolstadt. An appendix, with four additional plates, was published at Leipzig in 1791, under the title of "Nachtrag zu der Conchylien in Fürstlichen Cabinette zu Rudolstadt."

The "Journal de Physique" for 1787, contains a description accompanied with figures of chiton squamosus by Lefebvre des Hayes.

In the *Transactions of the Russian Academy*, for the year 1787, we find a memoir on testaceology, entitled "Marina variæ, novæ, et rariora," by professor Pallas. The subjects treated are *serpula spirillum*, *lepas cariosa*, *pholas terulella*, *chiton amiculatus*, and *helix coriacea*. This author had previously distinguished himself by his critical writings on conchology, both in his "Spicilegia Zoo-

logica," which appeared in 1780, and his "Miscellanea Zoologica," published some years before.

Retzius in the same year printed his "Nova Testaceorum Genera," a small work in quarto, in which many alterations and improvements on the Linnæan system of conchology are projected. It was previously the subject of an inaugural dissertation at Lund. Retzius was likewise the author of a description of *Venus lithopogoa*, published in the *Memoirs of the French Academy* for 1786.

Cordier's work of "Remarkable Ruins and Romantic Prospects of North Britain," appeared in numbers, and besides the views comprises some plates of natural history, among which are a few of the more remarkable species found on the coast of Scotland, grouped with a variety of other marine productions. Antiquity is however the leading feature of this work. Only part of this production appeared in 1783; some additions have been made to it since that time.

In the year 1789, Bruguière, the well known traveller in the east, commenced the testaceological part of the grand work, carried on in France, under the title of "Encyclopédie Méthodique," but unfortunately for the cause of science, this skilful naturalist lived only to complete the first volume, which does not go beyond the letter C. of the article *vers* (worms). The preface matter to this volume contains the method of an arrangement he intended to pursue, founded principally upon that of Linnæus, with such additions and deviations only, as he conceived to be required by the discoveries of other naturalists since the publication of the Linnæan Systema. This is the principal, though not the only production on the subject of conchology, Bruguière submitted to the world.

A pleasing variety of beautiful and curious species of testaceous tribes, chiefly the extra-European kinds, have been introduced, at various times, to the notice of the English reader, through the medium of that well known periodical undertaking the "Naturalist's Miscellany," of Dr. Shaw. We are not a little surprised indeed to observe, that the greater number of univalve shells in this work are reversed in the plates, and are therefore likely to mislead the incautious observer into a persuasion, that they are in reality heterotrophous. This work commenced in 1790, and still continues in a progressive course of publication.

The "Zoologia Adriatica," of Abbé Olivi, printed in 1791, contains an account of the shells found in the gulf of Venice, with a series of engravings, to illustrate some of the more remarkable species. In the "Ann. de Chimie," for the same year, M. Vauquelin treats of the respiratory process in the helix pomatia, and proves in the course of his observations, that the vermes require vital air for the excitement of their pulmonary system as well as other animals. The species above mentioned (according to this author) will respire azotic and carbonic acid gas, as long as any oxygen remains combined with either. The "Observations sur la génération des Buccins d'Eau douce," by M. Ribaucourt, inserted in the "Journ. d'Hist. Nat." for the same year, tend to prove that all the species of that tribe are viviparous. The last we have to mention in this year are the papers of M. Cuvier, the celebrated comparative anatomist. These relate to the anatomy of the animal of the Linnæan *patella vulgaris*, and *unguis*; and the *bala aperta*, and are to be found in the "Annales du Muséum National."

The first volume of "Testacographia ac Zoophytographia parva et microscopica," by Am. Soldani, is dated 1789; a second volume appeared in 1795. The microscopic subjects, described by this writer, are principally shells discovered

discovered by himself at Porto-Ferrara; the island del Giglio; on the shores of Castiglioneello, la Pollonica, &c. No less than 148 plates embellish this work, in which the shells are represented both of their natural size and magnified.

A number of minute, or microscopic shells, discovered by the late Mr. Adams, on the coast of Pembroke, are described by that ingenious collector in the third and fifth volume of the *Transactions of the Linnean Society*, in which will be also found two plates, containing figures of the shells described.

Among the "Observations sur les Coquilles," inserted in the "*Journ. d'Hist. Nat.*" for 1792, and in the "*Prodomme d'une nouvelle Classification des Coquilles.*" *Mem. Soc. d'Hist. Nat. An. 7*, the curious reader will find much interesting matter relative to the testaceological systems of Linnæus, and Bruguiere, and also a sketch of that proposed by their author, M. Lamarck. These were the prelude to his more important undertaking "*Système des Animaux sans Vertèbres*," in which we meet with a new arrangement of testaceology more comprehensive and satisfactory than has perhaps hitherto appeared upon this interesting subject.

The "*Testacea Microscopica aliisque minuta ex Generibus Argonauta et Nautilus ad Naturam picta et descripta*," published at Vienna in 1798, is the joint production of L. A. Fichtell and J. P. C. Moll. It treats principally on the minute shells of the argonauta and nautilus genera, and contains, besides the descriptions in the Latin and German languages, accurate figures of a great number of species, among which are many that escaped the observations of Plancus, and every other writer.

Mr. Hutchinso's new and enlarged edition of the "*History of Dorsetshire*," includes a catalogue of the birds, shells, and more rare plants of that county, by Dr. Pultney. The testaceological part of this catalogue is that which interests us in the present detail. Dr. Pultney bestowed considerable attention on this department; his remarks on the Linnean genera, which the limits of his views permitted him to notice, are judicious; the species he describes are, however, less numerous than might be expected, nor can we refrain adding, with due respect to the memory of that zealous and well informed naturalist, that all the shells described as species, are not defined in a clear and satisfactory manner. As a local catalogue we admit its general utility with this exception.

The above mentioned catalogue was printed in 1799, and in the *Philosophical Transactions* for the same year, appeared Mr. Hatchet's "*Experiments on Shell and Bone*," in which that accurate chemist relates the particulars of his discoveries resulting from analysis of the component parts of testaceous and crustaceous substances, in the first of which he detected the presence of phosphate of lime, and he found the other to consist only of the carbonate of lime mixed with gelatinous matter. The publication of Donovan's "*Natural History of British Shells*," commenced early in 1799. This work was designed to include all the species hitherto discovered in Great Britain, systematically arranged in the Linnean manner, with scientific and general observations on each. Five volumes have since appeared in a progressive course of publication, comprising altogether 180 plates, with many coloured figures. The writer of this article does not feel at liberty to comment further on a work which he has himself submitted with deference to public opinion. It is allowed by Dr. Maton and Mr. Rackett, in their review of testaceological writers, inserted in the *Linnean Transactions*, "that the author has given several new spe-

cies, and that he has rectified many errors of preceding writers."

The fifth or last volume of Mr. Dryander's "*Bibliotheca Hist. Natur. Bankiana*," was published in 1803. This is an account of the books on the subject of natural history, in the valuable library of Sir Joseph Banks bart., and although only a catalogue, will be found to contain much general information. In the "*Elenchus S. Clionum*," we are presented with a methodical arrangement of the principal testaceological subjects treated of by different writers, named in the other part of the catalogue; and which, in many respects, may prove more acceptable as a mode of reference than a catalogue confining merely of the titles of the books and names of the authors.

A paper describing the hinges of some British shells of the bivalve tribe, by Mr. W. Wood, is inserted in the sixth volume of the *Linnean Transactions*. The attempt is ingenious, but on a very confined scale, and it presupposes, without the slightest countenance of fact, that among the many writers who had previously noticed shells, or even written precisely on them, no one had hitherto paid attention to their hinges. The paper is illustrated by six plates of outlines.

In 1803, the "*Testacea Britannica*" of Mr. G. Montagu, was published in two quarto volumes. The number of shells described in this work is considerable, as it comprehends an account of the microscopic kinds, in addition to those of a larger size. It is embellished with sixteen coloured plates.

"The Historical Account of Testaceological Writers," to which, in the course of our foregoing observations, we have had frequent occasion to advert, appeared in the sixth volume of the *Linnean Transactions*, published in 1804, and is the joint production of Dr. W. G. Maton, and the Rev. Thomas Rackett.

The "*Tableau Methodique des Mollusques*," by Latreille, published in the twenty-fourth volume of the "*Nouveau Dictionnaire d'Histoire Naturelle*," printed at Paris in 1804, affords us an arrangement of shells, founded on that of Lamarck, with some additions that may render it more applicable to general use.

The rise, progress, and general traits of the history of this science may be more readily collected, we apprehend, in the course of the foregoing review of the different works that have appeared on the subject, than from any other mode that might be devised; and, under this idea, we have adhered as nearly as possible to the chronological order of arrangement, this being the most likely to facilitate the purpose intended. From the perusal of this, the reader will at once perceive which are the most considerable and valuable works on the subject, as well as obtain a general knowledge of a number of treatises, tracts, and memoirs, on particular articles connected with testaceology, which, being dispersed through a variety of miscellaneous and voluminous publications, might, without such reference, escape attention. The leading features, or design, of the respective performances, are likewise detailed, and the embellishments which accompany them pointed out; and, in fact, every other particular deemed likely to assist the student in his choice of the best books in forming a testaceological library.

In resuming this subject, as we propose under the article TESTACEOLOGY, we shall be prepared to offer some further, and more general remarks on this topic, and in particular to submit our own ideas as to an enlarged and improved arrangement for the classification of testaceous

bodies, founded on the leading principles of the best authors, with such amendments as we conceive necessary. D.

Miscellaneous Additions relative to Conchology.

The following instructions for collecting, cleaning, and preparing shells, may not be unacceptable.

The testaceous, like all other animals, have their particular resorts; some inhabit only the deep parts of the sea, and are what the old writers distinguished by the name of pelagian shells; others are as constantly found in shallow water, in bays, or those parts of the sea which are contiguous to the entrance of rivers: it has a fo been observed, that many fine and rare shells are sometimes found in the straits between islands, and in shallows near the coast, of four or five fathom water. Some species also are found on rocky, and others on sandy shores. The best shells are those taken alive out of the sea, from whence they may be obtained by means of a trawling-net, such as the fishermen employ, if the depths are not too great; they are also brought up by the cable in weighing anchor, the log-line in founding, and various other means. Sometimes valuable marine shells are found sticking to the bottoms of ships, or the sides of rocks.

After a storm, good shells may be picked up on the sea beach or shore, as the violent agitation of the water in a tempest separates them from their native beds, and often casts them ashore. But such as have lain exposed for some time to the heat of the sun, or beaten by the waves, are of little value, as their colours will be found faded, and the shells worn and broken; those only are worth selecting from the sea-shore, which have the animal alive within, or which have been recently thrown up.

River shells are, in general, of an obscure colour, and remarkably thin and brittle, inasmuch that some have imagined it a peculiar character, by means of which they may be distinguished from the marine or terrestrial kinds. This is not, however, an absolute criterion, for many of the latter are as thin as the river shells, as we observe, for example, in the argonautæ, or paper nautili, some pinæ, and many other sea shells, and in numbers of the shells of the terrestrial kind.

Terrestrial, or land shells, though few in comparison with the former, are oftentimes very beautiful, and not less esteemed than the marine kinds. Those are found most commonly crawling, like the snail tribe, on various sorts of plants, and in warm countries especially abound.

Many shells possess such a smooth, and highly polished surface, and are so beautiful in colour when they are fished up, that art cannot improve their appearance, such as for instance, the cypræa or cowry, and the voluta or volute, with many others. It is the commonly received opinion, that the animals, inhabiting all naturally polished shells whatever, are capable of not only adding to the extent and growth of their shells, but that they are able, from time to time, as occasion may require, to add a fresh polished covering to the whole shell. Should this opinion be unfounded, they can at least extend their organs to such a length, as to clear away all impurities from their shells, as we seldom find any cowries with coral, or any extraneous bodies, adhering to any part of them.

Other shells are covered with an epidermis or membrane, intended no doubt by nature to defend them from accident, and aid their growth. The structure of this epidermis varies very much, being in some laminated, in others fibrous

or brush like, or pilous, and velvety. The epidermis prevents the lepas, and other similar shells, or marine worms, from fixing their habitations on them; it is worthy of remark, that most shells, with a scabrous surface, are covered with an epidermis. Many others, when taken out of the sea, are slimy, and encrusted with fish, coralline, and other extraneous matter.

Immediately after gathering or collecting the shells, and those especially taken from the sea, the first process necessary, is to destroy and extract the animal inhabitant, without injuring the shell, and then to prepare the shell that it may not be damaged by the action of the marine salts, with which they are saturated. As shells are of a calcareous nature, all acids should be as much avoided as possible, both in killing the animal, and preparing the shell; it is usual to boil them in water for this purpose, but as boiling may injure the shells, it will be most advisable to dip them into scalding water, which will be sufficient to kill the animal, after which, let them remain for two or three minutes to cool, and then put them into cold water, in which they may lie till they are taken out to be cleaned. The animal, by being killed in this manner, becomes condensed, and somewhat solid, and may be picked out by any sharp instrument.

Shells encrusted with extraneous matter should be allowed to steep for some time in warm water, both for the sake of softening these substances, and to extract as much as possible the marine salts. They may be suffered to remain in water two or three minutes without any injury. After this brush them well, observing only that the brush must not be too hard. If that proves insufficient to clean them, rub or brush them again with tripoli or emery, or put them into weak acid for the space of a minute and then dip them into cold water; which process may be repeated as often as will be necessary to remove the extraneous matter. Strong soap may also be used with a rag of woollen or linen cloth to rub them, or a ley of pearl-ashes; and when cleaned finish them with a soft brush and fine emery.

Scientific collectors endeavour to preserve one at least of every shell with the epidermis on, to exhibit its natural appearance, together with the uncoated specimens.

The epidermis may sometimes be so thick that it will be necessary to take it off before the shell can be polished. For this purpose pour a quantity of the spirits of nitre, or nitrous acid, into water, in the proportion of about one-sixth or one-tenth part of the former; put this into a shallow basin or saucer, and place the shell or shells therein, in such a manner that the corrosive fluid may act only on the coat, without injuring the orifices or mouth, which in some cases may be coated with bees-wax: change the situation of the shell every two or three minutes, that all the parts may be equally uncoated; wipe off the bubbles as occasion may require with a feather, first dipped in water: when you perceive the enamel in any part free from the coat, take it out, and wash off the aquafortis, and after this process rub them with fine emery powder. If instead of a thick epidermis it is only a pellicle, it is sufficient to steep it in hot water, and then pick it off; or steep the shell in vinegar till it peels off freely, or is corroded away. The epidermis of some shells is so coarse and thick as to resist the corrosive quality of acids diluted, or even of aqua-fortis; emery with strong brushes is then substituted, or sea-skin, and pumice-stone, or the exterior coat may be ground off with a grind-stone, or files of various dimensions. If the matter is too obstinate to be cleared off by this means, pour some spirit of nitre into a cup or other vessel, stop up every

part of the shell that may be susceptible of injury with soft wax, as carefully as possible, and put it into the liquor in the vessel; remove it every minute into cold water, but observe never to shift it into the same water more than once, and wash it every time before you return it into the corrosive liquor. If the shell is warted, irregular, or armed with points, examine it with a common magnifier, and if you perceive on the more prominent parts through the wax any appearance of the polished surface, cover them with wax, and let the shell remain a few minutes longer in the spirit, take it out and wash it again; after which, polish the shell with fine emery, and pass a camel's-hair pencil with gum arabic over them to brighten the colours; the white of egg is sometimes used, but it is very apt to turn yellow in time, though at first it appears glaring; and varnish communicates a disagreeable smell.

Some shells have naturally a slight politure; those may be rubbed by the hand with chamois leather, which will give them a bright glossy appearance; avoid when possible the use of emery powder, as it is apt to detriment the beautiful workings on the shells; it cannot however be often left out of use.

It is desirable as far as can be to point out the impositions which are often practised on those who are not well acquainted with shells, and are therefore not aware that any individual shell may be made to assume a very different appearance by having the first or second exterior coat of the shell removed by acids, or any other means. Thus, for example, we see that though the outer surface of the common cowry, or tide shell, is of a pale colour, with dark spots; when that is cleared off, it is of a fine violet colour: the sea ears are clouded with brown, green, and white; but when that coat is rubbed away it appears of a beautiful pearl colour. Thus also the nautilus shell is externally of a pale brown or ochraceous hue, variegated with streaks of chestnut, but on the exterior coating being taken off, the whole shell will be found of that substance known by the familiar name of mother of pearl. The same circumstance is observed of the true mother of pearl shell, the exterior coat of which is blackish; many of the trochi, or top shells, and an infinite variety of other shells of different genera are of the same description. Among those shells which alter their appearance most, we must not omit the volute, called by us the purple or violet top, and by the French *onyx*; it has a brown epidermis which, being taken off, discovers the ground colour to be a dull yellow. When this is worked down to beneath the crust or surface, it is of a pure white, with the tip of a fine violet. We shall lastly mention the common muscle, the exterior coat of which is dull blueish black, that beneath purple, and the inner one white: sometimes we have seen muscles in the hands of dealers, and in scientific collections, of a fine purple colour, variegated with large distinct spots of white or brown, so dexterously managed as to have all the appearance of a shell in a natural state, though in reality such shells are the work of art, and no other than the common or edible muscle. For this purpose those of the largest size are usually selected, which, being first uncoated down to the brightest purple surface, are afterwards fretted or rubbed with a file, in particular parts, till the white or inner coating is seen through the purple. The spots may be managed however with more certainty, by covering the whole surface with a thin coat of wax, then scraping off the wax in such parts as it is designed should exhibit spots, and lastly suffering the shell to remain in spirit of salts diluted, or nitrous acid, till the outside is corroded in those parts down to the white or inner coat of the shell. After washing the shell, and clearing off

the wax, the spots thus formed may be stained of any colour, according to the fancy of the operator. A preparation of the oxyd of iron, or manganese, are most commonly employed, as these produce a brown colour of different tints, and form an indelible stain. The Dutch, who are great amateurs in conchology, paint shells with a variety of colours, and that to ingeniously, as to render it difficult to detect the imposition. Neither are they less expert in joining broken shells, cementing and filling up holes pierced by marine worms, or fractures, and filling the mouths and tips in such a manner as to entirely alter their appearance.

Fossil shells should be noticed here if any instructions were necessary for their preservation; but these in general constitute the most durable part of a collection, being either chalky, calcis in flint or stone, or replacements of sparry matter, with perhaps only some slight fragments of the shell adhering, and that very rarely. They are dug out of chalk-pits, lime-stone, or other stone quarries, and coal-pits, &c. Vide "Donovan's Instructions for collecting and preserving Subjects of Nat. Hist." from which the above particulars are chiefly extracted.

CONCHUCOS, in *Geography*, a jurisdiction of South America, in the vice-royalty of Peru, subject to the archbishop of Lima, which commences 40 leagues N. E. of Lima, and extends along the centre of the Cordilleras. Its air, therefore, is different according to the height of the situation of its several parts, the middle of which produce all kinds of grains and fruits, and the others, where cold checks their fertility, afford pasture for all kinds of cattle. This jurisdiction abounds with looms: the principal occupation of the Indians being woollen manufactures of various kinds, which constitute the greatest part of its commerce with other provinces.

CONCIATOR, in the *Glass Art*, is for the crystal glass what the founder is at the green glass houses. He is the person that weighs and proportions the salt on ashes and sand, and works them with a strong fire, till they run into lumps, and become white; and if the metal be too hard, and consequently brittle, he adds salt, or ashes; and if too soft, sand; still mixing them to a fit temper, which is only known by the working.

CONCILIO—*Querela eorum rege et CONCILIO*. See *QUERELA*.

CONCINNA, DANIEL, in *Biography*, an Italian Dominican, born in the Venetian territory about the year 1686. He was highly distinguished for his pupil talents, which attached to him numerous admirers in Italy, and even in Rome itself. As a writer he was esteemed, or account of the support which he gave to the institutions of the Papal church. He was author of numerous publications in the Latin and Italian languages, on historical, moral, and critical subjects, among which are "Defensio Concilii Tridentini, et Apoll. Const. Eccle. Rom. in causa Pauperum Montanis, &c." "Usura Contractus trini Dissertationis Hist. Theol. demonstrata," &c. "De Spectaculis Theatralibus Christiano cuiquam, tum Laico, tum Clerico, vetitis, &c." "Theologia Christiana, dogmatico-moralis," in 12 vols. 4to. "The logical, Moral, and Critical Dissertations, relative to the Logic of Probabilities, with Supplementary Observations." "A Defence of Revealed Religion, &c." He died at Venice in the year 1756. *Nouv. Hist. Diet.*

CONCINNOUS *Intervals*, in *Music*, are such as are apt and of use in harmony, as the V., 4^b, III., 3^d, VI., 6th, IV. and 5th, in contradistinction to such as are inconcinuous, as the intervals deficient or r^undant by a comma. See *COMMA-Redundant*, *Fifth*, *Fourth*, &c.

CONCINO

CONCINO CONCINI, MARSHAL D'ANCRE, in *Biography*, was a native of Tuscany, and, with his wife, Leonora Galigai, accompanied Mary de Medici, queen of Henry IV. into France, in 1660. He was made gentleman of the bed-chamber, governor of Normandy, and marshal of France, in 1615. As he was raised by the influence which he attained over the mind of the queen, he held the reins of government during the minority of Louis XIII. and behaved in so haughty a manner to the young king, that he was induced to order his arrest, and in case of resistance, the person sent on the business was commanded to kill him. The captain of the guard demanded his sword as he was passing the drawbridge of the Louvre, and upon his refusing to comply, he shot him dead, April 24, 1617. His body, after it had been buried, was taken up and given to the populace, who treated it with every indignity. His wife was afterwards condemned, by a decree of the parliament, to be hanged and burnt. *Moreri*.

CONCIOLO, an Italian painter, who flourished in the commencement of the thirteenth century. Upon a picture at Sabiaco, in the Ecclesiastical State, representing the consecration of a church, the artist has thus signed his name, *Consiolus pinxit, 1210*. This is one amongst the many proofs, with which the churches and converts of Italy abound, to shew that however low the state of the arts in Europe, previous to Cimabue and Giotto, the intervention of Greek painters was by no means necessary to their establishment. *Lanzi. Storia Pittorica*.

CONCIANTORES, in *Antiquity*, common-councilmen, freemen, called to the hall or assembly, as most worthy. Thus, "quodam tempore cum convissent *conciantores* apud London, &c." *Hist. Elicn. apud Gale, c. 46*.

CONCLAMATIO, a shout raised by those present at burning the dead, before they set fire to the funeral pile. See **SHOUT**. The word was also applied to the signal given to the Roman soldiers to decamp, whence the expression "conclamare vasa" and "conclamari arma" was a signal for battle. It was likewise used for a practice of calling to a person deceased three times by his name, and when no reply was returned, they thus expressed his decease, "conclamatum est." Whence the same term was afterwards applied to the cessation of the Roman empire.

CONCLAMATIO, among the Greeks, Romans, and several other nations, was a spontaneous cry or shout, which all the soldiers of an army made when they understood or heard the third signal for combat.

CONCLAVE, an assembly or meeting of all the cardinals that are at Rome, shut up for the election of a pope; whence it derives its name. See **CARDINAL**.

The conclave had its rise in the year 1270, and on this occasion; Clement IV. being dead at Viterbo, in 1268, the cardinals were nearly three years, *viz.* from the 29th of November 1268, to the 1st of September 1271, without being able to agree on the election of a successor; in effect, things were carried to such pass that they were upon the point of breaking up, without coming to any conclusion at all.

The magistrates of Viterbo, being apprised of their design, by the advice of St. Bonaventura, then at Viterbo, shut the gates of their city, and locked up the cardinals in the pontifical palace adjoining to the cathedral, till they were brought to a better understanding.

Hence arose the custom, which has since prevailed, of shutting up the cardinals in a single palace, till they have elected the pope.

Such was the origin of the conclave, as related by Oneph. Panvinus, Ciaconius, and Papebroch.

Panvinus informs us, that John of Toledo, cardinal

Bishop of Porto, seeing the cardinals daily praying the Holy Ghost to inspire them with the spirit of concord and union, and yet discord continuing to reign among them, said pleasantly, "Let us uncover the room, else the Holy Ghost will never get at us." When this farcalle remark was reported to the magistrates of Viterbo, they immediately ordered the roof of the room in which the cardinals were assembled, to be taken off, hoping that this new inconvenience would oblige them to hasten the election; but their obstinacy prevailed against all inconveniences, till the magistrates bethought themselves of daily lessening their subsistence; and this had the desired effect. For being thus reduced to the alternative of starving or agreeing, they left the election by compromise to fix of their number; and then Gregory X. was elected.

CONCLAVE is also used for the place where the election of the pope is performed; which is now at St. Peter's in the Vatican; though Gregory X. and Clement V. appointed it should always be held in the place where the last pope should die. But if he should die in a borough or village, where the electors could not conveniently meet, the election was to take place in the episcopal city, or in the nearest to it, if that city were under an interdict.

While the affair is in hand, if it be in winter, the walls and windows are all mured up, excepting only a single pane, to give a little light; in summer the windows are not closed; but the great door of the hall is secured with four locks and four bolts; an aperture being, however, left, through which to supply the imprisoned prelates with victuals.

If the election takes place at Rome, the door of the conclave, and all the avenues to it are to be carefully guarded by the city guards, by the Roman nobility, by the ambassadors of princes, and by the bishops and conservators of the city. If the election is to be made out of Rome, the same duty is incumbent upon the temporal lords and magistrates of the place; and it is a duty common to them all to see that nothing be carried into the conclave, or out of it, that has the least tendency to retard or prevent a lawful election.

In the hall, which is very ample, there are cells or stalls erected for as many cardinals as are to be present at the election; the cells being only separated by deal boards, and the room having no outlet, except to the privy.

The cells are marked with letters of the alphabet, and are distributed to the cardinals by lot: each cardinal puts his arms on the cell that falls to his share.

No one shall be allowed to go into the common room or conclave, nor out of it, but in case of sickness, or on some other urgent occasion.

After the assembly has continued three days, they are only allowed one dish for a meal; and after fifteen days more, only bread, wine, and water, though this rule is not very strictly regarded.

Each cardinal is allowed two conclavits, or servants to attend him, and to be shut up with him.

The election is begun ten days after the pope's decease, and decided by a majority of two parts in three of the cardinals present, who vote by ballot; and if, upon scrutiny, no one of the candidates has two-thirds of the votes, the balloting must, after a stated interval, be repeated. And this continues to be reiterated if they should remain shut up for years, till one of them attains the fore-mentioned superiority. Cardinals who arrive before the election is finished, are included with the rest.

These regulations were principally established by Gregory X. in 1274. But as this constitution of Gregory X.

was thought by the cardinals to be too rigorous, they prevailed upon Clement VI. in the year 1351, not long before his death, to mitigate it. Clement allowed them to have each two servants, clerks, or laymen; to have curtains round their beds, and one dish of flesh or fish at dinner, and another at supper, besides bread, wine, fruit, and sweetmeats, so long as they continued in the conclave.

Matthew Paris says, the word conclave anciently signified the pope's wardrobe.

It is a popular proverb in Italy, *chi entra papa, esce cardinale*; he who enters pope, comes out cardinal; q. d. he who according to common report will be elected pope, ordinarily is not.

We have various accounts, both by protestant and popish writers, of the intrigues that have been practised in the conclave, during contested elections. What is said to have passed upon the decease of Alexander VII. is no tale invented by protestants, but related by grave Roman catholics, viz. that on the last day, cardinal Sforza, going into the conclave, asked another cardinal, his intimate friend, what he thought would be the issue? He returned this frank answer: "Signior cardinal, if the French make the pope, he will be cardinal Farneze; if the Spaniards, cardinal Rospigliosi; if he is made by the people of Rome, he will be cardinal Barberini; if the Holy Ghost appoints him, cardinal Odescalchi will be the man; if the devil has a hand in it, he must be your eminence, or myself." Upon this, Sforza replied with a laugh, "then Rospigliosi will be the man;" and he was accordingly chosen by the name of Clement IX. In the year 1724, upon the death of Innocent XIII, the following satirical distinction was made between the candidates for the papal throne:

"Il Cielo vuol Orsini
Il popolo Corsini
Le Donne Ottoboni
Il Diavolo Alberoni."

i. e. "Heaven is for Orsini,
The people for Corsini,
The ladies for Ottoboni,
The devil for Alberoni."

But Orsini was chosen by the name of Benedict XIII. Keyser's Trav. vol. ii. p. 109.

CONCLUSION, in *Law*, is where a man by his own act upon record hath charged himself with a duty or other thing, or confessed any matter whereby he shall be concluded: as if a sheriff returns that he hath taken the body upon a *capias*, and hath not the body in court, at the day of the return of the writ; by the return, the sheriff is concluded from plea of *escape*, &c. Terms de Ley, 153, &c. In another sense the word conclusion signifies the end of any plea, replication, &c. and a plea to the writ, is to conclude to the writ; a plea in bar, to conclude to the action, &c. Conclusion of plea in bar shall be, *et hoc paratus est verificare*:—of other pleas *et de hoc ponit se super patriam*. Kitch. 219, 220. See PLEA.

CONCLUSION of *deeds*, mentions the execution and date of the deed, or the time of its being given or executed, either expressly, or by reference to some day and year before-mentioned. Not but a deed is good, although it mention no date, or hath a false date; or even if it hath an impossible date, as the 30th of February; provided the real day of its being dated or given, that is delivered, can be proved.

CONCLUSION, in *Logic*, the last part of an argument; or the judgement drawn from something either assumed or proved before.

The conclusion of an argument contains two parts: the consequent, which is the matter of it; and the consequence, which is its form, and which, of a simple absolute proposition, renders the conclusion relative to the premises whence it is drawn.

The question and conclusion, say the schoolmen, are the same ideas, only considered in different views, or relations: in the question they are considered as doubtful; in the conclusion as void of doubt.

CONCLUSION, in *Oratory*, consists of two parts; the RECAPITULATION, or ENUMERATION, and the PASSIONS. See also PERORATION.

CONCLUSIONS *d'une procedure militaire*, Fr. See the article JUDGE Advocate.

CONCOBAR, in *Ancient Geography*, a town of Asia, in Upper Media, towards the S.W. of Ecbatana.

CONCOCTION, in the *Animal Economy*, a term used by the older writers to denote the process which the food undergoes in the stomach, and by which it is converted into chyme and chyle. This process is now more usually termed DIGESTION, which see.

CONCOCTION, in the *Pathology* of Hippocrates and Galen, and their numerous followers, was also employed to signify certain changes in the fluids in the course of acute diseases, from a supposed analogy between the changes, and those which the aliments undergo in the stomach during digestion. The process of concoction may be particularly illustrated in the case of a common phlegmon, or boil; the progress of which is marked, according to Galen, by four distinct stages. The first, or *incipient stage*, when these fluids are beginning to collect, is considered as the stage of crude and unchanged humours: in the second, or stage of *increase*, in consequence of the process of concoction, heat is diffused through the part, and the pain, tension, and tumour are increased: when the humours are completely concocted, and converted into *pus*, the stage of the phlegmon is said to be *stationary*, or the disease to be in its vigour: and the fourth stage is that, in which the tension and tumour become less, and which is termed the *decline* of the swelling. A similar progress is observable in almost all inflammatory diseases. Thus in catarrh, affecting the mucous membrane of the nose, the discharge in the commencement is thin and watery, and, in the language of the humoral pathology, *crude*; by degrees a thicker and more opaque matter is discharged, which at length (becoming completely concocted), assumes a very thick and purulent appearance, which betokens the decline of the disease. Such also is the progress of change in the fluids expectorated in inflammations of the lungs and bronchiae, discharged from the eyes in ophthalmia, &c. By an analogy somewhat remote, this doctrine was transferred to febrile complaints, where no local inflammation, or depositary of morbid concocting matter, existed. In an idiopathic fever, as synochus or typhus, the alvine excrements, the urine, and the discharge from the skin, were referred to, as evidence of the process of concoction; and the varieties of the appearance of these discharges are described by Hippocrates, and his commentator Galen, as denoting the states of crudity and of concoction, and hence as affording a prognosis of the future progress and event of the disease. The alvine excrement is said to be well concocted, when it is, as in health, soft and connected, and is discharged with the usual regularity. When it is not in this state, but liquid and watery, partly liquid,

partly solid, &c. it is considered as not concocted, and therefore indicating the unhealthy condition of the bowels, through which it had passed. And thus, with respect to the urine, when it is extremely thin and Empid, it is said to be crude; and when it is slightly tinged with yellow, it is considered as having undergone a small degree of concoction, which is still more complete, if it soon deposits a moderate sediment. But the signs of concoction in the urine were said to be different in the young and the old, and different also in different diseases. Thus in bilious and summer fevers, a light cloud subsiding in the urine was deemed the sign of concoction; in inflammatory fever, a white sediment. See Galen, de Tot. Morbi. Tempor. et de Crisibus, lib. i.

CONCOLIN, in *Geography*, a town of France, in the department of the Isere; 4½ leagues N.E. of Grenoble.

CONCOMITANT, in *Theology*, something that accompanies, or goes along with, another.

Concomitant grace, is that which God affords us during the course of our actions to enable us to perform them; and as the Roman schoolmen say, to render them meritorious.

CONCOMITANT Necessity. See NECESSITY.

CONCORD, FORM OF, in *Ecclesiastical History*, a standard-book among the Lutherans, composed at Torgaw, in 1576, and thence called the Book of Torgaw, and reviewed at Berg, by six Lutheran doctors of Germany, the principal of whom was James Andreæ. This book contains in two parts, a system of doctrine, the subscription of which was a condition of communion, and a formal and very severe condemnation of all who differed from the compilers of it, particularly with respect to the majesty and omnipresence of Christ's body, and the real manducation of his flesh and blood in the eucharist. It was first imposed on the Saxons by Augustus, and occasioned great opposition and disturbance, both among the Lutherans and Reformed.

Several of the most eminent churches of the Lutheran communion rejected it so firmly and resolutely, that no arguments nor intreaties could engage them to admit it as a rule of faith, or even as a mean of instruction. Accordingly, it was rejected for various reasons, by the churches of Hesse, Pomerania, Nuremberg, Hollstein, Silesia, Denmark, Brunswick, and others. Among the Reformed, or Calvinists, the Swiss doctors, at the head of whom was Hôspinian, the Belgic divines, those of the Palatinate, together with the principalities of Anhalt and Bude, declared war against it. This form of concord, however, was patronized in a special manner by Julius, duke of Brunswick, to whom, in a great measure, it owed its existence; and who employed his authority and munificence in encouraging those by whom it was composed, and in commanding all the ecclesiastics, within his dominions, to receive and subscribe it as a rule of faith. But soon after it was published, this zealous prince changed his mind, suffered it to be publicly exposed by the divines of his university of Helmstadt, and to be excluded from the number of creeds and confessions that were received by his subjects. Various means were used to obviate his objections; and particularly in the year 1583, a convocation of divines from Saxony, Brandenburg, Brunswick, and the Palatinate, was held at Quedlinburg for this purpose. But Julius persisted in his opposition, and proposed that the form of concord should be examined, and its authority discussed by a general assembly or synod of the Lutheran church.

In the year 1614, John Sigismund, elector of Brandenburg, following the example of the landgrave of Hesse, renounced Lutheranism, and, under certain restrictions, embraced the communion of the Reformed churches. This event occasioned a dispute, which was agitated with violence,

and which occasioned the form of concord to be suppressed in the territories of Brandenburg, and the subjects of that electorate to be prohibited, by a solemn edict, from studying divinity in the academy of Wittenberg. Towards the close of the 17th century, viz. in the year 1675, a new confession of faith was drawn up by the Helvetic divines, under the denomination of the "form of concord or of agreement," which was also entitled the "Consensus;" but the introduction of it occasioned contests and tumults in several places. It maintained, however, its credit and authority in the church of Geneva, until the year 1706, when, without being abrogated by any positive act, it fell into disuse. In several other parts of Switzerland, it was still imposed as a rule of faith, particularly in 1718, by the magistrates of Bern, who published an order, by which all professors and pastors, particularly those of the university and church of Lausanne, who were suspected of entertaining any erroneous opinions, were obliged to declare their assent to this formulary. Many pastors and candidates for holy orders refused the assent that was demanded by the magistrates, and some of them were punished for this refusal. In consequence of these warm contests and grievous complaints letters were addressed by George I. king of England, as also by the king of Prussia, in the year 1723, to the Swiss cantons, in order to procure the abrogation of this form, or consensus, which was considered as an obstacle to the union of the Reformed and Lutheran churches. Moshem's Eccl. Hist. by Dr. Maclaune, vol. iv. v. vi.

CONCORD, in *Geography*, a flourishing post-town of America, in New Hampshire, pleasantly situated on the W. bank of Merrimack river, in Rockingham county, eight miles above Hookset falls. The legislature has, of late, held its sessions here; and on account of its central situation in the front of a thriving country, it will probably become the permanent seat of government. Much of the trade of the upper country centers here. This town is connected with Pembroke by a handsome bridge across the Merrimack. Concord was incorporated in 1765, and has 1747 inhabitants. Its Indian name was "Penacook." It was granted by Massachusetts, and called "Rumford." The compact part of the town contains about 170 houses, a congregational church, and an academy, which was incorporated in 1790. It is 54 miles W.N.W. of Portsmouth, 58 S.W. of Dartmouth college, and 70 northward from Bolton. N. lat. 43° 12'. W. long. 71° 29'.

CONCORD, a town of America in the state of Vermont and county of Essex, lying on Connecticut river, opposite to a part of the 15 mile falls.

CONCORD, a post-town of America, in the state of Massachusetts, being one of the most considerable towns in Middlesex county, situated on Concord river, in a healthy and pleasant spot, nearly in the centre of the county, and 18 miles N.W. of Bolton, and 17 E. of Lancaster. Its Indian name was Mulqueteguid; and it owes its present name to the peaceable manner in which it was obtained from the natives. It was incorporated in 1635; being at that time the most distant settlement from the sea-shore of New England. In 1791 this township contained 225 dwelling houses and 1590 inhabitants; and as a proof of the fertility of its situation, 80 of the number were above 50 years old; and for 13 years before 1791, the average number of deaths was 17, one in four of whom was 70 years old or upwards. The public buildings are a congregational church, a spacious stone gaol, and a very handsome county court house. The river is crossed by three bridges, of which one is 208 feet long and 18 feet wide, supported by 12

piers, and built after the manner of Charles river bridge. This town, during the revolution, was the seat of the provincial congress in 1774, and the spot where the first opposition was made to the British troops, on the 19th of April 1775. The grand court has been held here, when contagious diseases have prevailed in the capital. N. lat. 41° 25'.

CONCORD, a small river of Massachusetts, formed of two branches, which unite near the centre of the town of Concord, whence it takes its course in a N.E. and N. direction through Bedford and Billerica, and empties itself into Merrimack river at Tewksbury. This river is remarkable for the gentleness of its scarcely perceivable current. At low water mark it is from 100 to 200 feet wide, and from 3 to 12 feet deep. During floods it is nearly a mile in breadth: and when viewed from the town of Concord, exhibits a fine appearance.

CONCORD, a township of Delaware county in the State of Pennsylvania.

CONCORD, a settlement in Georgia, on the E. bank of the Mississippi, about a mile from the fourth line of Tennessee, 108 miles N. from the mouth of Yazoo river, and 218 below the Ohio. N. lat. 33° 55'. W. long. 91° 25'.

CONCORD, in Grammar, that part of syntax, or construction, whereby the words of a sentence agree among themselves, *i. e.* whereby nouns are put in the same case, number, gender, &c. and verbs in the same number and person, with nouns and pronouns.

The rules of concord are generally the same in all languages, as being of the nature of what is in use almost everywhere, for the better distinguishing of discourse.

Thus, the distinction of the two numbers singular and plural obliges us to make the adjective agree with the substantive in number; that is, to put the one either in this or that number, according as the other is: for the substantive being the thing confusedly, though directly, marked by the adjective; if the substantive word mark several, there are several subjects of the form marked by the adjective, and of consequence this should be in the plural; as *homines docti*, &c.

Again, the distinction of masculine, and feminine, renders it necessary to put the substantive and adjective in the same degree.

And verbs should have concord or agreement with nouns and pronouns in number and person.

If any thing occur apparently contrary to these rules, it is by a figure; *i. e.* something is implied, or the ideas are considered more than the words themselves. See SYNTAX.

CONCORD, *Order of*, in *Heraldry*, was instituted by Christian-Ernest, Margrave of Brandenburg, on his return from Spain, in the year 1660, to distinguish the part he had taken in restoring peace and union to many European princes. The badge of the order is a gold cross of eight points enamelled white, surmounted by an electoral crown; in the centre of the cross a medal thereon, two olive branches passing saltierwise through two crowns: around the medal the motto *concordans*. On the reverse the founder's cypher with the date of the institution. This badge is worn pendant from an orange ribbon.

CONCORD, in *Law*, is the agreement between parties who intend the levying a fine of lands to one another, how and in what manner it shall pass. This is usually an acknowledgment from the deforciant (or those who keep the other out of possession) that the lands in question are the right of the complainant. And from this acknowledgment or recognition of right, the party levying the fine is called the *cognizor*, and he to whom it is levied the *cogni-*

zee. This acknowledgment must be made either openly in the court of common pleas, or before the lord chief-justice of that court; or else before one of the judges of that court; or two or more commissioners in the country, empowered by a special authority, called a writ of "dedimus potestatem;" by which judges and commissioners are bound by Statute 18 Edw. 1. ft. 4. to take care that the cognizors be of full age, sound memory, and out of prison. If there be any feme-covert among the cognizors, she is privately examined whether she does it willingly and freely, or by compulsion of her husband.

CONCORD, is also an agreement made upon any trespass committed (betwixt two, or more); and is divided into *concord executory*, and *concord executed*. These concords or agreements are by way of satisfaction for the trespass, &c.

Plowden observes, that the first binds not, being imperfect; but the latter is perfect, and binds the party.

Others are of opinion, that concords executory are perfect, and bind no less than those executed.

CONCORD, in *Music*, denotes the relation of two sounds which are always agreeable to the ear, whether heard in succession or consonance.

If two single sounds be in such a relation, or have such a difference of tone, as that, being sounded together, they make a mixture, or compound found, which affects the ear with pleasure; that relation is called *concord*: and whatever two sounds make an agreeable compound in consonance, those same sounds will always be pleasing in succession, or will follow each other agreeably.

The reverse of concord is what we call *discord*; which is the general denomination of all the relations or differences of tone that have no pleasing effect.

Concord and harmony are, in effect, the same thing; though custom has applied them differently. As concord expresses the agreeable effect of two sounds in consonance: so harmony expresses the same sort of agreement in a great number of sounds in consonance: add, that harmony always implies consonance; but concord is sometimes applied to succession, though never but when the tones will make an agreeable consonance; whence it is, that Dr. Holder, and some other writers, use the word consonance for what we call concord.

Unconsonance, then, being the relation of equality between the tones of two sounds, all the unisons are concords, and in the first degree; but an interval being a difference of tone, or a relation of inequality between two sounds, becomes a concord or discord, according to the circumstances of the particular relation. Indeed some restrain concord to intervals, and make a difference of tone constitute the essential difference of concord and discord; but two unisons cannot form an interval.

It is not easy to affirm the reason or foundation of concordance: the difference of tone, we have elsewhere observed, takes its rise from the different velocity of the vibrations of the sonorous body, *i. e.* of the velocity of those vibrations in their recourses; the more frequent their recourses are, the more acute will be the tone, and *vice-versa*.

But the essential difference between concord and discord lies deeper: there does not appear any natural aptitude in the two sounds of a concord, to determine it to give us a pleasing sensation, more than in the two sounds of a discord: these different effects are merely arbitrary, and must be resolved into the divine pleasure.

We know by experience what proportions and relations of tone afford pleasure, and what do not; and we know also how to express the difference of tone by the proportion

of numbers; we know what it is pleases us, though we do not know why: we know, *v. gr.* that the ratio of 1 : 2 constitutes concord, and 6 : 7 discord: but on what original grounds agreeable or disagreeable ideas are connected with those relations, and the proper influence of the one on the other, are above our reach.

By experience we know, that the following ratios of the lengths of strings are all concord; *viz.* 2 : 1, 3 : 2, 4 : 3, 5 : 4, 6 : 5, 5 : 3, 8 : 5; that is, take any string for a fundamental, which shall be represented by the number 1, and the following divisions thereof will be all concord with

$$\frac{1 \cdot 2 \cdot 3 \cdot 5 \cdot 3 \cdot 5}{2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 5 \cdot 8}$$

So that the distinguishing character between concords and discords must be looked for in these numbers, expressing the intervals of sound; not abstractedly and in themselves, but as expressing the number of vibrations. Now, unisons are in the first degree of concord, or they have the most perfect likeness or agreement in tone; and therefore have something in them accessory to that agreement which is found, less or more, in every concord: the nearer two sounds come to an equality of tone, the slower are the beats, and the more agreement they have; therefore, it is not in the equality or inequality of the numbers that this agreement lies.

Further, if we consider the number of vibrations made in any given time by two strings of equal tone; on the principle laid down, they are equal: and therefore the vibrations of the two strings coincide, or commence together as frequently as possible, *i. e.* they coincide at every vibration; in the frequency of which coincidence, or united mixture of the motions of the two strings, and of the undulations of the air which they occasion, it is, that the difference of concord and discord must be sought. Now, the nearer the vibrations of two strings approach to a coincidence as frequent as possible, the nearer they should approach that condition, and consequently the agreement of unisons; which is confirmed by experience.

For if we take the natural series 1, 2, 3, 4, 5, 6, and compare each number to the next, as expressing the number of vibrations in the same time of two strings, whose lengths are reciprocally as those numbers; the rule will be found exact, for 1 : 2 is best, then 2 : 3; after 6 the union is unsufferable; the coincidences being too rare: though there are other ratios that are agreeable, besides those found in that continued order, *viz.* 3 : 5, and 5 : 8, which, with the preceding five, are all the concurring intervals within, or less than an octave, or 1 : 2; that is, whose acutest term is greater than half the fundamental.

On this principle, 3 : 5 will be preferable to 4 : 5; because those being equal in the number of vibrations of the acuter term, there is an advantage on the side of the fundamental in the ratio 3 : 5, where the coincidence is made at every third vibration of the fundamental, and every fifth of the acute term: so also the ratio 5 : 8 is less perfect than 5 : 6; because, though the vibrations of each fundamental that go to one coincidence are equal; yet in the ratio 5 : 6, the coincidence is at every sixth of the acute term, and only at every eighth in the other case.

Thus, we have a rule for judging of the preference of concords, from the coincidence of their vibrations: agreeable to which rule, they are disposed into the order of the following table; to which the names of the concords in practice, the ratio of their vibrations, the lengths of the strings, and the number of coincidences in the same, are expressed.

	Ratios, or vibrations.		Coincid.
	Grave	Acute	
Unison	—	1 : 1	
Octave, 8ve	—	2 : 1	60
Fifth, 5th	—	3 : 2	30 ^o
Fourth, 4th	—	4 : 3	20
Sixth, gr.	—	5 : 3	20
Third, gr.	—	5 : 4	15
Third, lesser	—	6 : 5	12
Sixth, lesser	—	8 : 5	12
	Grave	Acute	
	Lengths.		

Though this order be settled by reason, yet it is confirmed by the ear. On this foundation, concords must still be the more perfect, as they have the greatest number of coincidences, with regard to the number of vibrations in both the strings; and where the coincidences are equal, the preference will fall on that interval, whose acutest term has fewest vibrations to each coincidence: which rule, however, is in some cases contrary to experience; and yet it is the only rule hitherto discovered.

Indeed, Kircher, after father Merenne, gives us another standard for settling the comparative perfection of intervals with regard to the agreement of their extremes in tone: and it is this.

The perception of concordance, say they, is nothing but the comparing two or more different motions which in the same time affect the auditory nerve: now we cannot make a certain judgment of any consonance, till the air is as often struck in the same time by two strings, as there are units in each member expressing the ratio of that concord; *v. gr.* we cannot perceive a fifth, till two vibrations of the one string, and three of the other, are accomplished together; which strings are in length as 3 to 2: the rule then is, that those concords are the most simple and agreeable, which are generated in the least time; and those, on the contrary, the most compound and harsh, which are generated in the longest time.

For instance, let 1, 2, 3, be the lengths of 3 strings, 1 : 2 is an octave; 2 : 3 a fifth; and 1 : 3 an octave and fifth compounded, or a twelfth. The vibrations of strings being reciprocally as their lengths, the string 2 will necessarily vibrate once, while the string 1 vibrates twice, and then exalts an octave; but the twelfth does not yet exalt, because the string 3 has not vibrated once, nor the string 1 thrice, which is necessary to form a twelfth.

Again, for generating a fifth, the string 2 must vibrate thrice, and the string 3 twice; in which time, the string 1 will have vibrated 6 times; and thus the octave will be thrice produced, while the twelfth is only produced twice; the string 2 uniting its vibrations sooner with the string 1, than with the string 3; and they being sooner consonant than the string 1 or 2 with that 3. Whence, that author observes, many of the mysteries of harmony, relating to the performance of harmonious intervals, and their succession, are easily deduced.

But this rule, upon examining it by other instances, Mr. Malcolm has shewn defective, as it does not answer in all positions of the intervals with respect to each other; but a certain order, in which they are to be taken, being required: and there being no rule, with respect to the order, that will make this standard answer to experience in every case: so that at last we are left to determine the degrees of concord by experience and the ear.

Not that the degrees of concord depend much on the more or less frequent uniting the vibrations, and the ear's being

being more or less uniformly moved, as above; for that this mixture or union in motion is the true principle, or, at least, the chief ingredient in concord, is very evident: but because there seems to be something farther in the proportion of the two motions necessary to be known, in order to fix a catholic rule for determining all the degrees of concord, agreeable to sense and experience.

The result of the whole doctrine is summed up in this definition.—Concord is the result of a frequent union, or coincidence of the vibrations of two sonorous bodies, and, by consequence, of the undulating motions of the air, which, being caused by these vibrations, are like and proportionable to them; which coincidence, the more frequent it is, with regard to the number of vibrations of both bodies, performed in the same time, *cæteris paribus*, the more perfect is that concord: till the rarity of the coincidence, in respect of one or both the motions, produces discord. See some of the remarkable phenomena of sounds accounted for from this theory, under the word UNISON; see also INTERVAL, &c.

Mr. Carre, in the Memoirs of the Royal Academy of Sciences, lays down a new general proposition, to determine the proportion which cylinders are to have, in order to form the concords or consonances of music. And it is this—that the solid cylinders, whose sounds yield those concords, are in a triplicate and inverse ratio of that of the numbers which express the same concords.

Suppose, *e. gr.* two cylinders, the diameters of whose bases and lengths are as 3 to 2: it is evident their solidities will be in the ratio of 27 to 8, which is the triplicate ratio of 3 to 2: we say then, that the sounds of those two cylinders will produce a fifth, which is expressed by those numbers; and that the biggest and longest will yield the grave sound, and the smallest the acute one.—And the like of others.

Concords are divided into *simple*, or original, and *compound*.

A *simple*, or *original* concord, is that whose extremes are at a distance less than the sum of any two other concords.

On the contrary, a *compound* concord is equal to two or more concords.

Other musical writers state the division thus: an octave 1: 2, and all the inferior concords above expressed, are all simple and original concords: and all greater than an octave, are called compound concords; as being composed of, and equal to the sum of one or more octaves, and some single concord less than an octave; and are usually, in practice, denominated from that simple concord.

As to the composition and relations of the original concords, by applying to them the rules of the addition and subtraction of intervals, they will be divided into *simple* and *compound*, according to the first and more general notion; as in the following table.

Simple Concords	Compound Concords.	
5:6 a 3d less.	4th	} 3dg. and 3dl. } 3ve. com- } 4th. } 3dl. } posed of } 5th g. } 4th. } 3g. }
4:5 a 3d gr.	6th l.	
3:4 a 4th.	5th g.	

The octave is not only the first concord in point of perfection, the agreement of whose extremes is greatest and the nearest to unison; inasmuch that, when founded together, it is impossible to perceive two different sounds; but it is also the greatest interval of the seven original concords; and, as such, it contains all the lesser, which derive their sweetness from it, as they arise more or

less directly out of it; and which decrease gradually, from the octave to the lesser sixth, which has but a small degree of concord.

A remarkable circumstance is the manner wherein these minor concords are found in the octave, which shews their mutual dependences.

For, by taking both an harmonical and arithmetical mean between the extremes of the octave, and then both an harmonical and arithmetical mean betwixt each extreme, and the most distant of the two means last found; viz. betwixt the lesser extreme and the first arithmetical mean, and betwixt the greater extreme and the first harmonical mean; we have all the lesser concords.

Thus, if betwixt 360 and 180, the extremes of octave, we take an arithmetical mean, it is 270; and an harmonical mean is 240: then, betwixt 360 the greatest extreme, and 240 the harmonical mean, take an arithmetical mean, it is 300; and an harmonical mean is 288. Again, betwixt 180 the lesser extreme of the octave, and 270 the first arithmetical mean, it is 225; and an harmonical one 216.

Thus, we have a series of all the concords, both ascending towards acuteness from a common fundamental 360; and descending towards gravity from a common acute term 180; which series has this property, that taking the two extremes, and any other two at equal distances, the four will be in geometrical proportion.

The octave, by immediate division, resolves itself into a fourth and fifth; the fifth, again, by immediate division, produces the two thirds; the two thirds are therefore found by division; though not by immediate division; and the same is true of the two sixths. Thus do all the original concords arise out of the division of the octave; the fifths and fourths immediately and directly, the thirds and sixths mediately.

From the perfection of the octave arises this remarkable property, that it may be doubled, tripled, &c. and yet still will preserve a concord, *i. e.* the sums of two or more octaves are concord; though the more compound will be gradually less agreeable; but it is not so with any other concord less than octave; the doubles, &c. of which are all discords.

Again, whatever sound is concord to one extreme of the octave, is concord to the other also; and if we add any other simple concord to an octave, it agrees to both its extremes; to the nearest extreme it is a simple concord, and to the farthest a compound one.

Another thing observable in this system of concords is, that the greatest number of vibrations of the fundamental cannot exceed five; or that there is no concord where the fundamental makes more than five vibrations, to one coincidence with the acute term. It may be added, that this progress of the concords may be carried on to greater degrees of composition, even in *infinitum*; but still the more compound, the less agreeable.

So a single octave is better than a double one, and that than a triple one; and so of fifths, and other concords.

Three or four octaves form the extremes of all the intermediate sounds; what will afford all the variety of pleasure the harmony of sounds is capable of affording, or at least that we can receive; for we can hardly raise sounds beyond that compass, either by voice or instrument, that shall not offend the ear.

The phenomena attending simultaneous sounds have been considered by Euler, and treated of in so clear and perspicuous

CONCORD.

that such consonances are much more agreeable than perfect discords, whose pulses coincide very often.

We may, indeed, says Dr. Smith (p. 99.) approach as near as we please, and certainly much nearer than the sense can distinguish, towards the exact magnitude of an incommensurable ratio, by the ratios of whole numbers; but as these will grow larger and larger without bounds, so will the time between the successive coincidences, or the length of the approximating cycle of the pulses; by which is meant the time of either of the incommensurable vibrations, multiplied by the heterologous term of the approximating ratio. Let any man tell us then where we may stop, and which of those cycles it is, whose repetition excites the determinate sensation of the consonance.

The like difficulty occurs in approaching gradually even to a commensurable ratio of the vibrations of any perfect consonance. For, if either of its vibrations be pretty much altered at once, and then be made to approach by degrees to its former length, the terms of the several approximating ratios will grow larger and larger without bounds, and in regular order, except when ratios occur whose terms are reducible; and the cycles of their pulses will accordingly be longer and longer, and their coincidences fewer without limit, those interruptions excepted; and yet the consonance will grow better and better by regular degrees, till it arrives at perfection, as is certain by experience. For instance, the ratios 30 to 21, 300 to 231, 3000 to 2001, &c. approach nearer and nearer to 3 to 2, and the Vtths, whose vibrations are in those ratios, grow more and more harmonious, though the cycles of their pulses grow longer and longer to infinity.

It seems indisputable, that coincident pulses are not necessary to such harmony as the ear judges to be perfect. For if any long period of imperfect unisons, intercepted between two beats, be lengthened greatly and indeterminately, as in tuning an instrument, any given part of it, as long as any musical note, will approach indefinitely near to perfect unisons; certainly nearer than the ear can distinguish, as being often doubtful of their perfection. And yet throughout that part (supposed to be small in comparison to the whole period) the pulses of one sound divide the intervals of the pulses of the other very nearly in a given ratio, of any determinate magnitude, between infinitely great and infinitely small, in proportion to the distance of that part from the periodical point or point of coincidence. Nevertheless, the ear cannot distinguish any difference in the harmony of such different parts, as is evident by often repeating the same consonance, which can hardly begin constantly in the same place of the long period; and this argument applies to all other consonances besides unisons.

Dr. Robison supports this train of argument, by a reference to the well known fact, that if two musical instruments, as two organ pipes, tuned so exactly in unison that their pulses may be supposed to begin and end at the same instants, making the most perfect coincidence of pulses, be placed at a given distance from each other, and sounded, the consonance will be perfectly the same, in whatever part of the room or space round the sounding pipes the ear of an auditor may be placed; while, owing to the time taken up by sound in travelling through a given space, it is evident that the supposed coincidence of the pulses in the sounds cannot so affix or reach an ear unless it be placed exactly at equal distances from each of the sounds; whereas, by placing himself exactly in the middle of the right line joining two unison sounds, and gradually approaching one of the sounds, every possible dislocation or deviation of the pulses from coincidence will prevail, in their action upon one of

the ears of an observer, while in most cases the other ear will be very differently acted upon, owing to its relative distances from the sounding bodies being different. And hence, as Dr. Robison concludes, "a musical sound is the sensation of a certain form of the aerial undulation which agitates the auditory organ. The perception of harmonious sound is the sensation produced by another definite form of the agitation. This is the competition of two other agitations; but it is the compound agitation only that affects the ear, and it is its form or kind which determines the sensation, making it pleasant or unpleasant," or in other words, a concord or a discord.

On the supposition that nature has appointed no certain limits between concords and discords, Dr. Smith (Harmon. p. 15.) inquires into the order of simplicity of the consonances between different sounds, perfectly adjusted according to their ratios, on the principle, that one consonance may be considered as more or less simple than another, according as the cycle of times belonging to it is more or less simple than the cycle belonging to the other, or as the sum of the least terms expressing the ratio of the single vibrations is smaller than the like sum in the other consonance; and that, when several such sums are the same, these consonances are simpler in the same order as the lesser terms of their ratios are smaller; and he disposes the consonances in a table, differing little, except in arrangement of the columns, from the following:

Order of the Simplicity	Ratios of the vibrations.	Concords.	Order of the Simplicity	Ratios of the vibrations.	Concords.
1	1 : 1	Unison.	16	1 : 16	XXXIX
2	1 : 2	VIII	16 $\frac{1}{2}$	2 : 15	
3	1 : 3	XII	16 $\frac{2}{3}$	5 : 12	10 th
4	1 : 4	XV	16 $\frac{3}{4}$	8 : 9	*
4 $\frac{1}{2}$	2 : 3	V	17	1 : 17	*
5	1 : 5	XVII	18	1 : 18	
6	1 : 6	XIX	18 $\frac{1}{2}$	3 : 16	18 th
6 $\frac{1}{2}$	2 : 5	X	18 $\frac{2}{3}$	4 : 15	
6 $\frac{2}{3}$	3 : 4	4 th	18 $\frac{3}{4}$	9 : 11	
7	1 : 7	*	19	1 : 19	*
7 $\frac{1}{2}$	3 : 5	VI	20	1 : 20	XXXI
8	1 : 8	XXII	20 $\frac{1}{2}$	5 : 16	15 th
8 $\frac{1}{2}$	4 : 5	III	22	1 : 22	*
9	1 : 9		22 $\frac{1}{2}$	3 : 22	XX
10	1 : 10	XXIV	22 $\frac{2}{3}$	5 : 18	
10 $\frac{1}{2}$	2 : 9		22 $\frac{3}{4}$	8 : 15	
10 $\frac{2}{3}$	3 : 8	14 th	24	1 : 24	XXXIII
10 $\frac{3}{4}$	5 : 6	3 rd	24 $\frac{1}{2}$	9 : 16	*
11	1 : 11	*	25	1 : 25	*
12	1 : 12	XXVI	28 $\frac{1}{2}$	5 : 24	17 th
12 $\frac{1}{2}$	3 : 10	XIII	28 $\frac{2}{3}$	7 : 24	
12 $\frac{2}{3}$	5 : 8	6 th	30	1 : 30	
12 $\frac{3}{4}$	7 : 8	*	30 $\frac{1}{2}$	15 : 16	
13	1 : 13	*	76 $\frac{1}{2}$	32 : 45	
14	1 : 14	*	103 $\frac{1}{2}$	45 : 64	
15	1 : 15				

The first and second columns of this table can scarcely need any explanation; the third contains the concords, major and minor, expressed as in the second column of the general table of concords, which follows in this article: the blanks in this column denote the discords, such as are marked with a * being computed of primes larger than 5, as 7, 11, 13, &c. and have no existence in music, except in the false notes

of the TRUMPET. HORN, &c.; see those articles: the others, or their octaves, will be found in the table of DISCORDS; see that article.

On the other hand, Dr. Robison and other writers have maintained, and we think justly, that nature has not left the concords without other distinctions than the capricious and uncertain preference given to them by musicians, but in addition to the almost universal delight which concords afford to every description of auditors, that the phenomena of slow and audible beats, accompanying each concord, when slightly tempered either in excess or defect, sufficiently distinguish such from all other musical intervals, comprised properly under the denomination of discords, or imperfect concords; and we cannot but agree with Dr. R. in thinking, that the study of the principles of harmonics would be greatly facilitated by considering the concords as the elements or fundamental intervals of melody fixed by nature, and that we should proceed to supply the other steps wanting in the scale, from their differences or combinations, rather than by assuming the tones and hemitones (which are discords that the most refined ear cannot accurately appreciate) to be the elements for composing the practical intervals of music; which it is not meant to contend, that they cannot accurately do in theory, but that concords of the truth or exact magnitude of which ordinary ears can at once judge with sufficient exactness (while the curious can adjust such in practice, by help of the beats, to any desired degree of accuracy) are better adapted to the purposes of harmonical computations and reasonings, and will admit of more direct and perhaps also of some new applications in practice.

For illustrating this subject, we beg to be allowed to mention an experiment by Dr. Robison, made with a wheel monochord, perhaps improperly so named, because it had two strings, which, by means of a refined revolving wheel, could be made to yield clear and even sounds for any required space of time: one of the strings giving constantly the same sound, while the length of the other, after being accurately tuned in unison therewith, admitted of being shortened in any required degree, without altering its tension.

Beginning with the unison (but which was not exactly the order in the Doctor's experiment), the moveable bridge, which determined the length of the variable string, was slowly and gradually moved forwards; at first a very slow, and by degrees a quicker, beating of the imperfect unison was heard, which increased in rapidity until the beats could no longer be counted, and at length they became a violent rattling flutter, which degenerated into a disagreeable jar. Still advancing the bridge, vile discordant noises resulted from the sound of the two strings, until the variable string had been shortened nearly $\frac{1}{15}$, or when a little more than $\frac{1}{10}$ of the string continued to sound; when a very rapid angry flutter commenced, that became rather less rapid and offensive as the point $\frac{1}{8}$ was approached, and again increased after that, until the discordant jar prevailed again; and this continued, until $\frac{3}{8}$ of the string was approached, when a similar flutter commenced, decreased, and again increased as this point was passed by the bridge; the jar beginning again, and accompanying the motion of the bridge, until it almost arrived at $\frac{1}{2}$ ths of the string's length, when a flutter and rapid beat commenced, decreasing in frequency, until at $\frac{2}{3}$, or when the minor third (3^{rd}) was sounded, they ceased entirely, and the result was a concord rather agreeable than otherwise, but strongly marked by a mournful melancholy in the expression; which, being sufficiently noticed, the bridge was again advanced, and produced the same beating, slow at first, then quicker, and at length

fluttering, until the like grating dissonance succeeded as before. This continued, until near the point marked $\frac{3}{4}$, when the beatings again commenced, having a peculiar fretful expression as they decreased in quickness, owing to the advance of the bridge, to the point of the major third (III), when the beats ceased, and the peculiarly enlivening and gay character of this concord was experienced by the hearers, who noticed an angry and waspish expression to accompany the succeeding beats as the string shortened, but which gave place gradually to the same flutter and jar as before.

When little more than $\frac{2}{5}$ ths of the string's length continued to sound, the flutterings and rapid beats were again heard, and the latter decreased and ceased entirely, at the point marking the fourth (4^{th}) which was noticed as a soft and agreeable concord. To this first flow, and then rapid, beats succeeded, and rapid flutterings, and a jarring noise. Near $\frac{3}{4}$ ths of the string the fluttering commenced again, and decreased until about six of them could be counted in a second of time as the false IV was passed, after which they increased again in rapidity as the bridge advanced, and an indistinct and jarring noise succeeded, which soon again became a flutter that decreased until at $\frac{2}{3}$ ths of the string about eight of these angry flutters could be counted in a second, corresponding to the false fifth, after which they increased in rapidity, and the jarring noise was again heard.

The bridge being progressively moved, the flutterings began, beats succeeded, and passed into a gentle and not unpleasant undulation which ceased entirely at $\frac{1}{3}$ ds of the string, when the fifth (V) with the cheering sweetness which characterizes it, was heard in the accordance of the two flows, neither of which could be separately distinguished: after which the slow and rapid beats, and fluttering, and jar succeeded as before. Some time before the bridge reached the mark for $\frac{1}{2}$ ths of the string the flutter and beats began again, and at that point the minor sixth (6^{th}) a consonance in a slight degree pleasant was heard of a mournful character, without any beatings, but which were heard to recommence and increase as the bridge advanced; and the jarring dissonance continued, until little more than $\frac{1}{3}$ ths of the variable string was left sounding, when flutters and beats succeeded, and such ceased when the true major sixth (VI) was heard, the character of which it was found difficult to express, otherwise than as being greatly inferior to the V in sweetness, and to the III in gaiety, but possessing in a lower degree both of these qualities: shifting the bridge forwards, beats, flutters, and discordant noises succeeded, attended with two perceptible changes to flutters, in its progress towards the $\frac{1}{2}$ of the string; which was not reached without the violent flutters, rapid and slower beats, so often before described; but when the beatings ceased the true octave (VIII) was heard, the treble note being with difficulty distinguished from the bass or fundamental afforded by the other string, and not at all so if the notes were duly apportioned in loudness. After this, if the bridge was still further advanced, beats, flutters, &c. succeeded as before, answering to the octaves of the sounds already described, as the bridge advanced to make half of the lengths of the former strings, respectively.

The doctor concludes his account of this very interesting experiment by remarking, that he has perhaps been rash in ascribing certain moral or sentimental characters to certain concords; because he had seen instances of persons who gave them different denominations, but these were never contradictory to his, but always expressed some sentiment allied to those above assigned. A person capable of a little discriminating reflection was never met with by the doctor, who did not acknowledge a manifest sentimental distinction among the

CONCORD.

A TABLE of the Relations which the several *Concords* bear to the *Key-Note*, within the *Compass* of Seven Octaves.

1	2	3	+	5	6	7	
48	XXIX	c''	$\frac{1}{16}$	8.7958800,0	$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 4}$	$^4 + ^4 III + ^4 3, ^4 VIII, ^4 VI + ^4 3, ^4 6 + III, ^4 V + ^4 4$	
45	XXVII	a'	$\frac{3}{32}$	8.8750612,6	$\frac{3}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5}$	$^4 + ^4 III + ^4 3, ^4 VIII + VI, ^4 VI + ^4 3, ^4 6 + ^4 4 + ^4 III, ^4 V + ^4 4 + III$	
44	27th	b a'	$\frac{5}{16}$	8.8927900,3	$\frac{5}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + 6, ^4 6 + III, ^4 VI + ^4 4 + ^4 3, ^4 V + ^4 4 + 3$	
43	XXVI	g'	$\frac{1}{8}$	8.9208187,5	$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + V, ^4 V + ^4 4, ^4 VI + V + ^4 3, ^4 VI + III + ^4 3$	
41	25th	f''	$\frac{3}{16}$	8.9719913,7	$\frac{3}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + 4, ^4 V + ^4 4, ^4 VI + 4 + ^4 3, ^4 6 + 4 + ^4 III$	
40	XXIV	e''	$\frac{1}{8}$	9.0000000,0	$\frac{1}{2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + III, ^4 6 + III, VI + ^4 V + ^4 4, ^4 VI + V + ^4 3$	
39	24th	b c'	$\frac{3}{8}$	9.0177287,6	$\frac{3}{2 \cdot 2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + 3, ^4 VI + ^4 3, 6 + V + ^4 4, ^4 6 + V + ^4 III$	
36	XXII	c'	$\frac{1}{4}$	9.0969100,1	$\frac{1}{2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII, ^4 VI + ^4 3, ^4 6 + III, ^4 V + ^4 4$	
33	XX	a'	$\frac{3}{8}$	9.1760912,5	$\frac{3}{2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + VI, ^4 VI + ^4 3, ^4 6 + 4 + ^4 III, ^4 V + ^4 4 + III$	
32	20th	b a'	$\frac{5}{16}$	9.1938200,2	$\frac{5}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII + 6, ^4 6 + III, ^4 VI + 4 + ^4 3, ^4 V + ^4 4 + 3$	
31	XIX	g'	$\frac{1}{6}$	9.2218487,5	$\frac{1}{2 \cdot 3}$	$^4 + ^4 III + ^4 3, ^4 VIII + V, ^4 V + ^4 4, VI + V + ^4 3, ^4 VI + III + ^4 3$	
29	18th	f'	$\frac{1}{6}$	9.2730012,7	$\frac{1}{2 \cdot 3}$	$^4 + ^4 III + ^4 3, ^4 VIII + 4, ^4 V + ^4 4, ^4 VI + 4 + ^4 3, ^4 6 + 4 + ^4 III$	
28	XVII	e'	$\frac{1}{3}$	9.3010299,9	$\frac{1}{2 \cdot 3}$	$^4 + ^4 III + ^4 3, ^4 VIII + III, ^4 6 + III, VI + ^4 V + 4, ^4 VI + V + 3$	
27	17th	b e'	$\frac{5}{12}$	9.3187587,8	$\frac{5}{2 \cdot 2 \cdot 2 \cdot 3}$	$^4 + ^4 III + ^4 3, ^4 VIII + 3, ^4 VI + ^4 3, 6 + ^4 V + 4, ^4 6 + V + III$	
24	XV	c'	$\frac{1}{2}$	9.3979400,1	$\frac{1}{2 \cdot 2}$	$^4 + ^4 III + ^4 3, ^4 VIII, ^4 VI + ^4 3, ^4 6 + III, ^4 V + ^4 4$	
21	XIII	a	$\frac{3}{4}$	9.4771212,5	$\frac{3}{2 \cdot 2}$	$^4 + ^4 III + 3, VIII + VI, VI + 3, 6 + 4 + ^4 III, V + ^4 4 + III$	
20	13th	b a	$\frac{5}{8}$	9.4948500,2	$\frac{5}{2 \cdot 2 \cdot 2}$	$^4 + III + ^4 3, VIII + 6, ^4 6 + III, VI + 4 + ^4 3, V + ^4 4 + 3$	
19	XII	g	$\frac{1}{2}$	9.5228787,5	$\frac{1}{2 \cdot 2 \cdot 2}$	$^4 + ^4 III + ^4 3, VIII + V, ^4 V + 4, VI + V + 3, VI + III + ^4 3$	
17	11th	f	$\frac{3}{4}$	9.5740312,6	$\frac{3}{2 \cdot 2}$	$^4 + III + 3, VIII + 4, V + ^4 4, VI + 4 + ^4 3, 6 + 4 + III$	
16	X	e	$\frac{1}{2}$	9.6020599,9	$\frac{1}{2 \cdot 2}$	$^4 + ^4 III + 3, VIII + III, 6 + III, VI + V, V + 4 + III$	
15	10th	b e	$\frac{5}{4}$	9.6199787,5	$\frac{5}{2 \cdot 2 \cdot 2}$	$^4 + III + ^4 3, VIII + 3, VI + ^4 3, 6 + V, V + 4 + 3$	
12	VIII	c	$\frac{1}{1}$	9.6989999,9	$\frac{1}{1}$	$4 + III + 3, VIII, VI + 3, 6 + III, V + 4$	
9	VI	A	$\frac{3}{2}$	9.7781512,5	$\frac{3}{2}$	$4 + III, VIII - 3, VI$	
8	6th	b A	$\frac{5}{2}$	9.8958800,1	$\frac{5}{2 \cdot 2 \cdot 2}$	$4 + 3, VIII - III, 6$	
5	V	G	$\frac{3}{1}$	9.8239087,5	$\frac{3}{1}$	$III + 3, VIII - 4, V,$	
5	4th	F	$\frac{3}{1}$	9.8750612,6	$\frac{3}{1}$	$4, VIII - V, 4, 6 - 3,$	
4	III	E	$\frac{3}{1}$	9.9030899,9	$\frac{3}{1}$	$III, VIII - 6, III, V - 3,$	
3	3d	b E	$\frac{5}{1}$	9.9208187,5	$\frac{5}{1}$	$3, VIII - VI, 3, 6 - 4,$	
3	Key	C	$\frac{1}{1}$	0.0000000,0	$\frac{1}{1}$	Unison	
	Intervals in Half-Tones	Intervals, Major and Minor,	Letters	Ratios	Common Logarithms.	Ratio in their Component Primes.	Tunable Intervals.

The titles of the columns are placed at the bottom of the foregoing Table, because it is intended to be read from the bottom upwards, agreeably to the practice of musicians, who read their notes upwards. Column 1 contains the number of finger-key intervals or half-notes: it will be found of use, in rough calculations respecting musical intervals; thus, suppose a VI were to be added to a 6th, and it was required to know on what note the sum would fall, we have $9 + 8 = 17$, which answers in the Table to the 17th, and which happens to be exactly their sum, as is evident by comparing column 7: suppose again, that it was required to know the interval answering to three III^s, we have in this case $4 \times 3 = 12$; this in the Table answers to the VIII, but it is evident from col. 7, that this is only an approximate value, because this is $4 + III + 3$ instead of 3 III, the difference

being an enharmonic diesis, or the Tierce wolf of earl Stanhope.

Column 2 contains the marks of the intervals, the major intervals being denominated by Roman, and the minor intervals by Arabic characters, or numbers. Column 3 shews the notes of the gamut, distinguishing the seven different octaves, the first or lowest by Roman capitals, the next by Italic small letters, the third by these accented, the fourth by the same double accented, the fifth by three accents, and the sixth and seventh octaves by small figures or indices, to express the number of accents.

Column 4 contains the ratios of the several notes, in their lowest terms. Column 5 contains the common or Briggs's logarithms to eight places of figures, the last being separated by a comma, in order to agree with the common Tables,

Tables,

tables, which have only seven places: whenever this number only is wanted, the seventh figure must be increased an unit, in every case where the eighth figure in the table exceeds 5.

Column 6 shews the ratios, expressed in their component primes, for the convenience of decomposing the same into tuneable intervals, as explained in our article *COMMA*; thus, the second fraction, or $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$ may be divided or expressed by $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}$, which shews it to be equivalent to 6 VIII + VI, as in column 7. The fraction answering to the 6th, or $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$ may be thus stated, *viz.* $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$, or VIII - III, the last term being negative, because the ratio or fraction expressing it is found reversed.

Column 7 contains several different values of each interval in col. 2, all expressed in tuneable intervals, or concords: the first, in each case, is expressed in the concordant elements, or smallest concords 4, III and 3^d; the next expression in each line has one or more VIIIths in its composition; we have next given those tuneable intervals, which are found to express each interval by two terms only; and have then added two others, (being all that our room would admit) of the various expressions in tuneable intervals, which can be had for any concord in col. 2, especially if negative signs are admitted, as we have done in the lowest octave of our table. Matter for curious reflection will present itself to the musical student, who attentively considers the last column of our table, such as; 1st, that the octave is the only concord which admits of being added to itself, without producing a discord; 2dly, that the complement of every concord to an octave (or to 2, 3, 4, &c. octaves,) is a concord; 3dly, that all the simple combinations by one, by two, or by three, of our concordant elements 4th, III and 3^d, produce concords; 4thly, after these simple combinations are made, no farther ones can be made, except the addition of an equal number of each of the concordant elements (as 4 + III + 3, 2 4 + 2 III + 3, &c.) without producing discords; &c. If the difference between any two concords be wanted, as between the XVII and the X, such is readily obtained from column 7th thus; 2 4 + 3 III + 3 - 4 - 2 III - 3 is equal to 4 + III + 3, or the octave. The sum also of any concords, as a VI and 6th, is thus obtained; 4 + III + 4 + 3, or 2 4 + III + 3, which answers to the 11th, as before observed, when explaining the uses of column 1.

It may be of use here to mention, that the differences between each adjoining concord, in each several octave in column 7, will be found to be 3^d, III - 3 (or the minor semitone, $\frac{2}{3}$), 4 - III (or the major semitone $\frac{4}{3}$) III + 3 - 4, or V - 4 (or the major semitone $\frac{5}{4}$), 4 - III, III - 3, and 3^d; and this, whether we begin at the top or at the bottom of the octave, which shews that nature has distributed these six concords, in a surprisingly uniform manner, between the unison and the octave. The intervals which will, in addition to those above, be found by deducting every concord within the octave from each other, are, 4 - 3 (or the minor tone, $\frac{4}{3}$) and 4 + III - 3, or VI - 3 (or the comma deficient tritone or sharp fourth $\frac{13}{9}$).

It has been remarked by Mr. Holder, that the number 6 combined with itself, or with every less integer, produces in every instance a concord, thus $\frac{6}{6}, \frac{6}{4}, \frac{6}{3}, \frac{6}{2}, \frac{6}{1}$, expresses the unison, 3^d, V, VIII, XII and XIX.

CONCORD, or *Concordia*, in *Mythology*, was personified by the Romans, and worshipped as a deity under this appellation. Concord is commonly represented on coins as a graceful female, holding a cup in her right hand, and in her

left sometimes a sceptre, and at other times a cornucopia, to intimate that plenty is the result of unanimity and friendship. Her symbols were two hands joined, as is seen on a coin of Aurelius Verus, and another of Nero; also two serpents twisting round a caduceus. Mr. Spence observes, that concord is sometimes represented with two cornucopias in one of her hands, a thing, says he, which I do not remember to have seen in any figure but her's, and as agreement often doubles the advantages we receive from the world, they seem to be given her with more propriety than perhaps they could be to any other.

CONCORD, *Temple of*, a building erected in Rome, at the expence of the public, upon an eminence at the foot of the capitol; so that it was seen from the forum, and the places where the assemblies were held and justice was administered. This temple was built in pursuance of a vow of Camillus to this purpose. See the article *CAMILLUS*.

Concord had several other magnificent temples, besides this and another erected by Tiberius, at the request of his mother Livia. In one of these temples were deposited the rich spoils of the temple of Jerusalem.

CONCORDANCE, a dictionary or index to the bible wherein all the leading words, used in the course of the inspired writings, are ranged alphabetically; and the various places where they occur referred to; to assist in finding out passages, and comparing the several significations of the same word.

Cardinal Hugo de St. Charo is said to have employed five hundred monks at the same time in compiling a Latin concordance: besides which, we have several other concordances in the same language; one, in particular, called the concordance of England, compiled by J. Darlington, of the order of Prædicants; another more accurate one, by the Jesuit de Zamora.

R. Mordecai Nathan has furnished us with a Hebrew concordance, first printed at Venice in 1523, containing all the Hebrew roots branched into their various significations, and under each signification all the places in scripture wherein it occurs: but the best and most useful Hebrew concordance is that of Buxtorf, printed at Basil in 1632.

Dr. Taylor published, in 1754, a Hebrew concordance in two volumes folio, adapted to the English Bible, and disposed after the manner of Buxtorf. See the preface of this work.

The Greek concordances are only for the New Testament: indeed we have one of Conr. Kircher's on the Old; but this is rather a concordantal dictionary than a concordance; containing all the Hebrew words in an alphabetical order; and underneath, all the interpretations or senses the LXX. give them; and in each interpretation, all the places where they occur in that version.

In 1713, Frommiius published his Greek concordance for the Septuagint at Amsterdam, in two volumes folio; and Schmidius, improving on a similar work of H. Stephens has given an excellent Greek concordance for the New Testament, the best edition of which is that of Leipzig, an. 1717.

Calasius, an Italian Cordelier, has given us concordances of the Hebrew, Latin, and Greek, in two columns: the first, which is Hebrew, is that of R. Mordecai Nathan, word for word, and according to the order of the books and chapters: in the other column is a Latin interpretation of each passage of Scripture quoted by R. Mordecai; this interpretation is Calasius's own; but in the margin he adds that of the LXX. and the Vulgate, when different from

his. The work is in four volumes folio, printed at Rome in 1621.

Of all the helps towards understanding the Hebrew Scriptures, says Dr. Geddes (Prospectus, p. 71.) a good concordance is undoubtedly the most useful. But we yet want a good concordance; and the man who should devote five or six years to the compiling of one from Buxtorf, Calasio, Noldius, Taylor, Kircher, Montfaucon, and Trinius, would do a singular service to biblical studies. Buxtorf's method of arrangement, with very little improvement, should be strictly followed; the errors of orthography rectified from the authority of manuscripts and other sources of emendation; and the various acceptations of the same word in the ancient versions exactly noted and methodically distinguished. Such a work would be worth all the commentaries that have ever been made.

We have several very copious concordances in English; as Newman's, &c. but the last and best esteemed is that in 4to. by Alex. Cruden.

CONCORDANT Elements, in Music, are the fourth (4^{th}) the major third (III) and the minor third (3^{rd}); see CONCORD. Dr. Smith considers the major tone (τ) the minor tone (ι) and the hemitone (ω) as elements; Harmonics, p. 13.

CONCORDANT Verses, such as have several words in common; but which, by the addition of other words, convey an opposite, at least, a different meaning. Such are these,

Et { *Canis* } in *silva* { *venatur* } *Somnia* { *servat*.
 { *Lupus* } { *nutritur* } { *vaflat*.

CONCORDAT, in the Canon Law, denotes a covenant, or agreement concerning some beneficiary matter, as a resignation, permutation, promotion, or the like.

The council of Trent, sess. vi. de reform. cap. 4. speaking of concordats made without the authority and approbation of the pope, calls them *concordias que tantum suos obligant auctores, non successores*. And the congregation of cardinals, who have explained this decree, declares also, that a concordat cannot be valid so as to bind successors, unless confirmed by the pope.

CONCORDAT is also used, absolutely, among the French, for an agreement concluded at Bologna in 1516, between pope Leo X. and Francis I. of France, for regulating the manner of nominating to benefices. The concordat serves in lieu of the pragmatic sanction, which has been abrogated; or, rather, it is the pragmatic sanction softened and reformed. The king went in person to the parliament to offer the concordat to be registered, and letters patent were made out, requiring all the judges and courts of justice to observe this act, and see it executed. The parliament, after deliberating a month upon this important matter, concluded not to register the concordat, but to observe still the pragmatic sanction, unless the former edict was received and established in as great an assembly as that was, which published the latter in the reign of Charles VII. And when, by violence and force, they were obliged to publish the concordat, they joined to the publication a solemn protest and an appeal from the pope to the next general council, into both which measures the university and the clergy entered with the greatest alacrity and zeal. But royal and papal despotism at length prevailed. The chancellor De Prat, who was principally concerned in promoting the concordat, has been generally regarded as an enemy to the liberties of the Gallican church. The illustrious and learned Hainault has defended his memory against this accusation, and justified the concordat as an equitable contract, and as a measure attended with fewer inconveniences, than the pragmatic

sanction. He observes, that by the king's being invested by the concordat with the privilege of nominating to the bishoprics and vacant benefices of the first class, many corruptions and abuses were prevented, which arose from the simoniacal practices that prevailed almost every where, while, according to the pragmatic sanction, every church chose its bishop, and every monastery its abbot. He observes moreover, that this nomination was the natural right of the crown, as the most considerable part of the great benefices had been created by the kings of France; and he particularly insists on this consideration, that the right which Christian communities have to chuse their leaders, cannot be exercised by such large bodies without much confusion and many inconveniences; and that the subjects, by entrusting their sovereign with the government of the state, invest him, *ipso facto*, with an authority over the church, which is a part of the state, and its noblest branch. The most specious objection that was made to the concordat was this: that, in return for the nomination to the vacant benefices, the king granted to the popes the annates, or first fruits, which had too long been complained of as an intolerable grievance. There is, however, no mention of this equivalent in the concordat. And it was by a papal bull that succeeded this compact, that the pontiffs claimed the payment of the first fruits, of which they had put themselves in possession in the year 1316, and which had been suspended by the pragmatic sanction.

As the concordat gave to the kings of France the absolute right of succeeding to all the great, or what are called the consistorial benefices, of the Gallican church; it was a very important edict. Since the establishment of the pragmatic sanction and of the concordat, the clergy of France in general (before the late Revolution) manifested less respect to the decrees of the papal court than the clergy of any other Catholic country. In all the disputes which their sovereign has had with the pope, they have almost constantly taken part with the former. Their independence on the court of Rome seems to have been principally founded on this act.

The concordat between the pope and the republic of Venice resembles the former.

There is also a German concordat, made between the emperor Frederic III. and the princes of Germany, in 1448, relating to beneficiary matters, confirmed by pope Nicholas V.

CONCORDAT, as it is now used in France, is a term that applies exclusively to an agreement or convention exchanged between the pope, Pius VII., and the French government, the 23d Fructidor, an. 9, or September the 16th, 1801. In this agreement the Roman catholic religion is acknowledged to be that of the majority of the French people; and the better to consolidate the reformation of its worship, which had been almost totally neglected since the year 1792, the pope engages not to disturb the proprietors or purchasers of estates, which, before the French revolution of 1789, belonged to the church; and he acknowledges in the first consul of the French government the same rights and prerogatives which the ancient government possessed. By virtue of the said concordat, the whole territory of European France is divided into ten archbishoprics; *viz.* Paris, containing eight bishoprics, Malines seven, Besançon five, Lyons four, Aix four, Toulouse five, Bourdeaux three, Bourges three, Tours seven, and Rouen four; and fifty bishoprics; *viz.* Troyes, Amiens, Soissons, Arras, Cambrai, Versailles, Meaux, Orleans, Namur, Tournay, Aix la Chapelle, Treges, Gand, Liege, Mayence, Autun, Metz, Strasbourg, Nancy, Dijon, Mende, Grenoble, Valence, Chambéry, Nice, Avignon, Ajaccio, Digne, Cahors, Montpellier, Carcassonne,

Carcassonne, Agen, Bajonne, Poitiers, La Rochelle, Angoulême, Clermont, Saint Flour, Limoges, Le Mans, Angers, Nantes, Rennes, Vannes, Saint Brioux, Quimper, Coutances, Bayeux, Siez, and Evreux. The nomination to the sees rests with the French government; the pope only confirms each nomination by his canonical institution, according to the forms anciently established with regard to the Gallican church, whose privileges and immunities continue in full force. The bishops, before they enter upon their functions, shall take before the first consul, in person, the oath of fidelity which was in use before the change of government, expressed in the following terms: "I swear and promise to God, upon the holy evangelists, to preserve obedience and fidelity to the government established by the constitution of the French republic. I also promise to have no correspondence, nor to assist at any council or cabal, either within the country or out of it, that shall be contrary to the cause of the public tranquillity; and if in my diocese, or elsewhere, I shall learn of any plot or machination prejudicial to the state, I shall inform the government of it." The clergy of the second order shall take the same oath before the civil authorities appointed by the government. The following prayer shall be recited at the end of divine service in all the Catholic churches of France:

Domine, salvam fac rempublicam!
Domine, salvos fac consules!

The bishops shall make a new division of parishes in their dioceses, subject to the consent of the government: the bishops shall name the curés, subject to the approbation of the government. The bishops may have a chapter in their cathedral, and a seminary in their diocese, but the government is not engaged to endow them. All the metropolitan, cathedral, parochial, and other churches, undivided of, shall be placed at the disposal of the bishops. The government engages to secure a suitable provision for the bishops and curés, whose dioceses and parishes shall be marked out by the new division. The allowance of the archbishops shall be 15,000 livres annually, and that of the bishops 10,000. Bishops may add to their titles the qualification of "citoyen," or "monseigneur." No man can be named a bishop but a Frenchman, aged at least 30 years, having an attestation of his morals delivered by a bishop, and after an examination of his doctrine by a bishop and two priests: nor shall bishops quit their sees without the permission of the first consul. Bishops are required to visit every year a part of their diocese, and the whole every five years. No clergyman shall be ordained as priest, who is not 25 years of age, and possessed of 300 livres annual revenue. The curés shall reside in their parishes; and priests, who do not regularly belong to any diocese, shall not officiate. The clergy in general shall wear black clothes; and the bishops violet coloured stockings. There shall be a liturgy and a catechism for the French church. The names of the days shall be as in the ancient calendar; and Sunday shall be the day of rest for the public functionaries; nor shall any other holidays, except Sundays, be kept without the consent of the government. The bells shall only be rung for divine service. The same temple shall be consecrated only to one form of worship. The nuptial benedictions shall be only given by the clergy to those who have been married by the civil officers.

With regard to the Protestant religion, no person shall exercise the ministerial functions but a Frenchman; nor shall the Protestant churches and their ministers have any connection with any foreign power. The ministers and their communities shall pray for the prosperity of the French republic, and the consuls. No doctrine, nor alteration of doctrine, shall be published or taught, without being first authorized

by the government. The maintenance of the ministers shall be provided for, wherever the property and oblations of the communities fall short. The articles for the liberty of foundations, in the organic laws of the Catholic worship, shall be common to the Protestant churches. There shall be two seminaries, one in the east of France, for the instruction of ministers of the confession of Augsburg; and the other at Geneva for the reformed churches. The professors are to be named by the first consul, and no minister to be appointed without a certificate of his having studied in the seminary of his religion. The regulations of the seminaries are to be settled by the government. The reformed churches of France shall have pastors, local consistories, and synods. There shall be a consistorial church for every 6000 souls of the same communion. Five consistorial churches shall form the district of a synod. The number of ministers or pastors in the same consistorial church cannot be increased without the authority of government; nor can the pastors resign without stating their motives to government, which shall approve or reject them. The title of election shall be presented to the first consul for his approbation. Each synod shall consist of a pastor and a notable of each church. The synods shall superintend the celebration of worship and conduct of ecclesiastical affairs, and all their decisions shall be submitted for the approbation of government. The synods cannot assemble until they shall have received the permission of government; nor shall any synodal assembly last more than six days.

The churches of the confession of Augsburg shall have pastors, local consistories, inspections, and general consistories. The pastors and consistorial churches shall be subject to the regulations prescribed for the reformed pastors and churches. The churches of this confession shall be subordinate to the inspections. Five consistorial churches shall form an inspection, which is to assemble only by permission of government. Each inspection to choose an inspector, and two laymen of such choice to be confirmed by the first consul. There are to be three general consistories; one at Strasburg, for the Protestants of Augsburg, of the departments of the Upper and Lower Rhine; a second at Mentz, for those of the departments of the Sarre and Mont-Tonnerre; and the third at Cologne, for those of the departments of the Rhine, Moselle, and Rour.

CONCORDAT *Militaire*, Fr., an agreement entered into by officers of the same corps, to establish a fund or provision for one of them that quitted it. This agreement, however, was only tolerated in particular cases and circumstances, to which the chiefs seemed to consent, without either openly, or with their signatures, giving their approbation to the same.

CONCORDIA, in *Ancient Geography*, a town of Italy, with the title of colony; placed by Ptolemy in the country of the Carpi, but by Pliny in that of the Veneti, between Pons Liguentis and Tlavemptus. Eutropius and the Itinerary of Antonine place it in Venetia. It took the name of *Julia*, because a colony had been sent thither by Julius Cæsar.—Also, a town of Spain, placed by Ptolemy in Lusitania, supposed to have been the present *Tomar*.—Also, a town and Roman fortress of Gaul, in Germania Prima, between Brocomagus and Noviomagus, according to the Itinerary of Antonine.

CONCORDIA, in *Geography*, a town of Italy, in the duchy of Mirandola, on the Secchia; 6 miles W. of Mirandola; between which cities there is a fine canal, which facilitates the communication of both.—Also, a town of Italy, in the country of Trulli; which, though in ruins, is the see of a bishop, who resides at Porto Gruato.

CONCOTS, a town of France, in the department of the Lot; 3 leagues S.S.E. of Cahors.

CONCOU, in *Botany*, a name given by the people of Guinea to an herb which is in great esteem with them for killing that troublesome sort of worm called the Guinea-worm, which breeds in their flesh. They bruise the leaves, and mixing them with oil, apply them in form of a cataplasm. The leaves of this shrub somewhat resemble those of the caggow, but they are thicker and stiffer, and are not so full of veins. They are broadest within one third of the base, and from thence they go tapering to each end. They are placed on long footstalks of a fine green throughout. Phil. Trans. N^o 232.

CONCOURS, in *Geography*, a town of France, in the department of the Aveyron, and district of Rhodéz; 7 miles N.N.E. of Rhodéz.

CONCOURSE, or CONCURRENCE, the reciprocal action of divers persons or things co-operating toward the same effect or end.

The schoolmen distinguish two kinds of concurrence; *viz.* mediate, which consists in giving a power or faculty to act; and immediate, which is a contemporary influence of one cause along with another, to produce an effect. Thus, the grandfather concurs mediately to the production of a grandson, as he originally gives the power of generating to the father; but the father concurs immediately with the mother to the production of the same child. With respect to the agency of God, some divines maintain both these kinds of concurrence; others deny the latter. See CAUSE.

CONCOURSE, *Point of*. See FOCUS.

CONCQUE, Fr. A piece of artillery, of which the bore is wider towards the muzzle than towards the breech. It is also the name of a shell, which the ancients made use of in their armies instead of a trumpet.

CONCRESSAUT, or CONCORSAUT, in *Geography*, a town of France, in the department of the Cher, on the Saudre, almost ruined by the civil wars; 25 miles N. of Bourges.

CONCRETE, in the *School Philosophy*, an assemblage, or COMPOUND.

CONCRETE, *Physical*, or a CONCRETE *body*, may denote any mixed body, or body composed of different principles; and consequently, all sensible bodies whatever, as all bodies arise from a coalition of divers elements, or at least of divers principles, matter, and form.

But, in strictness, concrete is only used for those compounds wherein the ingredients still retain their distinct natures, nor are wholly converted into any new common nature.

Authors distinguish *natural* concretes and *artificial* ones: antimony is a *natural* concrete, and soap a *fascitious* concrete.

CONCRETE *Juices*. See JUICES.

CONCRETE, *Logical*, or a CONCRETE *word*, called also *paronymum*, is that which has a compound signification, as denoting both the subject and some quality or accident of the subject, which gives it its denomination.

Such, *e. gr.* are *man, learned, white*; for *man* signifies as much as *having human nature*; *learned*, as much as *having learning*, &c. Hence, the word concrete is chiefly used to express the union of qualities or quantities with the bodies or subjects, without any separation, even in idea. The opposite term, whereby things are separated in thought, is *abstract*.

Concrete properly signifies a subject accompanied with its form or quality; as *pious, hard, white*: *abstract*, on the con-

trary, expresses the form and quality without the subject, as *piety, hardness, whiteness*.

CONCRETE *Numbers*. are those which are applied to express or denote any particular subject: as two men, three pounds, two thirds of a shilling, &c.

Whereas, if nothing be connected with a number, it is taken abstractedly or universally: thus, three signifies only an aggregate of three units; let those units be men, pounds, or what you please.

CONCRETION, the act whereby soft bodies are rendered hard; or an insensible motion of the particles of a fluid or soft body, whereby they come to a confluence.

The word is used indifferently for *induration, condensation, congelation, and coagulation*.

CONCRETION is also used for the coalition of several little particles into a sensible mass, called a CONCRETE; by virtue of which union, the body acquires this or that figure, and these or those properties.

CONCRETION, in *Surgery*, from *concretio*, the adhesion or joining together of parts. This term also denotes the impasting or cohering of substances together, so as to form a mass; as in the sanguineous concretion, the bilious or biliary concretion, the calculous concretion, &c. The coalescence of parts which ought to be separate, as of the fingers and eyelids, might be rather called agglutination or cohesion.

Membranes and other parts may adhere together, either from natural or accidental causes; but the most frequent cause of external concretions is an ulceration or abrasion of the skin, so that two surfaces lying in contact shall unite by inflammation and reciprocal granulation. In all such cases, where an operation is practicable and necessary, the surgeon must separate the united parts with a scalpel, and keep them asunder during the cure. See STONE and CALCULUS.

CONCUBINAGE sometimes expresses a criminal, or prohibited commerce between the two sexes; in which sense it comprehends *adultery, incest, and simple fornication*.

Promiscuous concubinage is productive of a great variety of evils, and tends not only to the corruption, but to the ultimate destruction, both of individuals and of society. It is not only ineffectual to promote love, and the tender affections, either between persons themselves, or towards their offspring, but it contributes towards exciting and maintaining endless jealousies and quarrels among mankind. The great and radical mischief attending unrestrained promiscuous concubinage in a state of society, consists in its tendency to diminish marriages, and thus to defeat the several beneficial purposes resulting from this institution. (See MARRIAGE.) It discourages marriage by weakening the force of a very urgent motive and temptation to it, arising from the intention of the original former of mankind, and the constitution of human nature. "The male part of the species," says Dr. Paley, "will not undertake the incumbrance, expense, and restraint of married life, if they can gratify their passions at a cheaper price; and they will undertake any thing rather than not gratify them."

A just idea may be formed of the magnitude of this mischief, by attending to the importance and variety of the uses to which marriage is subservient; and by duly considering that the malignity and moral quality of each crime are not to be estimated by the particular effect of one offence, or of one person's offending, but by the general tendency and consequence of crimes of the same nature. The libertine may not be conscious that those irregularities hinder his own marriage; from which, as he may allege, he is deterred by different considerations; nor may he perceive, or be disposed to acknowledge, that his indulgences hinder the marriage of others;

others; but it behoves him to reflect, what would be the consequence of universal licentiousness in this respect, and what should prevent its becoming universal, if it be innocent or allowable in him. Moreover, fornication supports prostitution; and prostitution entails on its victims almost certain misery, occasioned by the indigence, disease, and infamy, to which these wretched outcasts of society, who infect populous cities, are subject; the whole aggregate of which is a general consequence of fornication, and to the increase and continuance of which, every act and influence of fornication contribute. Besides, fornication promotes habits of ungovernable lewdness, which introduce the more aggravated crimes of seduction, adultery, violation, &c.; to which we may add, in this connection, that the criminal commerce of the sexes depraves the mind and moral character more than any single species of vice whatsoever; these indulgences prepare an easy admission for every other crime: in low life, they are usually the first stage in men's progress to the most desperate villainies; and, in high life, to that lamented dissoluteness of principle which manifests itself in a profligacy of public conduct, and a contempt of the obligations of religion and moral probity. Habits of libertinism also incapacitate and indispose the mind for all intellectual, moral, and religious pleasures, which would very much contribute to every man's happiness.

It deserves further to be considered, that fornication perpetuates a disease, which may be accounted one of the severest maladies of human nature; and the effects of which are said to contaminate the constitution of even distant generations. This dreadful malady, the severest scourge, says Dr. Robertson, (*Hist. of America*, vol. ii. p. 87), with which, in this life, offending Heaven chastens the indulgence of criminal desires, seems to have been peculiar to the Americans; and he adds, that by communicating it to their conquerors, they have not only amply revenged their own wrongs, but by adding this calamity to those which formerly embittered human life, they have, perhaps, more than counterbalanced all the benefits which Europe has derived from the discovery of the New World.

Dr. Hartley, in his "Observations on Man," (p. 443), remarks, that the shameful, loathsome, and often fatal disease, which peculiarly attends the vice of lewdness, may be considered as a most unquestionable evidence of the Divine Will. This disease, with all its consequences, would soon cease among mankind, could they be brought under the restraints of lawful marriage; but must ever continue, whilst licentiousness continues. Without this check, however, the licentiousness which has always been observed to follow improvements in arts and politeness, and to attend upon bodies politic in their declension, and which the corruption of the Christian religion in some, and the disbelief of it in others, have, in a manner, authorized, would have brought on utter dissoluteness in this western part of the world, such as would have been inconsistent with the very existence of regular government. Nay, it may be, that this will fill be the case, and that we are hastening to our period, through the great wickedness of the world in this respect particularly, though our lives, as a body politic, be somewhat prolonged by this correction.

If we appeal to the Christian scriptures on the subject of this article, it is certain that these sacred writings condemn fornication absolutely and peremptorily, and that they class this crime with murders, thefts, false witness, and blasphemies. Besides, the aggravated sin of idolatry is represented by adultery and fornication in the prophetic writings. Although the scriptures give no sanction to those austerities which have been imposed upon the world under the name of

Christianity, as the celibacy of the clergy, the practice of perpetual virginity, the "prohibitio concubitus cum gravidâ uxore;" yet, with a just regard to the condition and interest of the human species, they have provided, by the marriage of one man with one woman, an adequate gratification for the propensities of their nature, and have *refrained* them to that gratification. The avowed toleration, and in some countries the licensing, taxing, and regulating of public brothels (see *BLVDY HOUSE*), have appeared like a sanction of fornication, and have contributed, with other concurring causes, so far to vitiate the public opinion, that there is no practice, the immorality of which is so little thought of or acknowledged, although there are few in which it can be more easily and more satisfactorily evinced. The legislators who have patronized spectacles of prostitution ought to have foreseen this effect, and also to have considered, that whatever facilitates fornication, diminishes marriage. As to the usual apology for this relaxed discipline, the danger of greater enormities if access to prostitutes were too strictly watched and prohibited, "it will be time enough," says Dr. Paley, "to look to that, when the laws and magistrates have done their utmost." After all, these fears are without foundation in experience. The men are in all respects the most virtuous, in countries where the women are the most chaste.

In its more refrained sense, concubinage is used for a man's and a woman's cohabiting together in the way of marriage without having passed the ceremony thereof.

This species of cohabitation is, without doubt, distinguishable from vagrant concubinage, and by reason of its resemblance to marriage, may be thought to participate of the sanctity and innocence of that state. In modern phrase, it is denominated "the keeping of mistresses," under the supposed favourable circumstance of mutual fidelity. For this practice the following kind of apology has been sometimes alleged:

"That the marriage rite being different in different countries, and in the same country among different sects, and with some, scarcely any thing; and, moreover, not being prescribed or even mentioned in scripture, can be regarded only as a form or ceremony of human invention; and that, consequently, if a man and woman betroth and confine themselves to each other, their intercourse must be the same, as to all moral purposes, as if they were legally married; for the addition or omission of that which is a mere form and ceremony can make no difference in the sight of God, or in the actual nature of right and wrong."

To this specious sort of reasoning, archdeacon Paley has replied:

1. If the situation of the parties be the same thing in marriage, why do they not marry? 2. If the man choose to have it in his power to dismiss the woman at his pleasure, or to retain her in a state of humiliation and dependence inconsistent with the rights which marriage would confer upon her, it is not the same thing. 3. It is not at any rate the same thing with respect to the children. Moreover, as to the marriage rite being a mere form, and that also variable, the same may be said of signing and sealing of bonds, wills, deeds of conveyance, and the like, which yet make a great difference in the rights and obligations of the parties concerned in them. And with respect to the rite not being appointed in scripture, the scriptures forbid fornication, that is, cohabitation without marriage, leaving to the law of each country to pronounce what is, or what makes, a marriage; in like manner as they forbid theft, that is, the taking away of another's property, leaving it to the municipal law to fix what makes the thing property, or whose it is, which also,

as well as marriage, depends on arbitrary and mutable forms. Independently of the injunctions of scripture, the plain account of the question seems to be this; it is immoral, because it is pernicious, that man and woman should cohabit, without undertaking certain irrevocable obligations, and mutually conferring certain civil rights: if, therefore, the law has annexed these rights and obligations to certain forms so that they cannot be secured or undertaken by any other means, which is the case in this instance (for whatever the parties may promise to each other, nothing but the marriage ceremony can make their promise irrevocable), it becomes in the same degree immoral, that men and women should cohabit without the interposition of these forms. Paley's Principles of Moral and Political Philosophy, vol. 1. b. 3. c. 2.

Concubinage was anciently tolerated: the Roman law calls it an allowed custom, *licita consuetudo*. When this expression occurs in the constitutions of the Christian emperors, it signifies what we now call a "marriage in conscience."

The concubinage tolerated among the Romans in the time of the republic, and of the heathen emperors, was that between persons not capable of contracting marriage together: nor did they even refuse to let inheritances descend to children which sprung from such a tolerated cohabitation.

Concubinage between such persons they looked on as a kind of marriage, and even allowed it several privileges: but then this concubinage was confined to a single person, and was of perpetual obligation, as much as marriage itself. Hottoman observes, that the Roman laws had allowed of concubinage long before Julius Cæsar made that law whereby every one was allowed to marry as many wives as he pleased. The emperor Valentinian, Socrates tells us, allowed every man two.

CONCUBINAGE is also used for marriage performed with less solemnity than the formal marriage; or a marriage with a woman of inferior condition, and to whom the husband does not convey his rank, or quality.

Cujas observes, that the ancient laws allowed a man to espouse, under the title of concubine, certain persons, such as were esteemed unequal to him, on account of the want of some qualities requisite to sustain the full honour of marriage. He adds, that though concubinage was beneath marriage, both as to dignity, and civil effects; yet was concubine a reputable title, very different from that of *mistresses* among us.

The commerce was esteemed so lawful, that the concubine might be accused of adultery in the same manner as a wife.

This kind of concubinage is still in use in some countries, particularly in Germany, under the title of a *half-marriage*, *morgengabig marriage*, or *marriage with the left hand*; alluding to the manner of its being contracted, *viz.* by the man's giving the woman his left-hand instead of the right.

This is a real marriage, though without solemnity: the parties are both bound for ever; though the woman be thus excluded from the common rights of a wife, for want of quality or fortune.

The children of concubines were not reputed either legitimate or bastards, but natural children, and were capable only of donations.

They were deemed to retain the low rank of the mother; and were on this ground unqualified for inheriting the effects of the father.

CONCUBINAGE, in a *Legal Sense*, is used as an exception

against her that sueth for dower, alleging thereby, that she was not a wife lawfully married to the party, in whose lands she seeks to be endowed, but his concubine. Brit. c. 107. Braët. lib. iv. tract. 6. cap. 8.

CONCUBINE, a woman whom a person takes to cohabit with him, in the manner, and under the character, of a wife, without being authorized thereto by a legal marriage.

CONCUBINE is also used for a real, legitimate, and only wife, distinguished by no other circumstances but a disparity of birth or condition between her and the husband. Du-Cange observes, that one may gather from several passages in the epistles of the popes, that they anciently allowed of such concubines. The seventeenth canon of the first council of Toledo declares, that he, who with a faithful wife keeps a concubine, is excommunicated; but that if the concubine served him as a wife, so that he had only one woman, under the title of concubine, he should not be rejected from communion: which shews that there were legitimate wives under the title of concubines.

In effect, the Roman laws did not allow a man to espouse whom he pleased; there was required a kind of parity, or proportion, between the conditions of the contracting parties; but a woman of inferior condition, who could not be espoused as a wife, might be kept as a concubine; and the laws allowed of it, provided the man had no other wife.

It is certain the patriarchs had a great number of wives, and that these did not all hold the same rank; some being subaltern to the principal wife; which were what we call concubines, or half-wives. The Romans prohibited a plurality of concubines, and only had regard to the children issuing from a single concubine, because she might become a legitimate wife. Solomon had 700 wives, and 300 concubines: the emperor of China has sometimes two or three thousand concubines in his palace. Q. Curtius observes, that Darius was followed in his army by 365 concubines, all in the equipage of queens; and Diodorus Siculus says, that he maintained as many as the days of the year. Artaxerxes had by his concubines 115 children. The concubines were introduced to the Persian king, each in her turn; whence some have concluded, that the ancient Persian year consisted of 365 days, since several of the Persian monarchs had this number of concubines, who went to their kings in constant courses.

CONCUPISCENCE, among divines, an irregular desire, appetite, or lust after carnal things, inherent in human nature.

The dominion or prevalence of concupiscence, according to F. Malebranche, is what we call original sin.

The origin of concupiscence he ascribes to those impressions made on the brain of our first parents at their fall; which are still transmitted and continued on those of their children; for as animals produce their like, and with like traces in the brain (whence the same sympathies and antipathies in the same kind; and whence the same conduct on the same occasions); so our first parents, after their fall, received such deep traces in the brain, by the impression of sensible objects, that they might well be supposed to communicate them to their children.

The schoolmen use the term *concupiscible appetite* for the desire we have of enjoying any good; in opposition to *irascible appetite*, whereby we eschew what is evil.

CONCURRENCE. See CONCOURESE.

CONCURRING, or CONGRUENT Figures, in Geometry, such as, being laid upon one another, do exactly correspond to, and cover one another, and consequently must

CONCUSSION.

must be equal among themselves. Thus, triangles having two sides and the contained angle equal each to each, appear to be equal to one another in all respects. See CONGRUITY.

CONCUSSION *crimen repetundarum*, in *Jurisprudence*, is the abuse of power by some person entrusted with a public commission or employment; by extorting money from those under his power or command. This crime is taken notice of in the heads of the Digest, or Code—*ad legem Juliam repetundarum*; and it is to be observed, that he who gave a bribe contrary to the oath he had taken, might be prosecuted as well as the receiver: and that the judge who was corrupted was deemed guilty of concussion, as much as he who purchased property which was in a course of litigation. The magistrates were even forbidden to acquire any thing by way of purchase, donation, or otherwise, in the provinces wherein they resided, under pain of being guilty of concussion.

The crime of concussion was not ranked in the number of public offences, except when committed by a magistrate; when committed by a person of inferior station, it was only a private crime; but it is not the quality of the person which renders the crime public or private, but the nature of the crime itself.

CONCUSSION, in *Surgery*, from *concutio*, a shaking together. This term is mostly applied to a violent commotion of the body, and especially of the brain; but a concussion of the nervous system in general, or of the spinal marrow in particular, may produce the same train of symptoms in a partial degree, as a commotion of the brain does in the whole body. A concussion of the brain may be occasioned not only by blows on the head, but also by violence inflicted upon other parts of the body. It is frequently occasioned by a fall upon the thighs when stretched out straight, or upon the breech; it is also observed in cases of contusion of the face, and fractured bones, occasioned by a fall from a considerable height, in gun-shot wounds attended with a splintering of the bones, and, in general, in every case of external violence attended with considerable commotion of the whole body. However, from whatever cause it may arise, it always requires surgical treatment.

Most of the symptoms attending compression of the brain occur also in concussion; but in a compressed state of the brain they are more permanent. See COMPRESSION.

There is no discharge of blood from the eyes, nose, or ears, which frequently happens in compression; and instead of that apoplectic stertor in breathing which accompanies compression, the patient seems to be in a sound and natural sleep. The pulse is irregular and slow in compression, and grows stronger and fuller by blood-letting; but in concussion it is weaker, being soft and equal, and sinks by blood-letting. There are besides, convulsions in compressions, which are not observed in a state of concussion. The symptoms arising from concussion come on immediately after the injury is received. In the violent degrees of these, the patient remains quite insensible; the pupils are much dilated, and do not contract though the eyes be exposed to the strongest light.

In more violent accidents, especially when the patient is rendered insensible, it is extremely difficult to distinguish between concussion and depression; for symptoms which have been supposed to arise entirely from concussion, have, after death, been found to be owing to extravasation or undiscovered fracture; and extravasation has been blamed, when, on dissection, not the least morbid appearance could be discovered.

The symptoms consequent upon concussion of the brain

are various, in proportion to the different degrees of the violence inflicted. In its slightest degree, it produces stupor and inclination to sleep, debility of the intellectual and corporeal faculties, insensibility, or paralysis of some particular part. In the second degree, the patient lies without sensation and motion in a state of profound coma, from which he cannot be roused. But at the same time he is generally restless, tosses about, speaks much in his sleep, sometimes looks up, flares wildly, raves, is affected with convulsions, and generally his pulse betokens irritation. In the third degree, death supervenes, either immediately, or as the symptoms increase in violence.

These symptoms, however, are not always of the same nature and origin, and therefore require different methods of treatment. Thus the blood-vessels of the brain may be weakened in consequence of the violence inflicted; the blood may be preternaturally accumulated in them, and dilate them, to which sometimes also a congestion in the head contributes. Sometimes, also, the external violence acts upon the substance of the brain itself and the whole nervous system, either by the irritation or by the debility and paralytic state which it induces: in the first of these cases spasmodic affections, restlessness, want of sleep, or come attended with delirium and convulsions, are observed, and in the second the patient is thrown into a state similar to syncope.

Before the external violence has been inflicted, it may happen that the patient may have been in a state of great anxiety and fear, and he may have been greatly terrified by the danger whilst it was still impending, in which cases the consequences of these violent emotions of the mind, may be mistaken for effects of a concussion of the brain. The patient is in a very different state when the injury has been inflicted whilst he was intoxicated, or in anger, or when his stomach was full. Not unfrequently also some of the symptoms proceed from lesions of other parts of the body more remote from the head, or from collateral causes, especially from inflammatory, and bilious complaints in the viscera; which frequently produce not only a determination towards the head, but also various other symptoms indicative of irritation.

All these symptoms the surgeon must take into mature consideration, in order to be able to form a proper judgment concerning the state of the patient in whom he discovers symptoms of concussion of the brain. These symptoms are commonly of a fourfold nature; that is, they are symptoms indicative of compression of the brain, and arise from the congestions in the vessels; or they are symptoms of debility and inactivity of the concussed nervous system; or they are symptoms of irritation in the nervous system; or finally, they are consequences of preternatural irritating causes in the abdominal viscera. Commonly the symptoms belonging to each of these four different heads are combined; but frequently those of one class are more violent than those of the rest, and to this circumstance the surgeon must especially attend in regulating his method of treatment.

With respect to the cure, much also depends upon making the proper distinction between the symptoms of concussion and those of extravasation. In many cases this may easily be done; for the symptoms of concussion come on immediately after the violence has been inflicted, whilst those of extravasation generally supervene within a longer or shorter time after. This criterion is however not always to be depended upon, nor discoverable in every case; for when the patient was alone at the time when the accident happened, and is now deprived of his senses, the surgeon cannot

ascertain whether the symptoms followed the accident immediately.

If the symptoms abate after the use of antiphlogistic remedies, such as blood-letting, evacuations, glysters, washing with cold water, &c. they ought to be continued; but in the contrary case, they are to be relinquished and an opposite method of treatment adopted. The effects of blood-letting alone sometimes form an important criterion; for in cases of concussion of the brain it frequently lowers the pulse to a great degree, nay, even aggravates the symptoms; whilst in extravasations, even though it be frequently repeated, it produces a far less decided effect upon the pulse, and frequently alleviates the symptoms:

Amongst the various remedies that have been recommended in concussions of the brain, blood-letting is most generally employed; but it ought to be moderate. Topical detraction of blood from the head has sometimes been found useful. Purgatives are always very serviceable, but in general it is necessary to administer them in large and repeated doses. Still more beneficial are emetics, and amongst these tartar emetic and vitriolated zinc commonly prove the most efficacious; though, on account of the insensibility of the patient, they must usually be administered in very large doses, in order to produce their effect. Many recommend also stimulating glysters, and various other stimulating remedies; such as the volatile alkalis, blisters applied to the head, and it is affirmed that some have even administered wine internally with the best effects. Cold fomentations are here particularly useful, as they are adapted to all cases, as are likewise all the remedies usually employed in syncope. Where there are symptoms of irritation, spasms, and convulsions, antispasmodics are frequently found to produce great benefit; and in these cases Dover's powder is particularly recommended. Before using it, the warm bath, and when the patient is plethoric, blood-letting is prescribed. This remedy must be continued as long as the symptoms remain, and it must be repeated when they return. Also a mixture of three parts of Vin. Antimonii and one part Tinct. Theb. given in doses of ten drops every four hours, is found very useful. The use of laudanum alone has sometimes removed the symptoms of concussion.

Notwithstanding that all the above mentioned remedies stand recommended by authentic experience, yet as they are so opposite to each other in their properties, it cannot possibly be advisable to prescribe them all together, or any single one in all cases; and the surgeon has therefore in every single case to choose those remedies that are particularly adapted to remove the most urgent symptoms of the disease. Thus, when the symptoms of preternatural repletion of the vessels of the brain are urgent, he must employ blood-letting, cold fomentations, evacuations, and glysters; to the latter of which it has been particularly recommended to add powder of squills: when the urgent symptoms are those of debility bordering on syncope, he may use volatile alkali, wine, epispastics, cold fomentations, emetics, and other tonic remedies; when the spasmodic symptoms are the most prominent, Dover's powder, Tinct. Antimon. and laudanum; when the symptoms of bilious effusions prevail, emetics and purgatives.

As there is always reason at first to suspect an accumulation of blood, and to apprehend inflammation, it will almost always be advisable first to draw blood, unless it should be contraindicated by any peculiar symptoms. Stimulants and tonics will produce more benefit after the symptoms have continued for some time, than if administered at the beginning. If after the first or second blood letting, the pulse sinks whilst the other symptoms remain the same, or

are even aggravated, it ought not to be perfited in, but a contrary mode of practice is to be attempted. We may expect advantage from blood-letting, purgatives, and emetics, when the pulse is full, hard, and quick; from antispasmodics, when it is small and hard; and from stimulant and tonic remedies, when it is small and soft. Neutral salts, gentle purgatives, and blood-letting, may be employed when the patient is strong, vigorous, plethoric, and fluid; stimulant antispasmodics, when he is weakly, very irritable, pale, and cold.

Finally, we must also attend to the state in which the patient has been before the injury: should he have received it whilst in a state of intoxication, cooling evacuations, and blood letting are necessary; if he has received it whilst his stomach was full, or whilst in a paroxysm of anger, emetics and purgatives are indicated; if whilst under the influence of great fear or apprehension, tonic and antispasmodic remedies will be proper. Moreover, the head of the patient must be carefully guarded against all motion and concussion during the course of the cure.

Should the patient recover under the use of the above-mentioned remedies, he must still for some time after carefully avoid all commotion of the head, and whatever tends to accelerate the circulation, as anger, wine, violent bodily exercise; it is also proper to continue still for some time, to wash or bathe the head in cold water; and sometimes to take tonic remedies, such as Peruvian bark, acid of vitriol, &c. When the patient, though in other respects recovered, still continues to labour under debility or paralysis of particular parts, these complaints may sometimes be removed by the continued use of internal and external tonics and stimulants, especially volatile alkali, emetics, blisters, electricity, &c. But when the symptoms increase in spite of the most careful treatment, the surgeon is authorized, especially when the diagnosis is doubtful, to suppose an extravasation, and to trepan the part that has been injured. And supposing even that the surgeon has drawn a false conclusion, the operation of the trepan, if skillfully performed, will do no harm, nay, may even in some instances be productive of benefit, in consequence of the discharge of blood which it occasions.

On this important subject Mr. Abernethy's observations deserve particular attention. He is of opinion that the effects of concussion have not been justly described by authors, nor the symptoms related by them those which usually occur. In his Surgical Essays, he, therefore, selects two cases out of many others, in order to shew what really are the common consequences of this injury named concussion.

"The whole train of symptoms following a concussion of the brain," says he, "may, I think, be properly divided into three stages. The first is, that state of insensibility and derangement of the bodily powers which immediately succeed the accident. While it lasts, the patient scarcely feels any injury that may be inflicted on him. His breathing is difficult, but, in general, without stertor; his pulse intermitting, and his extremities cold. But such a state cannot last long; it goes off gradually, and is succeeded by another, which I consider as the second stage of concussion. In this, the pulse and respiration become better, and though not regularly performed, are sufficient to maintain life, and to diffuse warmth over the extreme parts of the body. The feeling of the patient is now far restored that he is sensible if his skin be pinched; but he lies stupid, and inattentive to slight external impressions. As the effects of concussion diminish, he becomes capable of replying to questions put to him in a loud tone of voice, especially when they refer to his chief suffering at the time, as pain in the head,

head, &c. otherwise, he answers incoherently, and as if his attention was occupied by something else. As long as the stupor remains, the inflammation of the brain seems to be moderate; but as the former abates, the latter seldom fails to increase; and this constitutes the third stage, which is the most important of the series of effects proceeding from concussion.

"These several stages vary considerably in their degree and duration; but more or less of each will be found to take place in every instance where the brain has been violently shaken. Whether they bear any certain proportion to each other or not, I do not know. Indeed this will depend upon such a variety of circumstances in the constitution, the injury, and the after treatment, that it must be difficult to determine.

"With regard to the treatment of concussion, it would appear, that in the first stage very little can be done; and perhaps, what little is done, had better be omitted, as the brain and nerves are probably insensible to any stimulants that can be employed. From a loose, and, I think, fallacious analogy between the insensibility in fainting, and that which occurs in concussion, the more powerful stimulants, such as wine, brandy, and volatile alkali, are commonly had recourse to, as soon as the patient can be got to swallow. The same reasoning which led to the employment of these remedies in the first stage, in order to recal sensibility, has given a kind of sanction to their repetition in the second, with a view to continue and increase it.

"But here the practice becomes more pernicious, and less defensible. The circumstance of the brain having so far recovered its powers, as to carry on the animal functions in a degree sufficient to maintain life, is surely a strong argument that it will continue to do so, without the aid of means which probably tend to exhaust parts already weakened by the violent action they induce.

"And it seems probable that these stimulating liquors will aggravate that inflammation which must sooner or later ensue. The access of it, in the cases which I have related, is sufficiently evident; and its cure is to be effected by the common methods. The great benefit of evacuations was, in those cases, very evident."

After some further remarks in opposition to the cordial plan of treatment, and the relation of a fatal case of simple concussion, in which that system would have been manifestly hurtful, Mr. Abernethy adverts to the very desirable object of pointing out the marks by which we may distinguish between compression and concussion of the brain; for these, he apprehends, may in general be distinguished.

"As far as my observation goes," says he, "the insensibility is much less in concussion, especially after a short time has elapsed. Patients in this case, though they seem reluctant to answer questions, yet complain much if their heads are moved; and in those instances where it was judged necessary to inspect the bone, I have generally found they made great complaint during the operation. The pupils also are usually more contracted than in compression of the brain, the muscles of the limbs retain their natural state of tone, and respiration is performed with little or no stertor, though the pulse generally intermits in a very considerable degree. In the slighter cases of concussion, the sickness of the patient is often very great.

"But, in cases of compression of the brain, circumstances very much the reverse of those just related take place; the sensibility is much diminished in proportion to the degree of the injury; from this cause also the pupils are dilated, and the limbs relaxed; the respiration is attended with stertor; and the pulse is subject to much less intermission."

COND, CON, or CONN, in *Sea Language*, signifies to guide or conduct a ship in her right course.

He that conds her, stands aloft with a compass before him, and gives the word of direction to the man at the helm how he is to steer. See **STEERING**.

If the ship go before the wind, or, as they call it, be-tween the sheets, the word is either *starboard*, or *port the helm*; according as the conder would have the helm put to the right or left side of the ship, upon which the ship always goes the contrary way.

If he says, *helm a mid/ship*, he would have the ship to go right before the wind, or directly between her two sheets.

If the ship sail by wind, or on a quarter wind, the word is, *aloof, keep your luff, fall not off, wear no more, keep her to, touch the wind, have a care of the lee-latch*: all which expressions are of the same import, and imply that the steersman should keep the ship near the wind.

On the contrary, if he would have her sail more large, or more before the wind, the word is, *ease the helm, no near, bear up*.

If he cries *steady*, it means, keep her from going in and out, or making yaws (as they call it), howsoever the sail, whether large or before a wind; and when he would have her go just as she does, he cries *keep her thus, thus, &c*

CONDA, or KOND, signifies fortrefs, and often occurs as a termination of words in the fourth part of India, in this sense, as *colta* and *cote*, which have the same signification, do in the north.

CONDABORA, in *Ancient Geography*, a town of Spain, placed by Ptolemy in Celtiberia.

CONDALIA, in *Botany*, Cavanilles, Icon. tab. 525. Clafs and order, *pentandria monogynia*. Nat. Ord. *rubrami*.

Gen. Ch. Cal. one-leafed, with five lanceolate divisions, permanent. Cor. none. Stam. five. Pijl. Germ superior, egg-shaped, surrounded by the glandular disk of the calyx; style one; stigma emarginate. Peric. Drupe egg-shaped; nut one-celled.

Sp. C. *parvifolia*. A shrub. Branches numerous, spinous. Leaves small, egg-shaped, acute, clustered in the axils of the spines. Flowers yellowish, very small, axillary. Ruiz and Pavon, in their Flora Peruvienfis, have given the same name to another genus, consisting of some herbaceous plants discovered by them in Peru. Clafs and order, *tetrandria monogynia*.

Gen. Ch. Cal. one leafed, four-toothed, permanent. Cor. monopetalous, funnel-shaped; tube inflated; border with four lanceolate divisions. Stam. four, very short. Pijl. Germ inferior; style bifid. Peric. Berry egg-shaped, crowned by the calyx, hollow, spongy, two-celled. Seeds several, attached to a pedicelled receptacle, adnate to the interior of the partition.

CONDALUS, in *Antiquity*, a kind of ring usually worn by slaves.

CONDAMINE, CHARLES-MARIE DE LA, in *Biography*, a celebrated traveller. was born at Paris in the year 1701. In early life he distinguished himself as a military man; but quitting the profession of arms for the purpose of indulging a laudable curiosity, and a thirst for natural science, he diligently surveyed all the countries bordering on the coasts of the Mediterranean, and travelled into various parts of Lesser Asia, Egypt, and Turkey. He was elected a member of the Academy of Sciences, and proposed a voyage to the equator, in order to measure a degree of the meridian. In 1736 he went, with other mathematicians, to Peru for this purpose, and exhibited the greatest assiduity and skill in accomplishing the work. On his return he descended the celebrated river of the Amazons; in this enterprize

he suffered many hardships, which were, however, more than requited by the instruction, which regions so remote, and so fruitful of the wonders of nature, afforded him. Here he compared the number of vibrations made by the same pendulum, which he had used at Paris, at Quito, and other places, and he found that for 100,000 vibrations at Paris, 68,770 were made by the same pendulum at the side of the Amazon, 68,740 at Quito, and 68,720 on Pinchincha. He published in the year 1745 an account of his travels, under the title of "Relation Abrégée d'un Voyage fait dans l'Intérieur de l'Amérique Méridionale;" and in 1751, a "Journal du Voyage fait par Ordre du Roi à l'Équateur, avec un Supplément, en deux Parties." Condamine, after a short residence at home, went to Italy, where he was honoured with the particular notice of the pope, who granted him a dispensation to marry his own niece. In 1762 he published some remarks on what he had seen in his tour through Italy. He then visited England, and, among other interesting objects, he became warmly attached to the new practice of inoculation for the small-pox. On his return he published in two volumes "Mémoires et Lettres sur l'Inoculation." About this period he was elected member of the French Academy of Belles Lettres; he likewise received the same honour from several foreign learned societies, as those of London, Petersburg, Berlin, and Bologna. He died in February 1774, in consequence of an operation for the hernia. "The acquisitions of M. de la Condamine," says one of his biographers, "were more extensive than profound; and he possessed rather an ardour for making researches on a variety of subjects, than patience completely to investigate any." *Nouv. Dict. Hist. Gen. Biog. See also the article BOUGUER.*

CONDANORE, in *Geography*, a town of Hindoostan, in the country of Golconda; 15 cosses E. of Adoni. N. lat. 15° 40'. E. long. 78°.

CONDAPILLY, a town of Hindoostan, and capital of a circar of the same name, near the bay of Bengal; 142 miles S.E. of Hydrabad. N. lat. 16° 40'. E. long. 80° 40'.

CONDAPILLY, a circar of Hindoostan, bounded on the N.E. by the circar of Ellore, on the S.E. by the bay of Bengal, on the S.W. by the river Kistnah, which divides it from Guntoor, and on the N.W. by the country of Golconda; about 60 miles long and 25 broad.

CONDATCHY, a bay of Ceylon in the East Indies, lying on the west side of the island, six miles southward from Arippo, and about 12 miles from Manaar. N. lat. 8° 45'. E. long. 80°. In this bay all the boats are collected for the pearl-fishery. The bay forms nearly a half-moon; the beach which surrounds it is an extensive sandy waste, with only a few miserable huts scattered along the shore between the bay and the woods which skirt the beach. Such is the appearance which this bay presents at most seasons of the year; but during the fishery the scene is entirely reversed. At that time the bay is crowded with small vessels, and the beach presents an astonishing multitude of people from every quarter of India. The principal bank for the fishery is opposite to Condatchy, and lies out at sea about 20 miles. See PEARL-Fishery.

CONDATE, in *Ancient Geography*, an appellation, probably of Celtic original, bearing relation to the idea of *Confluent*, and giving name to several towns, such as follow.

CONDATE, or REDONES, *Rennes*, a town of Armenia, the capital of the Redones, according to Ptolemy.—Also, *Montreau*, a town of Gaul, between Melodunum and Agedinnium, which afterwards bore the name of Monactiolum.—Also, *Combe*, a place of Gaul between Noviomagus

and Darocasses.—Also, *Cone*, a town of Gaul, between Nevirnum and Brivodurum.—Also, *Coignac*, a town of Gaul, between Medio anum Santonum and Velu na, according to the table of Peutinger.—Also, a place of the isle of Albion, between Manucium or Manchester and Deva or Chester in, Antonine's Itinerary; generally placed at Congleton; but Mr. Horsley hath made it very probable that it was somewhere near Northwich.

CONDAT-EN-FERRIERES, in *Geography*, a town of France, in the department of the Tarn; 10 miles N. of Murat.

CONDATOMAGUS, in *Ancient Geography*, a place of Gaul, marked in the Peutingerian table between Ségodunum and Luteva.

CONDAVIR, in *Geography*, a fortified place of Hindoostan, and a principal post in the circar of Guntoor; strongly situated on a mountain, eight cosses to the west of Guntoor, and ten from the bank of the Kistnah. Not far from Condavir is Colore, a diamond mine on the southern bank of the Kistnah. Condavir is distant S. E. from Hydrabad 131 miles; from Madras 276 miles; from Nagpouur, S. 385 miles; and N. E. from Seringapatam 414 miles.

CONDE, LEWIS I. *De Bourbon*, in *Biography*, was the son of Charles of Bourbon, duke of Vendome, and born in 1530. He distinguished himself when very young at the battle of St. Quintin, and behaved with great gallantry till the death of Henry II, when he became a leader of the Huguenots. He was accused of having been the principal contriver of the conspiracy of Amboise, but, in the presence of the king, he vindicated his honour with all the intrepidity natural to him, and offered to maintain his innocence in single combat against his accuser. He was set at liberty, but engaging in another plot, he was condemned by his judges to have his head struck off on a scaffold before the king's apartment. To the sudden death of the sovereign he was indebted for his freedom a second time; he now openly put himself at the head of the Huguenots, and was admitted, with Admiral Coligny, to share their full confidence. After many and very important instances of success, he was wounded and taken prisoner in the battle of Dreux in 1562. At the battle of Jarnac 1569, he encountered the enemy with his arm in a scarf, and as he marched to the attack, the horse of his brother-in-law reared and broke his leg; superior however to this painful accident, he thus addressed his followers: "Nobility of France, know, that the prince of Condé, with an arm in a scarf, and broken leg, fears not to give battle, since you attend him." The village of Jarnac has been rendered memorable by the courage and constancy with which the Huguenots disputed the day; but their leader Condé, exhausted with fatigue, was surrounded and taken prisoner. Those to whom he had yielded his sword, had placed him at the foot of a tree, when Montsieu, captain of the duke of Anjou's guards, shot him dead, in cold blood, in revenge of a private quarrel. This savage, and truly infamous deed has affixed an indelible stain on the character of the duke of Anjou who was supposed to have authorized it. The body of Condé, thrown upon an ass, was carried to the castle of Jarnac, and after being exposed to the view of the victorious army, was delivered to the duke of Longueville, his brother-in-law, who caused it to be interred with those of his ancestors at Vendome. In his person, the prince of Condé was ungraceful and diminutive, yet his wit and vivacity rendered him a great favourite with the ladies. His amours gave occasion to the conclusion that he engaged in the cause of the Huguenots more as a party-man, than as a religionist. This trait in his character was a foil to qual-

ties the most splendid, and to virtues the most heroic. Of high and determined courage, he was formed to shine in camps as well as courts, and though his income was narrow, he displayed a magnificence of temper worthy his birth and station. *Nouv. Hist. Dict. Hist. de France.*

CONDÉ, *Lewis II. de Bourbon*, was born at Paris, Sept. 7, 1621. He was styled Duke d'Enguien, and is known in history, under the appellation of the *great Condé*. He succeeded to the rank of prince by his father's death in 1646. In his infancy he was of an extremely delicate constitution, and was sent into the country for the sake of pure air. At a proper age the prince took upon himself the task of governor, and selected, as his assistant, in this important business, M. de la Bouffière, a private gentleman, upon whom he could depend for the most exact attention to the orders given him. Two jesuits were likewise assigned to him as preceptors, who, with some officers of high rank and eminent probity and discretion, formed the household of the young prince. With these attendants he went to Bourges, where he frequented the college of jesuits, and became distinguished in every branch of learning. His inclination was evidently turned towards the military art, and at the age of eighteen he made a campaign under Marshal de la Meillcraye, that laid the foundation of that renown by which he was afterwards distinguished as the greatest general of his age. In the year 1643, he was entrusted with the command of the army opposed to the Spaniards who had invaded France; by a signal victory which he at that time gained, he was looked upon as the guardian genius of his country. So much coolness did he display on this occasion, that on the night preceding the battle, after he had made all the proper dispositions, he slept so soundly that it was necessary to awaken him when it was time to begin the attack. He next formed the project of besieging Thionville, and proposed the scheme to the council of regency, who unwillingly consented to it. The duke, contrary to expectation, carried it into execution with so much skill that the town soon surrendered. After this he was engaged in many combats in Germany, in one of which he threw his general's staff into the enemies' trenches, and led on a regiment, sword in hand, to recover it. The victories of the duke d'Enguien, and his great and growing reputation rendered him an object of jealousy to Cardinal Mazarin, who did every thing in his power to thwart his ambitious projects. The treachery of the cardinal, and the artifices of the leaders of the country party, excited cabals and troubles, and the duke d'Enguien, who, by the death of his father, had succeeded to the title of the prince of Condé, was carested by both parties. He at length took part with the court, though he felt it was an ungrateful task, and he protected the miller without feeling for him the least esteem.

The royal family left Paris privately, and went to St. Germain, upon which the parliament sent deputies to learn from the queen the causes of her departure; but Mazarin dismissed them contemptuously and without an answer. Exasperated at this, the people made a common cause, and resolved to defend themselves against the power of the court. With about 8000 men, the prince of Condé formed a design of reducing above 500,000 entrenched behind walls. He had neither money nor magazines; nevertheless he triumphed over Paris, and this success added not a little to the glory he had already attained. During the siege he constantly defeated the troops of the malecontents; he prevailed on the army that marched to their assistance under Turenne, to abandon their general; he stopped the progress of the duke de Longueville, who had caused an insurrection in

Normandy, and got the start of the Spaniards who were advancing to give him battle. Peace was at length concluded, but Condé alone acquired glory by this war, and after the treaty was signed, the prince traversed the streets in his coach alone. All persons of any rank paid their compliments to him, and he received a vote of thanks from the parliament. The people, however, were uneasy at the king's absence, and Condé at length brought the royal family to Paris amidst the acclamations of the public: for this he was not recompensed in the manner which he had anticipated; he accordingly united with the malecontents, was arrested in 1650, and detained a year in prison. Soon after his liberation, he broke out into open revolt, and a civil war followed which was attended with various success. Condé exhibited great prowess, and sustained his military reputation through the whole of this unhappy warfare, though he was engaged in the service of the malecontents, the inveterate foes of his country, whom he had formerly obtained so much glory in resisting. At the peace of the Pyrenees in 1659, the re-establishment of the prince of Condé was made a condition. In 1668, he contributed very materially to the conquest of Franche-Comté. He took part in the invasion of Holland in the year 1672, and received a wound at the famous passage of the Rhine. He fought the bloody battle of Seneff against the prince of Orange, in which he had three horses killed under him, and was anxious to lead to a fourth attack, but as an officer observed, "No one but the prince of Condé was desirous of fighting any longer." After the death of his great rival Turenne in 1675, Condé was sent to check the progress of the imperial army, in Alsace, and displayed as much caution in this business, as he had before exhibited ardour and impetuosity. By his consummate prudence and judgment he forced the enemy to cross the Rhine, and then, full of glory, he resigned the military profession, and retired to Chantilly, where he spent the remainder of his days in cultivating and patronizing letters and the fine arts, to which he had been always attached. During the last two years of his life his faculties had so much declined, that scarcely a trait was left of the *great Condé*. He died in 1686 at Fontainebleau, leaving behind him two sons, by his wife, the niece of cardinal Richelieu. *Nouv. Dict. Hist. Heme.*

CONDÉ', in *Geography*, a small town of France, in the department of the Aisne, and chief place of a canton in the district of Chateau-Thierry, 9 miles S.E. from Chateau-Thierry. The place contains 508 and the canton 9613 inhabitants. The territory includes 235 kilometres and 27 communes. — Also, a fortified town of France, in the department of the North, on the confluence of the Haine and Scheldt, 9 miles N.E. from Valenciennes, known at present by the name of Nord Libre, which it took under the republican government of France. After a blockade of nearly four months, it surrendered to the Austrians on the 11th of July 1793, but was soon evacuated. It is the chief place of a canton in the district of Donay, and contains 5978 inhabitants. The territorial extent comprehends 87½ kilometres, with 10 communes, and 139,621 inhabitants. Before the revolution of 1789, Condé was a principality from which the princes of Condé derived their title. There are in France several other small towns of the name of Condé, which signifies confluence, from the Latin *condare, circumdare*, and means a place built on the spot where two rivers meet. See CONDÉ.

CONDÉ *sur Noireau*, a town of France, in the department of Calvados, on the river Noireau, or Noireux, chief place of a canton in the district of Vire, 24 miles S. from Caen, and 150 W. from Paris. The place contains 3030,

and the canton 10,681 inhabitants. The territory includes 122½ kilometres, and 12 communes. The inhabitants carry on a considerable trade in cloth, leather, and cutlery.

CONDE' sur Non, or *CONDE' l'Evêque*, a town of France, in the department of the Eure; 12 miles S.W. of Evreux.

CONDEAU, a town of France, in the department of the Orne, and district of Bellefme; 10 miles E. of Bellefme.

CONCEDDO, a cape or promontory of North America, in the province of Yucatan; 100 miles W. of Merida. N. lat. 26° 50'. W. long. 91° 27'.

CONDEMNATION, the act of passing, or pronouncing sentence, or giving judgment against a man; whereby he is subjected to some penalty or punishment; either in respect of fortune, reputation, or life.

CONDEMNATION to the galleys. See GALLEYS.

CONDEMNATION of prizes taken from the enemy. See PRIZE.

CONDENSATION (from *condensatus*, and *condensate* from the Latin *condensatus*), denotes the contraction of a given quantity of matter into a smaller space, and in this sense only the word condensation ought to be used; however, in common language, the inspissation, the thickening, or hardening of certain compound substances, in consequence of the escape of some of their component ingredients, is frequently expressed by the same term; thus the juices of fruit, of plants, of meats, &c. are often said to be condensed over the fire. Compression and condensation (though sometimes used the one for the other) differ in this; *viz.* that the former denotes a diminution of bulk, occasioned by the application of external force; whereas the latter expresses the same effect, when produced without that external application, as is the case with most bodies in cooling. But the word condensation has been more commonly used for denoting the conversion of vapour into water, or of vapours in general into liquids.

The particulars which might be noticed with respect to condensation are, the quantity and rate of contraction in different bodies, the causes which produce it, and the limits of that contraction. These particulars, however, will, with more propriety, be stated under the articles EXPANSION, THERMOMETER, and PYROMETER, which see.

Notwithstanding the above-mentioned definition, it is to be remarked, that in every case of condensation, or of the contraction of a body into a narrower space, the effect is produced by the escape of something; and in bodies, which seem to be the simplest in nature, the contraction which they undergo in cooling, is occasioned by the escape of the caloric, which the present state of philosophical knowledge reckons amongst the elementary substances. But the reverse of this proposition is not always true; *viz.* bodies are not always contracted in their dimensions when the caloric escapes from them; and such has been found to be the case with water, with iron, and with some other substances, in certain temperatures. This will be rendered more evident in the sequel.

Most bodies are susceptible of three successive states of existence; namely, the solid, the liquid, and the elastic or vaporous; and all these are effected by the introduction of different doses of caloric. During every one of those states, a different degree of condensation is produced by the intermediate gradations of temperature; *viz.* such as are not quite sufficient to induce a different state of existence in the body concerned. Thus, a quantity of the vapour of water, which, at the temperature of 212° (Fahrenheit's thermometer), and under the mean gravity of the atmosphere, occupies the space of 3600 cubic inches; if it be gradually cooled until the temperature becomes equal to about 212°,

its bulk will be contracted so as to occupy the half of the space it did before, *viz.* about 1800 cubic inches. If the temperature be lowered below 212°, the vapour will be condensed into liquid water, which will occupy the space of not more than a single cubic inch. If the cooling be continued, the water will be contracted in its bulk, but not very regularly (that is, the decrements of bulk will not be exactly proportional to the decrements of heat); until the temperature descends to about 42°. Below that degree, the water, instead of contracting its bulk, is expanded by further cooling; *viz.* by a further abstraction of caloric. This is a very remarkable property of water, upon which some interesting phenomena of nature are depending. The water, though expanding below the temperature of 42°, still continues fluid as far as about the temperature of 32°; but below this last mentioned point, by farther cooling it becomes a solid; namely, ice; and in this state water occupies a greater space than it did in a liquid state. (See CONGELATION.) Similar irregularities have been observed in the condensations of several other bodies, both solid and fluid; and it is to be wished that experiments capable of determining the laws of condensation were instituted with all those bodies which are at all susceptible of the trial.

The causes of condensation are by no means thoroughly understood. It may seem, at first sight, sufficient to say, that since caloric is an elementary substance, which is combined in various proportions with every other known body, the separation of part of that element from the other bodies, naturally enables the particles of the latter to come closer to one another in virtue of their mutual attraction. But that this cannot be the sole cause of the condensation in its whole extent, is easily pointed out by the following queries. 1st. How are the particles of bodies disjoined, that they may be capable of approaching, or of receding from each other? 2dly, Why the degrees, or quantities, of condensation are not always proportional to the degrees of caloric that are abstracted from bodies? And, 3dly, Why clouds, fogs, mists, &c. (which consist of the vapour of water suspended in the atmosphere) are not always condensed into liquid water below the temperature of 212°; which is actually the case in the atmosphere?

It has for a long time been an opinion prevalent amongst philosophers, that the particles of bodies do not actually touch one another; for otherwise it seemed impossible to comprehend how a body could be expanded and condensed. But the least consideration will easily suggest a variety of dispositions of the particles, which, whilst they actually touch one another, will readily admit of the dilatation and condensation of the aggregate. Conceive, for instance (as professor Prevost of Geneva justly observes), the particles to be elongated, and united at their extremities like the legs of a pair of compasses, and they may turn, with regard to this point of union, as a centre, and produce condensations and dilatations of the whole apparent mass of the body. A sponge likewise will dilate in water without interrupting the continuity of its parts. One may also conceive the particles of bodies arranged in the form of rings; that is, many of them to be in absolute contact, one with the next, and this with the following, &c., so as to form circular or oval rings. With this disposition of particles, the dilatation and condensation of the aggregate is nothing more than an alteration of the form of those rings; *viz.* they become more like circles when the body is expanded, and more oblong when the body is condensed; it having been demonstrated by mathematicians, that the circle comprehends an ampler space than any other figure of the same periphery. Though the general disposition of the particles of a body is not known, yet a variety

riety of phenomena clearly indicate that they are not confusedly placed; but that some arrangement, probably a peculiar one, for the particles of each different body, actually takes place; and to this peculiar arrangement some of the effects of dilatation and condensation, at least the irregularities of those alterations, must undoubtedly be attributed. Thus the particles of water crystallize in freezing; that is, they dispose themselves with a peculiar regularity, somewhat resembling the filaments of a feather. These filaments of water form angles of about 60 degrees with a larger filament, which is, as it were, the stem of the feather; and to this crystallization the enlargement of the bulk of water in freezing is with propriety attributed. Such is the force with which the particles of water endeavour to arrange themselves in that particular order, and of course to enlarge the bulk of the aggregate, that several astonishing effects are produced by their united efforts. Pieces of timber, stones, and other bodies, are burst by the freezing of inclosed water. Even iron mortar-shells, such as are used in war, filled with water, and accurately flopped, have been burst by the freezing, and the consequent enlargement of the inclosed water.

Since the enlargement of the bulk of water commences at about the temperature of 42°, which is 10 degrees above the point of melting ice, commonly called the *freezing point*, which is 32°, it is evident that the particles of water begin to arrange themselves in a particular order long before the freezing takes place. And, by following the analogy, it may be supposed, that in every state of existence the particles of bodies have, more or less, a tendency to arrange themselves in a certain order; to which tendency the irregularities in the condensations of bodies are probably to be attributed.

The above-mentioned particulars, respecting the condensation of water, must in great measure be understood to belong to a great variety of bodies; for all those which have been subjected to decisive experiments have been found to contract or to enlarge their bulk with irregularity, in some part at least, if not throughout, the whole scale of heat.

The condensation of vapour in the atmosphere, which is not always accompanied with a proportionate degree of temperature, forms another difficulty, which the present state of philosophical knowledge is not entirely capable of explaining. We shall, however, briefly state certain facts and certain considerations, which ought to be kept in view by those who are willing to investigate this intricate and interesting subject. The conversion of water into vapour is attended with an increase of its capacity for containing heat, or caloric, and likewise with an increase of its capacity for containing electric fluid; so that if a quantity of water, held in an open and insulated vessel, be suffered to evaporate, the vapour will deprive the vessel of part of its heat, and of part of its electric fluid: consequently, the vessel will be cooled and electrified negatively. Now that which philosophers wish to ascertain is, whether the influx of the caloric and of the electric fluid produces the evaporation, or the conversion of the water into vapour draws the caloric and the electric fluid from the contiguous bodies. In the first case, we see no reason why the caloric and the electric fluid should spontaneously quit the contiguous bodies, and run to the water in order to force it to evaporate, because both the water and the contiguous bodies are in an equilibrium; that is, in the same state with respect to temperature as well as of electricity. In the second case, if the influx of heat and of electricity does not force the water to evaporate, what other cause can produce that effect?

The same reasoning which has been applied to the conversion of water into vapour, may, *mutatis mutandis*, be

adapted to the contrary effect; *viz.* to the condensation of vapour into water, it being equally difficult to comprehend how the vapour can remain in the elastic state, that is, without being converted into water, at a temperature much lower than 212°, which in the atmosphere is generally the case. There is one consideration, however, which may throw some light upon this remarkable phenomenon; *viz.* that in order to deposit the caloric and the electric fluid, which must necessarily take place in the condensation of vapour, there must be a body or bodies ready to receive both. But in the atmosphere, the only body which can receive them is the air, and it is well known, that air is a bad conductor of heat as well as of electricity. The last remark which we have to subjoin is, that it has been observed with several substances, and especially with water, that though placed in a colder temperature, they do not part with their caloric so easily as it might be expected, and this is particularly the case when they are to undergo a change in their state of existence; thus water will sometimes continue fluid when its temperature is 4 or 5 or even more degrees below 32°; though when once formed into ice, this will not melt at a temperature lower than 32°, and yet it will evaporate if exposed to the air whilst its temperature is many degrees below 32°.

CONDENSER, from *condense*, is an instrument capable of collecting, or of drawing into a smaller space any scattered matter, or quality, or effect. In philosophy and in mechanics, three different instruments have obtained the name of condensers; *viz.* the *condenser of air*, the *condenser of electricity*, and the *condenser of forces*.

The *condenser of air*, in pneumatics, is a syringe, by means of which a considerable quantity of air may be forced into a vessel fitted for the purpose. Fig. 1 and 2, Plate XIV. *Pneumatics*, represent two constructions of this sort of condenser, which differ but little from each other. They are generally made of brass or of iron. A B, fig. 1, represents a cylindrical tube, at most, two inches in diameter, and from 8 to 12 inches in length, or even longer. Its flat bottom B is perforated with a hole, on the outside of which, a valve, (consisting of a piece of oil silk, or rather of leather, stretched over a small flat piece of brass), is adapted, so that if any air be forced from the inside of the cylinder A B, that fluid will easily lift up the valve, and make its exit through the hole at B. But should any suction take place within the cylinder A B, the air cannot possibly enter through the hole at B, because the valve on the outside prevents it by stopping that hole. The piston *cd* fits the cavity of the cylinder A B pretty tightly, by means of leathers soaked in oil; and it may be moved up or down by the handle E which is fastened to its rod. This piston is perforated with a hole *d*, the lower part of which is furnished with a valve *d*, which, when the piston is drawn upwards, will permit the air to enter the lower cavity of the cylinder; but if the piston be pushed downwards, the air which is contained in the lower cavity of the cylinder, cannot pass through the hole *cd*, on account of the valve at *d*; therefore it will come out through the hole at B. At the extremity of the cylinder, a brass or iron cap F G is screwed over the valve, allowing however a little room for its free motion. The end G of this cap is perforated quite through, and its outside is formed into a screw.

Fig. 2 represents a condensing instrument simpler than the preceding, and such indeed is at present mostly used. Neither the cylinder nor the piston of this instrument is furnished with any valve. There is a hole through the screw at the bottom B of the cylinder, and a hole at C through its side, and at about two or three inches below its upper end; the piston has no perforation.

When

When the condenser, *fig. 1*, is screwed into the aperture of a glass or metal vessel, and the piston is moved alternately up and down, it will be readily understood, that the air will be forced into the vessel to which the condenser is adapted; for when the piston is pulled upwards, that is, towards *A*, the air cannot enter the cylinder through the hole at *B*, but it can easily pass through the hole *cd*; and when the piston is pushed in, the air which is contained in the cavity of the cylinder, cannot go out of it through the hole *cd*, but it can pass through the hole at *B*; hence it is forced to enter the vessel to which the condenser is applied. Thus by repeating the movements of the piston, more and more air is condensed into the vessel, until the latter is burst by the elasticity of the condensed air, or the same force pushes so hard against the valve at *B*, that the strength of the operator is no longer able to overcome it. The condenser, *fig. 2*, is used exactly in the same manner; this, however, must be adapted to such vessels as are furnished with a valve within their aperture, which permits the entrance, but not the exit of the air. When the piston of this condenser is drawn towards *C*, a vacuum is formed in the lower part of the cylinder, until the lower part of the piston is raised above the hole *C*; then the air rushes through that hole, and instantly fills the cavity, &c.

These instruments are generally used for condensing the air into the air-holders of wind-guns, of certain water fountains, and other machines. By this means, the air has sometimes been condensed to such a degree, as to become six, eight, and even more times, denser than common atmospheric air. The vessel, in that case, is said to contain respectively six, or eight, or a greater number of atmospheres.

In a variety of philosophical experiments, substances are frequently placed in a glass vessel in which air is condensed, in order to observe its effects upon the enclosed substances. For this purpose, one of the above-mentioned condensers is affixed to a frame and apparatus, as is represented in *fig. 3*; and this apparatus, all together, is called a *condensing engine*.

CD is a brass condenser, which is worked by applying the hand to the handle *Z* of the piston, and by moving the latter alternately up and down, the air is forced through the brass pipe *DNF* into the glass receiver *AB*. This receiver, which must be very thick and well annealed, is set with its smooth and flat edge upon the brass plate of the machine, which is similar to the plate of an air-pump. A thick piece of brass *LM*, is applied in a similar manner to the upper aperture of the glass receiver, and a slip-wire passes through a collar of leathers in this brass piece. In order to prevent the lifting up of the brass piece *LM* from over the glass vessel, or the latter from the plate on the frame of the machine by the force of the condensed air, two pillars of wood with a cross piece *GH*, likewise of wood, are annexed, for the purpose of keeping down the glass vessel, and the piece of brass *LM*. The cross piece *GH* is pressed upon *LM* by means of the screw-nuts on the pillars *I, K*. There is a gage *E, F*, annexed to this machine, which indicates the condensation of the air within the glass vessel, and tube of communication. It consists of a strong and narrow glass tube, hermetically closed at *E*, and connected with the brass tube of communication at *F*. A small quantity of mercury fills up a short part of the cavity about the middle of the tube, and the space between the mercury and the closed end *E* of the tube, contains air of the usual atmospheric density. It is by the contraction of this small quantity of air, that the degree of condensation in the glass receiver is indicated; for in proportion as the air is condensed into the receiver, or tube of communication, &c., so the air between

the mercury and the closed end of the gage becomes contracted more and more; and the quantity of that contraction is indicated by a scale annexed to the glass tube; for instance, if that air is, by working the machine, compressed into the half of the space it occupied at first, it shews that the air within the receiver is as dense again as it was before the working of the machine. If the air in the gage is compressed into a quarter of its original space, the air within the receiver is shewn to be four times as dense as it was before the working of the machine, and so forth; the condensations in the glass receiver being inversely as the spaces occupied by the air in the extremity *E* of the gage. These degrees of condensation are commonly expressed by saying, that the receiver contains two, or three, or four, or more atmospheres, when the air within it, is twice, or three times, or four times, or more times, denser than the usual air of the atmosphere.

There are certain air-pumps, as those of Smeaton, of Haas and others, the construction of which renders them capable of being used for condensing, as well as for exhausting the air. See *AIR-PUMP*. In certain forcing water pumps, in fire engines, and some other hydraulic machines, there is a vessel, in which the air is condensed by the action of the machine itself; the object of which is to produce a constant stream of water out of the engine, whilst the piston of it is moved up and down in the usual way. This vessel is called the *air vessel*, and often the *condensing-vessel*, or simply the *condenser*. See *PUMP*, and *FIRE-ENGINE*.

The head of an alembic, wherein the vapours are condensed into a liquid, has sometimes been called the *condenser* of the alembic.

CONDENSER of Electricity. This is an instrument capable of collecting, or of condensing into a small space, such quantities of weak and diffused electricity, as would otherwise remain unperceived, or be insufficient to affect even the most sensible electrometer. It was originally invented by a very distinguished philosopher, Mr. Volta of Como, and is by himself described in the 72d vol. of the *Philosophical Transactions*. But, since its original invention, this instrument has undergone several improvements and alterations, which we shall now describe, together with their peculiar advantages and defects.

The action of electric atmospheres is the principle which suggested the construction of this most useful electrical instrument. Though the nature of these atmospheres will be treated of in the article *ELECTRICITY*; it will, nevertheless, be necessary to give, in this place, some idea of their action, by means of an easy experiment, in order to render the principle upon which the electrical condenser acts, manifest to the reader. Affix an electrometer of pith-balls to an insulated metallic plate; that is, a plate of tin or brass, or other metal, having a glass handle. Communicate some electricity to it, and observe the divergence of the electrometer. In this state, bring the electrified plate near a conductor which is not insulated, such as the wall of a room or another metallic plate, and you will find that the electrometer collapses in proportion as the electrified plate comes near to the uninsulated conductor. Remove the electrified plate, and the electrometer will diverge again, nearly as much as it did at first; which shews, that by the vicinity of the uninsulated conducting body, which could easily acquire the contrary electricity, the intensity of the electricity in the electrified plate was diminished; or, which is the same thing, that the capacity of that plate for containing electricity was increased. Hence, when an insulated metallic plate is situated near another metallic plate not insulated,

CONDENSER.

the former will thereby be enabled to absorb a much greater quantity of electricity than it otherwise would, from any source whatever; and if the electrified plate be removed from the other, then that absorbed electricity will be manifested by the divergency of the electrometer, or even by affording a spark. It naturally follows, that according as the conductor which is opposed to the insulated plate, is nearer to, or farther off, so the capacity of the plate will be increased more or less. Such an insulated plate, placed upon an imperfectly insulating, or an imperfectly conducting plane, for the purpose of collecting weak and scattered electricity, was called a *condenser* by Mr. Volta. The reason of using an imperfectly conducting, or imperfectly insulating plane, is, that when the insulated condensing plate is placed upon it, the electricity will not pass from the latter to the former. In short, the following particulars should be attended to in the construction of this, Mr. Volta's, condenser. The metal plate should be about six inches in diameter, with the edge well rounded, and furnished with a varnished glass handle. The inferior plane must be of a very imperfectly conducting nature, such as dry marble, very dry and slightly varnished wood, a common piece of wood covered with oiled silk, or such like substance; but be its substance what it may, its surface must be very smooth, and such as to coincide as well as possible with the surface of the metal plate, *viz.* the receiving plate; on which account, if a marble slab be chosen for the inferior plane, it will be proper to fit the surface of the metal-receiving plate to that of the marble, by grinding one against the other.

The apparatus, consisting of the above described two planes, being properly constructed, lay the receiving plate upon the other plane, connect the former with an atmospheric conductor, not much elevated above a house, or with the vapour of boiling water, or, in short, with any weak source of electricity, such as could not be discovered by any other means, and after a certain time lift the receiving plate from over the other plane, holding it by the glass handle, and present it to an electrometer, which will be caused to diverge sufficiently to ascertain the presence and the quality of the electricity. Sometimes the receiving plate will even be able to afford a spark. Yet, in several cases, the receiving plate is electrified so slightly, as not to occasion the divergency of the most delicate electrometer. A contrivance of Mr. Cavallo, which is described in his *Treatise on Electricity*, (fourth edition, vol. ii. p. 265) rendered this weak state of electricity capable of affecting the electrometer in a very sensible degree. His description of this contrivance is as follows:

"I naturally thought that, for the same reason which enabled the condensing plate of Mr. Volta's apparatus, to manifest such small degrees of electricity as could not otherwise be observed, another smaller plate, or small condensing apparatus, might be employed to collect and to render sensible the weak electricity of the large metal plate. Accordingly, I constructed a small plate of about the size of a shilling, having a glass handle covered with sealing-wax; and when the large metal plate seemed to be electrified so weakly as not to affect an electrometer sensibly, I placed the small plate upon the inferior plane, and touched it with the edge of the large plate; then, after removing the large plate, I took up the small one from the plane, holding it by the extremity of the glass handle, and presented it to the electrometer, which generally was so much affected by it as to diverge to its utmost limits.

"In this manner I have often obtained electricity, more than sufficient to ascertain its quality, from a single stroke of the corner of an handkerchief; *viz.* the large plate being laid

upon the proper plane, was stroked once with the handkerchief; then, being removed and presented to an electrometer, it appeared not electrified; but by touching the small plate with the edge of it, that small plate acquired thereby electricity sufficient to make an electrometer diverge."

With this condensing apparatus Mr. Volta, and other philosophers, made several discoveries; yet the use of it was not always attended with the desired effect, which was principally owing to the changeable nature of the semiconducting plane, upon which the receiving plate was placed; it being difficult to obtain, and much more difficult to preserve, such plane in a middling or semiconducting state; for sometimes it would carry off the electricity from the superimposed receiving plate, and at other times it was not of a conducting nature sufficient to enable the upper plate to condense the electricity. It, likewise, often happened that this plane would acquire some electricity either in consequence of the slightest friction, or by communication, which rendered the action of the upper plate quite equivocal. With a view to remove these inconveniences Mr. Cavallo contrived an instrument capable of answering the same purpose, but quite free from all the above-mentioned objections. The principle of this instrument is like that of Mr. Volta's condenser; excepting that the receiving plate does not touch the other plane, though it comes very near it, and it likewise opposes another plane to the other side of the receiving plate. Those planes are of metal, and by their not touching the receiving plate, enable the latter to act with certainty and without obstruction. Upon this principle, *viz.* of the two plates not actually touching, but approaching one another very nearly, the present electrical condensers are constructed, however they may have been varied in size, in name, and in shape. By the aid of these condensers various important discoveries have been made in electricity, and especially in that branch of it, which is called galvanism. The original description of this instrument of Mr. Cavallo, is in the 78th. vol. of the Philosophical Transactions, for the year 1783, from which we make the following extracts.

"The properties of this machine, which from its office may be called a *collector of electricity*, are first, that when connected with the atmosphere, the rain, or in short with any body which produces electricity slowly, or which contains that power in a very rarefied manner, it collects the electricity, and afterwards renders both the presence and quality of it manifest by communicating it to an electrometer. Secondly, this collecting power, by increasing the size of the instrument and especially by using a second or smaller instrument of the like sort to collect the electricity from the former, may be augmented to any degree. Thirdly, it is constructed, managed, and preserved with ease and certainty; and it never gives, nor can it give, an equivocal result, as I have proved experimentally, and as will appear by considering its construction."

"The figures 4 and 5, *Plate II. Electricity*, exhibit this instrument, *viz.* *fig.* 4 shows the instrument in the state of collecting the electricity, and *fig.* 5 shows it in the state in which the collected electricity is to be rendered manifest. An electrometer is annexed. The letters of reference indicate the same parts in both figures. A B C D is a flat tin plate, thirteen inches long and eight inches broad; to the two shorter sides of which are soldered two tin tubes, A D and B C, which are open at both ends. D E and E F, are two glass sticks covered with sealing wax by means of heat, and not by dissolving the sealing wax in spirits. They are cemented to
the.

the lower apertures of the tin tubes, and also in the wooden bottom of the frame or machine, at E and F, so that the tin plate, ABCD, is supported by those glass sticks in a vertical position, and is exceedingly well insulated. GHIKLM and NOPV, are two frames of wood, which being fastened to the bottom boards, by means of brass hinges, may be placed so as to stand in an upright position and parallel to the tin plate, as shewn in *fig. 4*. or they may be opened, and laid upon the table which supports the instrument, as shewn in *fig. 5*. The inward surfaces of those frames from their middle upwards are covered with gilt paper, X, Y; but it would be better to cover them with tin plates, hammered very flat. When the lateral frames stand straight up, they do not touch the tin plate; but they stand at about one-fifth part of an inch asunder. They are also a little shorter than the tin plate, in order that they may not touch the tin tubes, AD, BC. In the middle of the upper part of each lateral frame is a small flat piece of wood, S and T, with a brass hook; the use of which is to hold up the frames without the danger of their falling down when not required, and at the same time it prevents their coming nearer to the tin plate than the proper limits. It is evident that when the instrument stands as shewn in *fig. 4*, the gilt surface of the paper, X, Y, which covers the inside of the lateral frames stands contiguous and parallel to the tin plate."

"When the instrument is to be used, it must be placed upon a window, a table, or other convenient support, a bottle electrometer is placed near it, and is connected, by means of a wire, with one of the tin tubes, AD, BC; and by another conducting communication the tin plate must be connected with the electrified substance, the electricity of which is required to be collected on the plate, ABCD: thus, for instance, if it be required to collect the electricity of the rain, or of the air, the instrument being placed near a window, a long wire must be put with one extremity into the aperture, A or B, of one of the tin tubes, and with the other extremity projecting out of the window. If it be required to collect the electricity produced by evaporation, a small tin pan, having a wire or foot of about six inches in length, must be put upon one of the tin tubes; so that the pan may stand about two or three inches above the instrument. A lighted coal is then put into the pan, and a few drops of water poured upon it, will produce the desired effect."

"The quantity of electricity, which the tin plate, ABCD, is capable of collecting, principally depends on three circumstances, *viz.* 1st. On the distance between the tin-plate and the conducting lateral surfaces: the smaller that distance is, the greater being the collecting power; 2^{dly}. On the size of the instrument; and 3^{dly}. On the quantity of electricity possessed by the body from which it must be collected or taken away."

"I need not expatiate on the principle upon which the action of this instrument depends; this being the same as that of the electrophorus of Mr. Volta's condenser, and of many other electrical experiments; namely, that a body has a much greater capacity for holding electricity, when its surface is contiguous to a conductor which can easily acquire the contrary electricity, than when it stands not in that situation."

Though this original condenser, which, by way of distinction, its inventor called a collector, answers the purpose for which it was intended perfectly well; yet for the common run of experiments, its size may be dispensed with, as it takes up too much room on the table of an electrician. On this account, not only the size of the instrument has

been reduced, but its shape also has been varied according to the fancy of almost every philosophical instrument maker. For the sake of simplification in the condensers which are at present in general use, one conducting plane only is opposed to the receiving plate, which answers the purpose sufficiently well; for if the electricity collected by the receiving plate happens to be too weak to affect the electrometer, a smaller condenser may be used, which will condense the electricity of the former, &c.

The forms of the condensers that are mostly used at present, are represented in *figs 6, 7, 8, and 9*. *Fig. 6* exhibits a vertical section of the condenser constructed by Mr. John Read of Knights-bridge; *aa* is a circular flat plate of brass, about eight inches in diameter, standing insulated, by means of the glass stick *f*, on the wooden foot *g*; *gb* is a hollow brass cylinder, terminating in the hollow brass cone *ecdb*; and to this cone the flat perforated brass plate *bccb* is affixed. The glass stick *f*, which, by means of a brass ferril, is fastened to the plate *aa*, has its lower extremity cemented in a cylindrical piece of wood, and this piece of wood is fixed in the bottom *g*. Now it will be easily perceived, by inspecting the figure, that the hollow cylinder *bg* may be moved up or down by sliding it upon the cylindrical piece of wood; and that, by so doing, the plate *bccb* may be brought near to, or removed from the plate *aa*, which is the receiving plate of this condenser; *i* is a milled-head screw, which serves to fix the plate *bb* at a proper distance from *aa*, where a stop is made for that purpose; when *i* is loosened, the plate *bb*, with *cbg*, which is all one piece, falls in the situation represented in the figure, and in that state an electrometer is put in contact with the plate *aa*, in order to manifest the electricity which *aa* condensed whilst *bccb* stood near it.

Fig. 7 represents a condenser of another form, as made by Mr. Cuthbertson. This sort of condenser is both simple in its construction, and commodious in practice; *ab* is a brass plate of about 8 inches in diameter (the instrument being shewn in profile), which is screwed tight into the wooden head *c*, which is cemented on the glass stick *d*, and this is cemented with its lower extremity into the wooden stand *ee* of the instrument; *fi* is a similar plate of brass, fastened to the brass head and pillar *gi*, the lower part of which turns round a pin at *h*, so that it may either stand upright, or it may be inclined after the manner of the dotted representation *hm*. It is almost superfluous to add, that *ab* is the receiving plate of this condenser. *Fig. 8* shews a front view of a condenser of this sort, placed close to a gold leaf electrometer, furnished with a smaller condenser, *viz.* such as is represented by itself in *fig. 9*. The small condenser, *fig. 9*, is similar to the one represented in *fig. 7*; saving that in *fig. 9* the receiving plate is affixed to the cap of a gold-leaf electrometer; so that this apparatus, *viz.* *fig. 9*, may be used by itself in most experiments; but in certain cases it will be necessary to employ the condenser *fig. 7* first, and afterwards the electricity may be farther condensed by means of the apparatus *fig. 9*, as shewn in *fig. 8*.

There is an instrument contrived by Mr. Wilson, which he calls "a compound electrical instrument for condensing and doubling." But as the construction, as well as the principal use, of that instrument properly belongs to another class of electrical instruments, its description will be found in another part of this work. See DOUBLER, and MULTIPLIER of electricity.

CONDENSER of forces. This name was given by Mr. R. Prony to a contrivance for obtaining the greatest possible effect from a first mover, the energy of which is subject to augmentation

augmentation or diminution within certain limits; and in general to vary at pleasure the resistance to which the effort of the first mover forms an equilibrium in any machine whatever, without changing any part of their construction. (Bulletin of the Philomathic Society at Paris, No. 83.)

The general problem in mechanics, of which this condenser is intended as a practical solution, is enunciated by Mr. PROY in the following terms:

"Any machine being constructed, to find, without making any change in the construction, a means of transmitting to it the action of the first mover, by fulfilling the following conditions; viz."

"1. That it may be possible at pleasure, and with great speed and facility, to vary the resistance (against which the effort of the first mover must continually make an equilibrium) in limits of any required extent."

"2. That the resistance, being once regulated, shall be rigorously constant until the moment when it is thought proper to increase or diminish the same."

"3. That in the most sudden variations of which the effort of the first mover may be capable, the variation in velocity of the machine shall never undergo a solution of continuity."

Mr. PROY applies this solution of this problem to the dynamic effect of wind; but it will be easy to make the same general, when other first movers are used. *Fig. 10 (Plate XVI. Mechanics)* represents the plan, and *fig. 11* the elevation of the machine. *OO* is the vertical arbor to which windmill-fails are adapted; *eeee* is an assemblage of carpentry, of which one of the radii, *Oe*, bears a curved piece, *bd*, of iron or steel: vertical axes of rotation *aaa*, being placed round the axis *OO*; they also divide the circumference in which they are found, into equal parts. Each of these axes carries a curve *af*, of iron, steel, or copper; so situated, that when the wind acts upon the fails, the curve *bd* presses against one of the curves *af*, and causes the vertical axis to which this last curve is affixed, to make a portion of a revolution. The curves *bd*, and *af*, must be so disposed, that when *bd* ceases to press on one of the curves *af*, it shall at the same instant begin to act upon the following curve: the number of axes which are provided with these curves, must be determined by the particular circumstances of each case, and it is also practicable to substitute, instead of *bd*, a portion of a toothed wheel having its centre in the axis *OO*, and to place portions of pinions instead of the curves *af*; but the dispositions represented in the figure are preferable. Each of the axes *aaaa* (which are all fitted up alike, though, for the sake of clearness, only one of them has its apparatus represented in the drawing), carries upon it a drum or pulley, *tttr*, on which is wound a cord that passes over a pulley *p*, and serves to support a weight *Q*, by means of the lever *FG*, upon which this weight may be slid and fastened at different distances from the point of motion *G*. The same axes, *a, a*, pass through the pinions *q, q*, to which they are not fixed; but these pinions carry clicks or ratchets, which bear against *rr*; so that when the weight *Q* tends to rise, the ratchet gives way, and no other effect is produced on the pinion *qq*, either by the motion of the axis or of the drum *tttr*, excepting that which causes the ascent of the weight *qq*. But the instant that the curve, or tooth *bd*, ceases to bear against one of the curves *af*, after having caused the corresponding weight *Q* to rise, that weight *Q* tends to re-descend, and then the toothed wheel *rr* acts against the ratchet, so that *Q* cannot descend without turning the pinion *qq* along with the drum *tttr*. The pinion *qq* takes in the wheel *ab*, from

the motion of which the useful effect of the machine immediately results; so that the effect of the descent of one of the weights *Q* is to solicit the wheel *AB* to motion, or to continue the motion in concurrence with all the other weights *Q*, which descend at the same time. This wheel, *A B*, carries beneath it oblique or bevelled teeth, *G D*, which take in a like wheel, *C E*, and cause the buckets at *S* to rise.

From the preceding description, it is seen that the machine being supplied to start from a state of repose, the wind will at first raise a number of weights, *Q*, sufficient to put the machine into motion, and will continue to raise new weights, whilst those before raised are fallen, so that the motion once impelled will be continued.

Among the numerous advantages of this new mechanism, the following may be remarked:

1. No violent shock can take place in any part of the mechanism. 2. The useful effect being proportioned to the number of weights *Q*, which descend at the same time, this effect will increase in proportion as the wind becomes stronger, and causes the sails to turn with greater velocity. 3. The weights, *Q*, being moveable along the levers *FG*, it will always be very easy to place them in such a manner as to obtain that ratio of the effort of the first mover to the resistance, which will produce the maximum of effect. 4. From this property it results, that advantage may be taken of the weakest breezes of wind, and to obtain a certain product in circumstances under which all other windmills are in a state of absolute inactivity. This advantage is of great importance, particularly with regard to agriculture: the windmills employed for watering lands, are sometimes inactive for several days, and this inconvenience is more particularly felt in times of drought. A machine capable of moving with the slightest breeze, must, therefore, offer the most valuable advantages.

CONDENSING OF WINES. See WINES.

CONDEON, in *Geography*, a town of France, in the department of the Charente; 25 miles S.E. of Saintes.

CONDER, a river of England, in the county of Lancaster, which runs into the Irish sea; 3 miles S. of Lancaster.

CONDERCUM, in *Ancient Geography*, a station of Britain on the line of Severus's wall at Benwell-hill, where the prefect of the first wing of the Alti was placed. Not. Imp.

CONDERS, from the Fr. *Conduire*, to conduct, persons who were employed in the fishery to give notice where shoals of herrings were passing; otherwise called *Balkers*; which see.

CONDESCENSION, in *Ethics*, denotes that species of benevolence, which designedly disregards the supposed advantages of birth, title, or station, in order to accommodate itself to the state of an inferior, and diminish the restraint which the apparent distance is calculated to produce. Accordingly, it greatly enhances the value of every other species of benevolence.

CONDESUYOS DE AREQUIPA, in *Geography*, a jurisdiction of South America, under the bishop of Arequipa, 30 leagues distant from that city; which extends about 30 leagues, with different temperatures of the air, and consequently produces grains and fruits. In this jurisdiction is bred the wild cochineal, with which the Indians carry on a kind of trade with the provinces in which the woollen manufactures flourish. They first pulverize the cochineal by grinding it, and after mixing four ounces of it with twelve of violet maize, they form it into square cakes called

"mango," each weighing four cunes, and sell it for a dollar per pound. This country abounds in gold and silver mines, which have of late been much neglected.

CONDETTA, a town of France, in the department of the fruits of Calais, and district of Boulogne; $1\frac{1}{2}$ league S. of Boulogne.

CONDICA, in *Ancient Geography*, a town of Asia Minor, in Lycia, and in the country called Mylas, according to Ptolemy.

CONDIGNITY, MERIT OF, in *Theology*. See MERIT.

CONDIGRAMMA, in *Ancient Geography*, a small town of Asia, on this side the mouth of the Indus, upon the coast of Gedrosia, according to Pliny.

CONDILLAC, STEPHEN BONNET DE, in *Biography*, a French metaphysician, member of the Academy, and preceptor to the infant Don Ferdinand, prince of Parma, an honour to which he arrived from the high reputation that he had gained from his writings. The work by which he was first known was an "Essay on the Origin of Human Knowledge," in 2 vols. published in 1745; in which he endeavours to develop the faculties of the mind, by giving a sort of historical account of its several functions. In 1754, he gave to the world a "Treatise on Sensations," in 2 vols. 12mo.: here he considers what would be the conceptions of a statue, provided at first with a single sense, and successively with the others; and hence he undertakes to account for the origin of memory, judgment, and the mental affections, and the gradual formation and correction of sensible ideas. In the course of the following year he published a "Treatise on Animals;" in which he refutes the notions of Descartes and Buffon concerning the merely mechanical nature of brutes, and shews in what manner their faculties are acquired. In 1776 his great work, entitled, "A Course of Study drawn up for the Instruction of the Prince of Parma," was published in 16 vols. 12mo. As an introduction to these volumes, we have a discourse on the different modes of communicating instruction; giving a decided preference to the gradual advance from particular facts up to general principles, instead of the contrary method. Metaphysical lectures, logic, and the philosophy of the human mind, are among the earlier parts of this course of study; and from these, as preliminary steps, he proceeds to the study of history, of which he has given an ample and well-arranged abridgment, in eleven volumes. As an appendix, is added a volume consisting chiefly of political reflections. This ingenious writer published also a small work, entitled, "Commerce and Government considered relatively to each other." In all his works he exhibits an extensive knowledge, a mind well imbued with the principles of humanity, and with the most liberal notions of government. He died in the year 1780, highly respected by his countrymen, and characterized for the soundness of his judgment, for the clearness of his ideas on every subject which he undertook to discuss, and for his general knowledge in almost every department of literature. Nouv. Dict. Hist.

CONDITION, in the *Civil Law*, an article of a treaty, or contract; or a clause, charge, or obligation, stipulated in a contract, or added in a donation, legacy, testament, &c.

The donee does not lose his donative, if it be charged with any dishonest or impossible conditions. Lawyers distinguish three kinds of conditions, under which a legacy or donation may be made: these are the *casual*, which depends merely on chance; the *potestative*, which is absolutely in our power; and the *mixed condition*, which is both casual and potestative together.

CONDITION, in *Common Law*, is a manner, quality, or restriction, annexed to an act; qualifying or suspending the same; and making it precarious and uncertain, whether or not it shall take effect.

Accordingly, it is defined to be what is referred to an uncertain chance, which may or may not happen. Or, condition is a modus, or quality, annexed by him that hath estate, interest, or right to the land, &c. whereby an estate, &c. may be either created, defeated, or enlarged upon an uncertain event; and it differs from a *limitation* (which see), which marks the bounds or compass of an estate, or the time how long the estate shall continue.

A condition is also considered as one of the terms upon which a grant may be made; and in this sense a *condition in a deed* is a clause of contingency, on the happening of which the estate granted may be defeated; as "provided always, that if the mortgager shall pay the mortgagee 500*l.* upon such a day, the whole estate granted shall determine;" and the like.

Of conditions there are various kinds; *viz.* conditions in deed or express, and in law or implied; conditions precedent and subsequent; conditions inherent, and collateral, &c.

CONDITION *in deed, or express*, is annexed by express words to the feoffment, lease, or grant, either in writing, or without. As, if a man make a lease of lands to another, reserving a rent to be paid at such a feast; *upon condition*, if the lessee fail in payment, it shall be lawful for the lessor to re-enter.

CONDITION *implied*, called also *condition in law*, is when a man grants to another the office of a steward, bailiff, keeper of a park, &c. for life: though there be no condition expressed in the grant, yet the law makes one covertly; which is, that if the grantee do not justly execute all things belonging to the office, it shall be lawful for the grantor to discharge him.

CONDITION *precedent*, is when a lease or estate is granted to a person for life, upon condition of the payment of a certain sum by the lessee to the lessor at a certain day, when he shall have fee-simple: in this case the condition precedes the estate in fee, and on performance gains the fee simple.

CONDITION *subsequent*, is when a man grants to another his manor in fee, upon condition that the grantee shall pay to him a certain sum on such a day, or that his estate shall cease: so that here the condition follows the estate, and the performance preserves it. From these definitions it appears, that a *condition precedent* gets or gains the thing or estate made upon condition by the performance of it; and that a *condition subsequent* keeps and continues the estate by the performance of the condition. If one agree with another to do such an act, and for the doing of it the other shall pay so much money; here the doing of the act is a *condition precedent* to the payment of the money, and the party shall not be compelled to pay till the act is done; but when a day is appointed for the payment of money, which day happens before the thing contracted for can be performed, there the money may be recovered before the thing is done; for here it appears, that the party did not intend to make the performance of the thing a *condition precedent*. For a further account of these conditions, see the article *ESTATE upon condition*. There are other conditions, besides those already mentioned: such are conditions *inherent*, being such as descend to the heir with the land granted; and *collateral condition*, being that which is annexed to any collateral act. Conditions are likewise *affirmative*, which consist of doing; *negative*, which consist of not doing:

some are said to be *restrictive*, for not doing a thing, and some *compulsory*, as that the lessee shall pay the rent, &c. Some conditions are *single*, to do one thing only; some *copulative*, to do divers things; and others *disjunctive*, where one thing of several is required to be done. Co. Litt. 201.

CONDITIONS in *restraint of Marriage*, have not been generally favoured, as contrary to sound policy; but where a legacy hath been given over to another, the condition has been held valid; and it seems, that such conditions as only reasonably restrain children from imprudent marriage will be always supported;—that is, when they operate only as particular, not as universal restrictions. Where a legacy is given on consideration that the legatee should not marry without consent, and there is no devise over, the condition is void. 4 Burr. 2055. Com. Rep. 739. The rule of the ecclesiastical law is, that where a portion is given in consideration that the daughter should never marry, the condition is void. As the intent of the testator chiefly governs in wills, such construction is always made of the words, as will best support his intent; and therefore these words *ad faciendum, faciendum, ea intentione, ad effectum*, &c. in a will create a condition. Co. Litt. 204. a. A grant to one to the intent he shall do so and so, is no condition, but a trust and confidence. Some words in a lease do not make a condition but a covenant, upon which the lessor may bring his action. A covenant not to grant, sell, &c. may be a condition; and covenant, that, paying the rent, the lessor shall enjoy the land, is conditional. 2 Danv. 2. 6. Where words are indefinite, and proper to defeat an estate, they shall be taken to have the force of a condition. Palm. 503. For the performance of conditions and relief against the breach of them, see Jacob's Dict. by Tomlins, art. CONDITION.

CONDITION of a *Bond*. See BOND.

CONDITION *without which, sine qua non*, is used in *Philosophy*, in speaking of some accident or circumstance, which is not essential to the thing, but is yet necessary to its production. Thus, light is a condition without which a man cannot see objects, though he have good eyes; and thus fire, though considered in itself, may burn without wood; yet is its presence a condition without which the wood cannot be burnt.

CONDITION, *applied to Horses*, is used to signify that a horse is well fed and of good appearance; it also has another signification, that of his being brought by suitable treatment into a state of body, that gives him the fullest use of all his faculties in performing any very difficult or arduous exertion or exercise, as for hunting, racing, trotting, or the arts of the manege.

A horse that is moderately fat may be said to be in good condition, and so he is for sale, or for slow heavy draught-service; but such a one would be totally out of condition for any of the above exercises. To condition a horse for these a proper share of clean nourishing food and exercise is necessary, as much only as would confer the utmost point of strength and power, without adding any useless incumbrance of matter to the body that might clog the freedom of respiration, or increase the weight and bulk of the animal, and impede rather than assist the functions of the organs, viscera, and limbs. This art, if properly understood, should impart the greatest facility of wind, and join to lightness of the body the greatest possible elasticity and strength of the muscular system. Such is properly the art of *training*, to which we refer the reader, and in which, though great things have been done, more wonderful might be yet effected; if to a well-founded view of nature in these animals was added all that consummate and well-placed art

could bring to her assistance, for nature we are led to believe has been but too often thwarted instead of assisted by the arts of stable-men, jockies, and smiths.

Though mere practice alone will teach much, yet when combined with a just system or knowledge of cause and effect, the art, whatever it be, may be carried to much higher perfection than it can otherwise.

For the present, we only treat of condition in horses, for the common and ordinary purposes to which they are applied.

To stable servants is left in general the physicking, dieting, and conditioning the horse; and a mystery has often, with the ignorant, more charms than the clear face of truth herself. The effects of drugs upon horses are very little known, perhaps, except the purgative effect of aloes, and the diuretic effect of soaps and turpentine, and neutral salts; we have scarcely any medicine whose effects we really know upon the horse, or that appears at present likely to be known, yet are grooms ever physicking their horses with some drugs or other; good clean food in plenty, dry lofty stables, gentle exercise, and attention to the skin in keeping it clean, will bring almost any horse that is out of condition into condition, unless there be some lurking disease; yet nauseous drugs are added to their food, and they are pleased to fancy that the effects they experience result from these, though it is more probable, as far as they go, and in the uncertain and often idle doses in which they are exhibited, that they prevent, rather than assist, the purpose they have in view, and rather disturb their digestion, and weaken the stomach, than assist it; or more certainly render nauseous and loathsome the food they could otherwise relish; antimony, nitre, brimstone, cleampare root, &c. are among their secrets for this purpose. Antimony is, however, believed, by better judges than these, to affect the skin of the horse, and promote perspiration; this it may possibly do. We may, however, just remark, that where it affects the skin, it has the power of affecting the stomach; but with pigs, horses, and a variety of other animals, it does not affect the one, and one should doubt whether, in these cases, it would affect the other; for in no quantity whatever, and we have given 4 oz. at a dose, does it appear to affect the stomach; nitre in larger quantities than they are used to give, will increase the urine; but how this promotes condition, we have not yet been informed. The rest of their nostrums are obviously inert, at least their actual effects, when pushed, till they become externally sensible, have never been exhibited; and unless they are, we cannot know them. There is, however, another, and a more certain purpose answered, in the administration of their drugs, and to which the science of medicine, in ignorant hands, is but too frequently made subservient; and without which, we believe, there would not be so much anxiety about the administration of them.

There is one instance, however, in which we rejoice to have it in our power to concur with these men in the use of medicine, and that is on horses coming from grass; this appears to be a really useful practice, and we think, from sufficient experience, we can vouch for the fact, though to give medicines without a direct indication for their use, would at first appear repugnant to reason, yet it is usual with grooms to give one, two, or more doses of physic, on the horse being brought from grass "to clear him out," as they say; but if such were the only effect, there would be no occasion for it, as the grass would very naturally come away from him without its good effects: we shall give a different account of the sudden change of life, from green relaxing watery food, as grass, to dry hay and stimulating corn; from free open air and nightly dews, and all kinds of weather, to a

close, low, foul, and crowded stable, the air of which is heated to an excess, and filled with stimulating exhalations from the dung; the water which had been received in quantities unrestrained, is now portioned out (though it is really more necessary) in miserable pittaunces. The body, before exposed, is wrapped in rugs and cloths, and the whole system becomes heated and inflamed by the sudden changes, inflammatory complaints of the lungs, eyes, palate, throat, intestines and feet, are produced; and it is therefore useful on this account, in keeping off these attacks, to lower the habit by physic, after the horse has been a few days in the stable, and to pass by slow degrees to the excessive use of these vigorous stimuli. Dealers like to mix carrots with their corn, and bleed occasionally, and give bran mashes, which has the same effect.

In turning out also, grooms are again for physicking their horses, and under the same pretence of clearing them out, and preparing them for grafs. They will, however, be sufficiently lowered and reduced by the grafs itself, without any additional reduction by physic. It may not be an useless precaution, however, to withdraw by deprees the use of corn, previous to turning out, and the removing all sort of clothing, to give water in greater abundance, that the change may not be too suddenly felt, and bring on broken wind, farcy, and the diseases induced by too great debility.

In Arabia, where the finest horses of the world are produced, a late traveller in those countries, (Mr. Barker), informs us of the extraordinary simplicity of their treatment of them. They do not use any instrument for dressing or cleaning them. They merely fasten them to a picket by the leg or a halter, to give them their food, which, during the spring, consists only of grafs; and when the earth no longer produces that nutriment, they supply the want by camel's milk, which, he says, is most assuredly preferable to any kind of grain.

Beans, malt, oats, clover, hay, and meadow hay, are the general food of horses in England, and are supposed to be stimulant or invigorating to the system of the horse, in the order in which we have placed them. Barley was the ancient food for horses, the discovery of oats being comparatively of modern date.

In the north of Holland, they feed their horses principally on the black four bread called bumpnickle, made of buck wheat, and there it is eaten also by a large share of the inhabitants; for this purpose, they alight from their vehicles, and, without taking the horses out of their hempen traces, cut it in slices, and give them to eat. We observed that they appeared relaxed by it, but apparently without much debilitating them, as they seemed to do their work very well.

In the "Museum Rusticum" is a proposition founded apparently on actual experiment of feeding horses on carrots, vol. i. p. 333. The following remarks we think worth recording from that communication: "I have a couple of hunters which I value as being very good horses, and these I feed in the season with very little else besides carrots well cleaned from the dirt, and loaves made of the meal of barley and oats, mixed sometimes with a small admixture of coarse but good wheat meal; and if they require to be loosened in their bodies, I now and then give them some bran. As to hay, they eat at this season but little of it, of oats none at all, yet they go through their work to admiration."

Furze or whinns has been found useful food in sustaining horses, after it has been bruised, and the spines or prickles crushed; this some horses will naturally do with their feet.

Dr. Darwin relates, that on one particular common, all the horses do it; and that fresh comers starve, till by imitation they learn this practice, as the common, in other respects, is very barren. In Wales, mills, we understand, have been used for crushing the furze for cattle.

Sainfoin is a food that horses are very fond of; but as they eat it very greedily, too much should not be allowed at once for fear of indigestion, and it serves better for horses of slow draught, being a coarse heavy food.

Salt is imagined an useful addition to the food of horses, Salt marshes have often a preference given them over other ground for horses and cattle; whether it is the salt that in itself operates beneficially, or whether the herbage itself is altered by it, and is rendered more salutary to the cattle, is not known. The same correspondent, in the Museum Rusticum, says that salt in substance is abundantly distributed in the mountains by the Swifs, for the use of their cattle and horses, who become excessively fond of it, and more healthy in consequence; it is conceived to be an antidote to worms and other formations in the body, and the long continued use of it to cure them when formed, vol. i. p. 99. Horses, he observes, are fond of it with their oats.

Horses when at liberty are almost ever feeding, therefore long fasting must be injurious to the stomach, and should be as much as possible avoided; they would also naturally, there is reason to believe, feed principally during the night, and sleep during the day; their sleep, however, is hardly ever, in health, profound and fast, but is a state of watchful dozing.

Horses are naturally gregarious, and though they will do very well alone, company, where there is an opportunity for it, is preferable for their health. The stable should be lofty, so as not to confine an atmosphere about them, loaded with exhalations from their own bodies and their dung; the loftiness alone of the stable is their best airing; all partial draughts from doors, windows, or holes into the loft, as far as they affect them, are injurious; for we have often remarked, that though they bear the coldest weather of our seasons when turned out, yet they easily take cold from partial draughts in stables, inasmuch, that persons not attentive to these effects would hardly believe their facility.

In cleaning the skin, the curry-comb is considered as a necessary implement. In warmer climates, where the scurf comes away more freely, this instrument is not so much used; and here it is often used to horses whose skins are particularly thin and sensible, yet no difference is made; and though the animal expresses, in every way he can, the excessive torture it occasions, yet it is persisted in, and violence is often had recourse to, to enforce it, and horses are thus rendered vicious and untractable. Where this is found to be the case, it would save much trouble and inconvenience to use a milder kind of comb, or to lay it aside altogether, and use a stiff brush made for the purpose. It is more easy by violence and punishment to create vice, than to overcome a natural dislike by it.

Warm clothing, on account of its keeping up a free perspiration, tends to render the skin cleaner, makes the coat lie better, and have a more glossy appearance, and saves trouble. It is too often, however, carried to an excess, and two or three hot rugs keep the horse in a perpetual fever; and as they are all taken off, when he is most exposed, on going out, the sudden check given to the perspiration by the elements without, lays the foundation of disease, and occasions inflammations of the lungs, catarrhs, and coughs, that might as well be avoided by more moderate and judicious proceedings, besides the weakening effects of such violent perspirations.

There is a principle in feeding them that ought not to be overlooked; which is, that good food may be carried too far, till, instead of condition, it produces fever and disease, and destroys the condition it is meant to promote. Green vegetable food fills out the body; and from its weight and watery nature weighs down the abdomen, giving an unrightly appearance. Some horses, however, can work with this, that more stimulating food does not suit so well. The dry diet braces the system, and draws up the abdomen. The food is longer retained in the large intestines, which occasions the flanks to appear full and rounded, and greatly adds to the beauty of the horse's make in these parts.

Some horses we have noticed have voracious appetites, and devour great abundance of corn, and whatever is set before them, yet always look meagre and out of condition. When this has been the case, we have been led to believe that by too much food, and of too heating a quality, the stomach and intestines have been paralyzed, and lost their powers of forming chyle, or absorbing it. Turning out to the green pasture will often bring them into condition, and they fall off again in the stable. Horses of small make and fiery temper are, we have thought, more particularly subject to this disease.

Water, like the food, should be given often, and not in too large quantities: stinting horses is a dangerous custom; it induces them, where there is an opportunity to take enough at once, to break their wind, or otherwise injure themselves. See art. *BROKEN WIND*.

The skin, to look well and healthy, should be smooth, supple, and easy upon the muscles, free from knots, and by no means tight about the ribs. The hair clean, bright, and glossy, lying to the skin, and not distorted, or turning away from it, or twisted, dry, or thrady. The effects of cold air on the skin of the horse, in setting up the hair, is well known to the grooms, who cautiously avoid it.

Exercise to animals by nature born to be fleet, is particularly necessary; besides the good it does in moving and forwarding all the secretions and excretions. This should be gentle or vigorous, proportioned to the strength and state of the horse, without distressing or too much fatiguing him. A gentle perspiration loosens the scurf, and makes him clean better.

The hide soon gets foul, and a groom that has much pride in the appearance of his horse, is almost incessantly currying, brushing, and hard rubbing the coat.

It is a customary thing with the dealers in horses, in forming a judgment of the actual state of the horse, and whether his condition will admit of farther advancement, to handle the crest, or upper part of the neck which carries the mane: if this be lax in the hand, and easily pliant, it is presumed the condition may be carried farther; if, on the contrary, this part has a stiff tense feel, it is considered that farther improvement is not to be expected. Among the acknowledged indications also of poverty and good condition, is the poor mark in the buttock, that is the channel, or depression running down the buttock, at its posterior part; being a depression formed between the muscles. If this channel is very visible and deep, the horse is out of condition; if obliterated, so as to be hardly visible, he is considered in condition.

Blood horses are more easily cleaned than the common kind of horses; their coat is not so thick, it does not retain the perspiration so much, and the hair takes a better polish; which makes an experienced groom always prefer them.

Too great excitement from the food, and undue fever, may be known by the heat of the mouth, the fulness of the

veils of the eyes, the strength of the pulse, and diminished appetite; the skin also, and extremities, are found too hot or too cold, languor and weakness follow: the remedies are before stated.

CONDITIONAL, something not absolute, but subject to limitation.

Conditional legacies are not due till the conditions are accomplished.

The Arminian divines maintain, that all the decrees of God, relating to the salvation and damnation of man, are truly conditional; and the Calvinists, that they are all absolute. See *ARMINIAN*, &c.

CONDITIONAL conjunctions, in *Grammar*, are those which serve to make propositions conditional. As, *if, unless, provided that, in case of, &c.*

Mr. Horne Tooke, in his "EHEA HTEPOENTA, or Diversions of Purley," &c. has given us a new system, with regard to these conditionals, as well as other conjunctions. Our conjunction *if*, he says, is merely a verb; being the imperative of the Gothic and Anglo-Saxon verb *ΓΙΨΑΝ*, *Giþan*. And in those languages, as well as in the English formerly, this supposed conjunction was pronounced and written as the common imperative, purely *ΓΙΨ*, *Liþ*, *giþ*. In proof of the truth of this etymology of the word *if*, the author observes, that when-ever the datum upon which any conclusion depends, is a sentence, the article *that*, if not expressed, is always understood, and may be inserted after *if*. But the article *that* is not understood, and cannot be inserted after *if*, where the datum is not a sentence, but some noun governed by the verb *if* or *give*. This, he says, will hold universally, not only with *if*; but with many other supposed conjunctions, such as, *but that, unless that, though that, lest that, &c.* which are really verbs, put in this manner before the article *that*. *An*, now indeed obsolete, but formerly often used to supply the place of *if*, is also a verb; being nothing else but the imperative of the Anglo-Saxon verb *Anan*, which likewise means to *give* or *grant*. If recourse should be had for consulting the author's opinion on the conditionals of the Greek and Latin, and Irish, the French, Italian, Spanish, Portuguese, and many other languages, he obviates the objection by alleging, that those words which are called conditional conjunctions, are to be accounted for in all languages in the same manner as he has accounted for *if* and *an*. Not that they must all mean precisely as these two do—*give* and *grant*; but some word equivalent: such as, *be it, suppose, allow, permit, put, suffer, &c.*; which meaning is to be sought for from the particular etymology of each respective language. "To put this matter of doubt," he says, "I mean to discard all supposed mystery, not only about these conditionals, but about all those words also which Mr. Harris and others distinguish with prepositions, and call conjunctions of sentences. I deny them to be a separate sort of words or part of speech by themselves. For they have not a separate manner of signification; although they are not devoid of signification. And the particular signification of each must be sought for amongst the other parts of speech, by the help of the particular etymology of each respective language. By such means alone can we clear away the obscurity and errors in which grammarians and philosophers have been involved by the corruption of some common words, and the useful abbreviations of construction." See **CONJUNCTION**.

CONDITIONAL propositions, in *Logic* are such as consist of two parts, connected together by a conditional particle. Of these, the first, wherein the condition lies, is called the antecedent, and the other the consequent.

Thus, "if the soul be spiritual, it is immortal;" is a conditional

conditional proposition, wherein, "if the soul, &c." is the antecedent, and "is immortal" the consequent.

The truth of these propositions depends on the truth of the connection of them, and they may be properly denied or contradicted when the negation affects their conjunctive particles. See PROPOSITION.

CONDITIONAL *syllogism*, is that whose major or minor, or both, are conditional propositions: *e. gr.* "If there be a God, the world is governed by Providence; but there is a God, therefore the world is governed by Providence." See SYLLOGISM.

CONDITIONAL *estate, fees, pardons, and resignations*. See the SUBSTANTIVES.

CONDITIONALS, *science of*, i. e. of *conditional truths*, imports that knowledge which God has of things, considered, not according to their essence, their nature, or their real existence; but under a certain supposition, which imports a condition never to be accomplished.

Some of the schoolmen deny, that God has the knowledge of conditionals: the Thomists maintain, that God's knowledge of conditionals depends on a predetermining decree; others deny it.

F. Daniel observes, that the truths which compose the knowledge of conditionals, being very different from those which compose the knowledge of intuition, and that of understanding; a third class must be added, and the knowledge of God be divided into *intuitive, intellectual, and conditional*. See KNOWLEDGE.

CONDIVI, ASCANTO, in *Biography*, an artist whose works of painting and sculpture are now unknown. He is indeed said to have possessed but an humble share of talent, inasmuch that although he had the good fortune to be the inmate and disciple of the great Michelangelo Buonaroti for many years, he never attained eminence.

The world however has obligations to Condivi for the life which he wrote of his master, in somewhat the form of a journal, and which he published in 1553, ten years prior to the death of Michelangelo. Mr. Mariette, the celebrated connoisseur, was decidedly of opinion that the greater part of this narrative was written absolutely under the immediate instigation and guidance of Michelangelo himself, and of course considered it as infinitely more authentic than the florid, but hasty, composition of Vasari. Vasari had published a life of the great Florentine artist in his first edition of 1550. Condivi points out and corrects many of his errors. This Vasari indignantly resents in his second edition of 1568; but as Michelangelo was then no longer alive to decide their respective claims, the veracity of Condivi should suffer no imputation. Vasari however relates many things which the other omits, dwells more largely upon others, and in his second edition gives us the sequel of Michelangelo's life, with a long description of his magnificent funeral, &c. it was therefore desirable to unite these and other scattered materials into one work: this has lately been done by Mr. Duppa in a handsome quarto volume.

The first edition of Condivi is in quarto and become rare. Another edition, with copious notes by Antonfrancesco Gori and Mariette, together with extracts from Vasari, was published in Florence, 1746, in folio.

CONDIVICNUM, in *Ancient Geography*, Nantes, a town of Gallia Lyonenfis, according to Ptolemy, and capital of the Namneti, from whom it took its name.

CONDOCHATES, a river of India, on the other side of the Ganges, according to Pliny and Arrian, which discharged itself into the Ganges, about the 26th degree of latitude.

CONDOLENCE, in *Ethics*. See COMMISERATION.

CONDOM, in *Geography*, a town of France, in the department of the Gers, and chief place of a district, situated in a beautiful valley on the river Baïse, 27 miles N.W. from Auch, and 60 S.E. from Bourdeaux. It has a sub-prefect and a court of justice. The place contains 6917, and the canton 13,232 inhabitants. The territory of the canton includes 247½ kilometres and 16 communes. The whole district counts 128 communes and 67,103 inhabitants, upon a territorial extent of 1662½ kilometres. Its soil is in general fertile, except in the southern part, which is an extensive barren heath; but as there are many mud pits, the waste land is improved with mail, which renders it tolerably fertile for a term of 20 years, at the end of which the ground is suffered to lie waste again, and another extent of heath is rendered productive upon the same plan. Corn, wine, and brandy are the chief articles of trade, most of which are sent to Mont de Marsan and Bourdeaux.

CONDOMOIS, a country of France, before the revolution, of which Condom was the capital.

CONDOMA, in *Zoology*, the name given by Buffon to the striped antelope of Pennant, the antelope strepticeros of Gmelin's Linnæus, the cervus capensis, or cape deer, of Collin. Aët. Ac. Theod. Palat. 1. 487, the bos strepticeros of Aldrovand, the strepticeros of Cams, Gesner, and Jonston, and the wild goat of Kolben, &c. It has long, compressed, wrinkled, tapering, sharp-pointed spiral horns, with a ridge on one side which follows the wreaths; the body has a white line along the back, and several white stripes across from that down the sides towards the belly and thighs. This animal inhabits the country near the Cape of Good Hope. It is near nine feet long from the nose to the rump, and four feet high at the shoulders; the body is long, slender, and of a reddish-grey colour; the face is brown, having a white line from the corner of each eye, running forwards and uniting above the nose; the transverse stripes above-mentioned are, in general, seven in number, four of which point towards the thighs, and three to the belly; it has a short mane on the neck, and long hairs hanging down from the throat to the breast; the breast and belly are grey; the tail, two feet in length, is brown above, white on the under side, and black at the end; the horns are of a dusky colour, and naturally wrinkled, though such as are brought to Europe are highly polished; they are near four feet long, close at the bases, above two feet and a half distant at the points, and have two spiral screw-like turns. The female has no horns. It is said to leap with surprising activity to a great height.

CONDORCET, JEAN ANTOINE, NICHOLAS CARITAT, *Marquis of*, in *Biography*, celebrated as a writer and political character, was descended from an ancient family in Picardy in France. He was born in 1743, and was educated at the college of Navarre, where he exhibited an ardent thirst for physical and mathematical pursuits, and acquired the reputation of a hard student. Condorcet first attracted public notice as a mathematician, by his treatise "On Integral Calculations," which he wrote when he was only twenty-two years of age, and in which he proposed to exhibit a general method of determining the finite integral of a given, differential equation, either for differences infinitely small, or finite differences. D'Alembert and Bezout, the commissioners of the academy, employed to examine the merits of this performance, declared that the greater part of the methods were of the author's own invention, that the production itself indicated a degree of knowledge very seldom to be met with at so early an age, and that it afforded a preface of talents worthy of being excited by the approbation of the academy. This was followed by his "Essay on Analysis," and other works, which shewed his skill in
analytica

analytical researches. In the year 1769, he was admitted member of the Academy of Sciences, the memoirs of which were enriched by various dissertations presented by him on the most abstruse subjects. During the administration of Turgot, celebrated no less for his integrity, than for his high talents, Condorcet was applied to for assistance in arranging plans for economical reforms in the state. In 1773 he was appointed secretary to the Academy of Sciences, when he composed eulogies upon several deceased members who had been neglected by Fontenelle. At this period he was the friend and intimate associate of Voltaire, D'Alembert, and other distinguished characters. Like D'Alembert he united in himself the reputation of an elegant writer, and of profound science; and in 1782 he was received into the French Academy, on which occasion he delivered a discourse concerning the influence of philosophy. In the following year he succeeded D'Alembert as secretary to that academy, and pronounced an able eulogy to the memory of his deceased friend, whose literary and scientific merits are set forth with great ability. The death of Euler afforded Condorcet another opportunity of displaying his own talents by appreciating those of the departed mathematician. In his discourse on this occasion, he exhibited a clear and scientific statement of the improvements and inventions introduced into one department of knowledge by the exertions of an individual. The lives of Turgot and Voltaire, and the eulogy pronounced upon the death of the celebrated Franklin, were decided testimonials to the abilities of Condorcet as a biographical writer. Turgot had occupied much of his time and attention with moral and political sciences, and was particularly anxious, for the good of his fellow creatures, that the certainty of which different species of knowledge are susceptible, might be demonstrated by the assistance of calculation, hoping that the human species would necessarily make a progress towards happiness and perfection, in the same manner as it had done towards the attainment of truth. To second these views of Turgot, Condorcet undertook a work replete with geometrical knowledge. He examined the probability of an assembly's rendering a true decision, and he explained the limits to which our knowledge of future events, regulated by the laws of nature, considered as the most certain and uniform, might extend. If we do not possess a *real*, yet he thought, we have at least a *mean* probability, that the law indicated by events, is the same constant law, and that it will be perpetually observed. He considered a forty-five thousandth part as the value of the risk, in the case when the consideration of a new law comes in question; and it appears, from his calculation, which we cannot go into, that an assembly consisting of 61 votes, in which it is required that there should be a plurality of nine, will fulfil this condition, provided there is a probability of each vote being equal to four-fifths, that is, that each member voting shall be deceived only once in five times. He applied these calculations to the creation of tribunals, to the forms of elections, and to the decisions of numerous assemblies; inconveniences attendant on which were exhibited by him. This work furnished a grand, and at the same time, an agreeable proof of the utility of analysis in important matters to which it had never before been applied.

Condorcet at this time flattered the idea of a dictionary, in which objects are to be discovered by their properties, instead of being searched for by their respective names; he also intimated a scheme for constructing tables, by which ten milliards of objects might be classed together by means of only ten different modifications. The talents of Condorcet

were very various, and he distinguished himself by many philosophical and economical discussions, which it is supposed, with great justice, had a great share in producing the subsequent important revolution in France. Without pretending to decide upon the motives of those who were active in achieving the downfall of the French monarchy, we shall bring before the reader a brief account of the part which Condorcet took in this business. Almost all his writings tended to pave the way for that most important change in government which took place in the year 1789. At this period, and in the following two or three years, he engaged in several periodical publications, with a view, no doubt, of guiding the public mind. He was a member of the popular clubs at Paris, particularly that of the jacobins, celebrated for democratic violence, where he was a frequent but by no means a powerful speaker. He was chosen a representative for the metropolis, when the constituent assembly was dissolved, and joined himself to the Brissotine party which, in point of real talents and integrity, were not inferior to any of the contending factions of the day. But they wanted energy to control the people, and finally fell victims to that revolutionary spirit which they had excited. Condorcet at this period was the person selected from the party to draw up a plan for public instruction, which he comprehended in two elaborate and very striking memoirs; the principles laid down were, perhaps, too abstract for general use, and too refined for the present state of society. He was the author of a manifesto addressed from the French people to the powers of Europe, on the approach of war; and of a letter to Louis XVI., as president of the assembly, which was dictated in terms desultory of that respect and consideration to which the first magistrate of a great people has, as such, a just claim. Condorcet attempted also to justify the insults put upon the sovereignty by the lowest, the most illiterate, and most brutal part of a delirious populace. On the trial of the king, his conduct was equivocal and unmanly; he had declared that he ought not to be arraigned, yet he had not courage to defend his opinion or justify those sentiments which he had deliberately formed in the closet.

After the death of Louis, Condorcet undertook to frame a new constitution, which was approved by the convention, but which did not meet the wishes and expectations of the nation. A new party, calling themselves the MOUNTAIN, were now gaining an ascendancy in the convention over Brissot and his friends. At first the contest was severe; the debates, if tumult and discord may be so denominated, ran high, and the utmost acrimony was exercised on all sides. Condorcet always timid, always anxious to avoid danger, retired as much as possible from the scene. By this act of prudence he at first escaped the destruction which overwhelmed the party; but having written against the bloody acts of the mountain, and of the monster Robespierre, a decree was readily obtained against him. He was arrested in July 1793, but contrived to escape from the vigilance of the officers under whose care he was placed. For nine months he lay concealed in Paris, when dreading the consequences of a domiciliary visit, he fled to the house of a friend on the plain of Mont-Rouge, who was at the time in Paris. Condorcet was obliged to pass eight-and-forty hours in the fields, exposed to all the wretchedness of cold, hunger, and the dread of his enemies. On the third day he obtained an interview with his friend; he, however, was too much alive to the sense of danger to admit Condorcet into his habitation, who was again obliged to seek the safety which infrequented fields and pathless woods could afford. Worn at length with fatigue, and want of
 necessary

necessary sustenance, he went to a public-house, and asked for an omelette, which he devoured with so much greediness as to induce the suspicion of a municipal officer who was present. At this period, suspicion and guilt were divided by very narrow boundaries; the unfortunate man was seized and thrown into a dungeon, in order that he might, on the following day, be conducted to the bloody tribunal at Paris. The precaution was, however, unnecessary. Condorcet was found dead in the morning; and as it was generally understood that he was never without a concealed dose of the most active poison, to this cause his melancholy end was generally ascribed. Such was the concluding scene of the career of a man who had sustained a brilliant part on the stage of life. He died March 28, 1794.

His character has been variously estimated. His manners were mild, and his talents were unquestionably of the first order. He is said to have been destitute of those fine feelings which distinguish great and generous minds; and it is allowed on all hands that he was a prey to timidity; a passion which at length induced him to commit the act of suicide. By Madame Rolande, his contemporary and intimate, he was, in his life-time, thus described: "The genius of Condorcet is equal to the comprehension of the greatest truths; but he has no other characteristic besides fear. It may be said of his understanding, combined with his person, that it is a fine essence absorbed in cotton. The timidity which forms the basis of his character, and which he displays even in company, on his countenance and in his attitudes, does not result from his frame alone, but seems to be inherent in his soul, and his talents furnish him with no means of subduing it. Thus, after having deduced a principle, or demonstrated a fact in the assembly, he would give a vote decidedly opposite, overawed by the thunder of the tribunes, armed with insults, and lavish of menaces. The properest place for him was the secretaryship of the academy. Such men should be employed to write, but never permitted to act." Condorcet was married, and lived on the most affectionate terms with his wife. He left one daughter, who has, during the present summer (1807), been married to Arthur O'Connor.

Condorcet was the correspondent of the great Frederic, and of Catherine, the empress of Russia. "Letters to the King of Prussia," he published during his life; and he left behind him, which appeared as a posthumous work, "A Sketch of a Historical Draught of the Human Mind." In this work, he considers man as he has been, as he is, and as he may be; and he inculcates, with great energy, his favourite idea of the perfectibility of the human species, and of its advance to actual perfection. He left behind him also "A Treatise on Calculation," and "An Elementary Treatise on Arithmetic." His work on the human mind was written during the months that he secreted himself from the savages who were seeking for his blood, with more than inhuman fury; and it is remarkable, and to the credit of the writer, that under such circumstances, dreading death at every instant, he could compose so able a treatise, and feel the conviction of the progress of his fellow creatures towards moral improvement. *Memoirs of the French Revolution.* Rolande's *Memoirs.*

CONDORE, or PULO CONDORE, in *Geography*, an island of the East Indian ocean, about 20 leagues from the coast of Cochinchina, taking its name from two Malay words, *Pulo* signifying an island, and *Condore* a calabash, of which it produces great quantities. This island is high and mountainous, and surrounded by several smaller islands, some of which are less than one, and others two miles distant. It is of the form of a crescent, extending, says Capt. King,

near 8 miles from the southernmost point, in a N.E. direction, and its breadth no where exceeds 2 miles. Sir Geo. Staunton says, it is 11 or 12 miles in length, and about 3 in breadth, confining of a ridge of peaked hills. From the westernmost extremity, the land trends to the S.E. for about 4 miles, and opposite to this part of the coast there is an island, called by Mons. D'Après "Little Condore," which runs two miles in the same direction. This position of the two islands forms a safe and commodious harbour, the entrance into which is from the north-west. The distance between the two opposite coasts is $\frac{3}{4}$ of a mile, exclusive of a border of coral rock, which runs down along each side, extending about 100 yards from the shore. The anchorage is very good, from 11 to 5 fathoms water, but the bottom is so soft and clayey, that great difficulty occurs in weighing the anchors. Toward the bottom of the harbour, there is shallow water for about half a mile, beyond which the two islands approach so near each other, as to leave only a passage at high water for boats. The most convenient place for watering is at a beach on the eastern side, where is a small stream that furnishes 14 or 15 tons of water a day. Sir George Staunton says, that beyond the beach, which stretches across two-thirds of the entrance, at the southern extremity of the spacious bay on the eastern side of the island, there is a safe passage to the inner part of the bay, the north of which is sheltered by a small island lying to the eastward. The whole of the bay, he says, is formed by four small islands, which approach so nearly to each other as to appear, from several points, to join. They all seem to be the rude fragments of primitive mountains, separated from the great continent in the lapse of time. This island has convenient anchoring places in either monsoon; and Sir Geo. Staunton stopped there, on the 17th of May, in a spacious bay on the eastern side of the island. Capt. Gore, on the 20th of January, stood for the harbour on the S.W. end of the island, which, having its entrance from the N.W. is the best sheltered during the N.E. monsoon.

This island, both with respect to animal and vegetable productions, is considerably improved, since the time when Dampier visited it. Neither that writer, nor the compiler of the East Indian Directory, mention any other quadrupeds besides hogs, which are said to be very scarce, lizards, and the guanoes; and the latter, on the authority of Mons. Dédier, a French engineer, who surveyed the island about the year 1720, says, that none of the fruits and esculent plants, so common in the other parts of India, are to be found here, except water melons, a few potatoes, small gourds, *chibbols* (a small species of onion), and little black beans. At present, besides the buffaloes, of which there are large herds, it supplies remarkably fine fat hogs, of the Chinese breed. There are also some of the wild tort in the woods, which also abound with monkeys and squirrels. One species of the squirrel is of a beautiful shining black colour, and another species is striped brown and white, which is called the flying squirrel, from its being provided with a thin membrane, resembling the wing of a bat, extending on each side of the belly, from the neck to the thighs, which, in stretching out the legs, spreads, and enables it to fly from tree to tree, to a considerable distance. Lizards are found in great abundance; but Capt. Gore says, that none of his company discovered the guano, and another animal described by Dampier as resembling the guano, only much larger. Among the vegetable improvements of the island are fields of rice and tobacco, and groves of cabbage palm-trees, plantains, various kinds of pumpions, cocoa-nuts, oranges, shaddockes, and pomegranates. These improvements are ascribed to the French, for the purpose of making

It a more convenient refreshing station for any of their ships that may be bound for Cambodia, or Cochin-china; and for this purpose it is well situated. The woods are well stocked with feathered game; and particularly with wild hens and cocks, resembling those of our own country. The land in the neighbourhood of the harbour is a continued high hill, richly adorned with a variety of fine tall trees, from the summit to the water's edge; and among others the tea-tree described by Dampier.

The town in this island is situated near the sea side, at the bottom of a retired bay, which affords a safe roadstead during the prevalence of the S.W. monsoon. It consists of between 20 and 30 houses, built close together; besides six or seven others that are scattered about the beach. The roof, the two ends, and the side fronting the country are neatly constructed of reeds; the opposite side, facing the sea, is entirely open; but by means of a fold of bamboo screens, they can exclude or let in as much of the sun and air as they please. There are other large screens or partitions, for the purpose of dividing, as occasion requires, the single room, of which the house properly speaking, consists, into separate apartments. The largest house of the town, belonging to the chief or captain, had a room at each end, separated by a partition of reeds from the middle space, which was open on both sides, and provided with partition-screens like the others. It had, besides, a pent-house, projecting four or five feet beyond the roof, and running the whole length on each side. At each end of the middle room were hung some Chinese paintings, representing men and women in ludicrous attitudes. In this apartment Capt. Gore's companions were civilly desired to seat themselves on mats, and they were presented with betel. In one of the apartments, visited by Sir George Staunton, was an altar decorated with images; and the partitions were hung with figures of monstrous deities; but the countenances and deportment of the people exhibited no idea of religious awe, nor was any person observed in the posture of prayer or adoration. A few spears stood against the wall with their points downwards, together with some match-locks, and a swivel-gun.

The inhabitants of this island, who are fugitives from Cambodia and Cochin-china, are not numerous. They are of a short stature, very swarthy, and of a feeble, unhealthy aspect, but seemingly of a gentle disposition. The dress of these people is composed chiefly of blue cotton, worn loosely about them; and their flat faces and little eyes indicate a Chinese origin or relation. Their colloquial language is altogether different from that which is spoken in China, but their written characters are all Chinese.

The English settled in this island in 1702, when the factory of Chusan, on the coast of China, was broken up, and brought with them some Macassar soldiers, who were hired to assist in building a fort; but the president not fulfilling his engagement with them, they watched an opportunity, and in one night murdered all the English in the fort. Those without the fort, hearing a noise, took the alarm, and ran to their boats, very narrowly escaping with their lives; but not without much fatigue, hunger, and thirst, to the Johore dominions, where they were treated with great humanity. Some of them afterward went to form a settlement at Banjer-Massin, in the island of Borneo. Since this event, no Europeans have ever resided in this island. The latitude of this island, calculated from a meridional observation, as stated by Sir Geo. Staunton, is $8^{\circ} 40' N.$; and its longitude, according to a good chronometer, $105^{\circ} 55' E.$ The harbour in which Capt. Gore was stationed, is in N. lat. $8^{\circ} 40' E.$ long., deduced from a great number of lunar observations, $106^{\circ} 18' 46''$; dip of the N. pole of the mag-

netic needle, $2^{\circ} 1'$; variation of the compass, $0^{\circ} 14' W.$; high water at the full and change of the moon, $4^h 16'$ apparent time. The water rose and fell 7 feet 4 inches perpendicular. Voyage to the Pacific Ocean, by captains Cook, Clerke, and Gore, vol. iii. p. 450. &c.

CONDOR, in *Ornithology*, the *Vultur Gryphus* of Latham, (Ind. Orn.) Klein, Brisson, Borowski, the condor of Lact and Ray, the conder of Prezier, Condamine, Buffon, and Molina, and the condor of Latham (Syn. and Sup.) is a bird of enormous size, having a longitudinal warty excrescence on the crown of the head, and a naked throat. It inhabits South America; and its size is so enormous that the wings, when extended, measure 9, 12, or even 16 feet from top to tip; the largest quill-feathers of the wings sometimes measure $2\frac{1}{2}$ feet in length, and the quill-part $1\frac{1}{2}$ inch in circumference. The body is of a black colour, with a white back; the neck is surrounded with a collar of longish white feathers; the chin is reddish; the head is clothed with brown down or wool; the eyes are black, with chestnut or light reddish irides; the bill is black, with a whitish point; the legs and feet are black, and the claws are straightish; the tail is small. The female is considerably larger than the male, which it resembles, except in having a crown crest or tuft on the scrag, or hinder part of the neck. The condore builds its nest on the highest mountains, under the shelter of some projecting shelf of a rock, in which the female lays two white eggs. It preys on calves, sheep, goats, and such animals, and when very much pressed by hunger, it has been known to carry off children of ten years of age; and two of them are said to be able to devour the carcase of a cow at one meal. When it alights upon the ground, or rises from it, the noise it makes with its wings is such as to terrify, and almost to deafen, any one who happens to be near the place. Don Ulloa informs us, that he actually saw one of them rising with a lamb in its talons. The Indians have various ways of catching them: besides traps and snares laid for them near any carion, they kill a cow or other animal, and moisten its flesh with the juice of some strong intoxicating herbs, and then bury the body till it putrefies. In this state they take it up and lay it on the ground; and when the condores come near to devour it, they are intoxicated and rendered motionless, when the Indians fall upon and kill them.

CONDORMIENTES, religious sectaries, whereof there have been two kinds. The first arose in Germany, in the thirteenth century; their leader was a native of Toledo. They held their meetings near Cologne; where they are said to have worshipped an image of Lucifer, and to have received answers and oracles from him: the legend adds, that an ecclesiastic having brought the eucharist to it, the idol broke into a thousand pieces; which put an end to the worship. They had their name from their *lying all together*, men and women, young and old.

The other species of Condormientes were a branch of Anabaptists in the sixteenth century; so called, because they lay, several of both sexes, in the same chamber; on pretence of evangelical charity.

CONDOTTIERI, in the Italian *Policy*, denoted leaders of bands, who, in the 15th and 16th centuries, made a trade of war, and raised soldiers in order to hire them out to different states.

CONDREN, CHARLES DE, in *Biography*, superior general of the fathers of the oratory, was born near Soissons in the year 1588. By his father, who was in high estimation in the court of Henry IV., he was designed either for a

pest about the king, or for the military profession. His own inclinations, however, led him to think of the church, as most suited to his talents, to which, after some hesitation, his father gave an assent. He accordingly prosecuted his studies in the college of the Sorbonne at Paris, was ordained priest, and admitted a doctor of that society in the year 1614. In the following year he became a member of the congregation of the oratory, and founded some houses belonging to that order. He was not long in obtaining a distinguished reputation for integrity and prudence as a man, and for piety and benevolence as a priest. On account of these traits in his character he was fixed upon as the most proper person to be confessor to the duke of Orleans, only brother to Louis XIII. In this situation he was successfully employed in confidential business between the duke and the king, and was the happy means of restoring these princes to a mutual good understanding with one another, after long and violent disagreements. For these services he was offered the archbishopric of Lyons, and a cardinal's hat; but he declined accepting offices of honour and emolument for having performed those acts, which, his religion taught him, were binding upon every Christian. He died in the year 1641, leaving behind him many pieces which evidenced superior talents, and a sincere piety. His principal works are, "Discourses and Letters," 2 vols. 12mo. 1648; and "An Explanation of the Priesthood of Jesus Christ," published in 1677. Father Amelotte drew up an account of his life, in which there is a collection of his letters and maxims with an exposition of his opinions. *Nouv. Dict. Hist.*

CONDRIEUX, in *Geography*, a small town of France, in the department of the Rhône, at the foot of a hill on the river Rhône, 21 miles south from Lyons. This place is celebrated for its excellent sweet wine.

CONDROS, **CONDROTZ**, in *Geography*, is a tract of land in the circle of Westphalia, situated in the bishopric of Liege, which formed part of the German empire, and is now incorporated with France. Condruz, in ancient geography, was reckoned part of Belgica. Huy, which was considered as the principal town of Condros, is, at present, the chief place of the district of the same name in the department de l'Ourthe. See *Huy*.

CONDUCT, *verb.* See *SAFE-conduct*.

CONDUCTOR (from *conduct*, and to *conduct* from the French *conduire*) *prime*, in *Electricity*, is a body of a conducting substance, (*viz.* such as will transmit the electric power or fluid) placed immediately before the glass cylinder, or globe, or plate, or other excitable body, of an electrical machine. Its office is to collect the electricity, and to convey it either in the form of sparks, or silently, to other bodies that may be presented to it in the course of experiments. Without this prime conductor no large sparks could be drawn immediately from the excited electric, because the electric body, being in its nature incapable of conveying the electric fluid through its substance, discharges, on a body which is presented to it, that quantity of electricity only which is accumulated upon a small part of its surface. But when the prime conductor is placed before the excited electric, the former successively collects all the electricity from the surface of the latter, whilst revolving; and if a proper body be brought near its surface, the electricity which has been accumulated, will rush from every part of the surface of the prime conductor in a copious stream, or in a full spark, to that body.

The forms of prime conductors have been continually varied from the very first invention of electrical machines, according as new discoveries, or the progress of experience, have either detected former defects, or suggested more ad-

vantageous forms. A gun-barrel, or a metallic chain, supported by silk strings, formed the prime conductor of the earliest electrical machines, *viz.* such as were used towards the beginning of the last, or eighteenth century. And in consequence of this usage some distinguished late writers on the continent, have retained the name of *chain* for the prime conductor, long after the shape of that instrument had undergone a total alteration. See "L'Électricité artificielle del P'Beccaria."

Though the gun-barrel or the chain would be highly improper for the modern electrical machines, either of them was quite sufficient for those of the old construction, in which the excitation was very slight and difficultly obtained. But when the glass globes or cylinders began to be made much larger, when a better method of excitation was discovered, and especially when Mr. Canton's amalgam was introduced, to which the great power of the modern electrical machines is principally owing; then the chain or the gun-barrel was found incapable of retaining the electric power, so that every narrow edge, or point, or curvature of the same, was found to dissipate the electricity into the surrounding air, as could be easily perceived in a darkened room. This suggested the idea of enlarging the size, and smoothing the irregularities of the prime conductor, in consequence of which some prime conductors were made of brass, others of tin, or even of gilt paper; and their shape became much more regular and compact. A cylinder with spherical terminations has been the most usual form of prime conductors. A few were made spherical; Dr. Priestley used one of a pear-like figure, and some have also been made of other fanciful shapes. But amongst all those forms, that which the practice of the best electricians has found to be, upon the whole, the most eligible, is the abovementioned one of a cylinder with hemispherical terminations. Those terminations, in small prime conductors, sometimes are made a little larger in diameter than the cylinder; but in the prime conductors of the larger kind, they do not project beyond the surface of the cylindrical part. As the conducting nature of their substance must be of the best kind, the prime conductors are made of metal, at least on their surface. The small ones are made of hollow brass, or tin plates, or of wood covered with tin-foil. But the large ones are almost always made of wood, or paste-board covered with tin-foil. The prime conductors of tin are frequently covered with a black varnish, which is preferred cleaner than the surface of the tin, and may perhaps in some measure prevent the dissipation of electricity from their surface. In any construction, care must be had, that the surface of the prime conductors be quite free from points, and sharp edges; and if holes are to be made in them, which indeed are necessary for the performance of various experiments; these should be well rounded off and their edges burnished. The prime conductor is generally supported in an horizontal position, by one or two glass sticks, which proceed from the bottom board of the electrical machine, or from separate wooden stands; the extremities of those glass sticks entering a little way within the surface of the conductor. The direction of the prime conductor is mostly perpendicular to the axis of the glass cylinder of the machine; but in some electrical machines, the conductor, or two conductors, are situated parallel to the abovementioned axis. When two conductors are affixed to the machine, one of them, which collects the electric fluid from the excited glass, is called the *positive conductor*, and the other, which is connected with the rubber, is called the *negative conductor*. At that extremity of the prime conductor, which stands nearest to the glass globe or cylinder, when the former is perpendicular to the

axis of the latter, or on the side when it stands parallel, lie collector is affixed. See COLLECTOR.

To the opposite extremity of the prime conductor which stands farthest from the glass cylinder or globe, a thick brass wire, with a pretty large and smooth brass ball, is usually affixed, and from this ball the longest and densest spark can be drawn; the greatest endeavour of the electric fluid to escape from the prime conductor being made at that extremity. In plate machines, viz. where glass plates are used instead of a globe or cylinder, the extremity of the prime conductor is furnished with two semicircular projections, which carry the collecting points at their extremities. The size of the prime conductor must be proportionate to the size of the machine; for if the prime conductor be too small, the sparks that are drawn from it will not be of the largest size possible to be obtained with that machine; and, on the other hand, if the prime conductor be too large, the dissipation of electricity from its surface will be very considerable. It is difficult to determine the exact size which might be the most advantageous for a given machine; for even with cylinders of the same size, different prime conductors might be used, according as the glass cylinders are more or less capable of a vigorous excitation. With one of the largest glass cylinders ever made in this country, which measured two feet in diameter, a prime conductor of wood covered with tin-foil was used, which measured six feet in length and 18 inches in diameter. With a small machine, the cylinder of which was seven inches in diameter, a prime conductor of two feet by three inches and a half was found the most advantageous. When the electrical machine is to be used only for charging a battery, then it will be better to use a very small prime conductor.

The forms of the above-mentioned prime conductors are represented in the various plates relating to electricity that are contained in this work.

CONDUCTOR of *Lightning*. See CONDUCTORS.

CONDUCTOR, in *Surgery*, is an instrument which serves as a guide for a scalpel, in several operations which do not allow the surgeon's discerning the exact course or extent of a wound. For instance, in opening a fistulous orifice, or dilating the abdominal ring in a strangulated hernia.

Conductors are either made of steel or of silver; and always have a groove on one side, to direct the cutting instrument. That which surgeons employ in cutting for the stone is named a GORGET. This is an instrument generally made of steel, and introduced, in the operation of Lithotomy, through the artificial orifice, into the bladder, in order to widen the neck of the bladder, and facilitate the introduction of the forceps, with which the stone is to be extracted. There are two species of this instrument; the one, which is provided with a knob at the top, is termed the male gorget; and the other with an excavation, the female gorget. See LITHOTOMY.

There is also a machine invented by Mr. Walker, by means of which, a patient labouring under a simple or compound fracture of the leg, may be conducted with safety and convenience from one place to the other, and the extremities of the bones kept in their proper situation during the progress of the cure.

To this head belong the conducting apparatus invented for the same purpose by Mr. Theden of Prussia, which are used in fractures of the superior and inferior extremities. Machines adapted for fractures of the femur have been described by Mr. Schmucker, and those for other parts by Mr. Theden himself. Mr. Richter conceives that these

machines may be rendered more serviceable, by constructing them of tinned iron, instead of walnut-tree wood.

CONDUCTORS. In two important branches of natural philosophy, a marked distinction has been observed between the various known bodies of the earth; and upon the peculiar properties of the two different classes of bodies, which are discriminated from each other by the above-mentioned distinction, numerous phenomena, of consequence to the human species, are absolutely depending. The two branches, of natural philosophy, above alluded to, are the science of electricity and the subject of heat. In electricity, if an excited piece of glass, or an electrified conductor, be touched with the extremity of a stick of sealing-wax, which a man holds by its other extremity; or if it be touched with the extremity of a silk string, the electric power will not be dissipated; but if the electrified body be touched with the extremity of a rod of iron or brass, held in a manner similar to the stick of sealing-wax, the electric power will be instantly dissipated; viz. it will pass through the metallic rod, and through the person that holds it, &c. Hence it evidently appears, that iron or brass will permit the transition of the electric power through its substance; whereas sealing-wax or silk will not permit it. Therefore, iron, brass, and all those substances through which the electric power can be transmitted, are called *conductors of electricity*; and all those substances, which, like the sealing-wax or the silk, will not permit the passage of the electric power, are called *non-conductors of electricity*.

A similar distinction has been remarked in the subject of heat and cold. Take a small piece of charcoal, make it red hot at one end, and in that state it will be found that a person may hold it with his fingers within about a quarter of an inch of the red hot extremity, without feeling any unpleasant degree of heat; but if an iron rod as thick as the charcoal be rendered red hot at one end, a person will not be able to hold it within less than four or five inches, at least, of that end; and such is the case with all metallic bodies, as well as with some other substances; which shews that heat will pass through certain bodies much more easily than through others. Hence those bodies which, like the iron rod, will easily transmit the heat through their substance, are called *conductors of heat*; and those which will convey it with great difficulty, are called *non-conductors of heat*. It must be observed, however, that though heat will pass incomparably more easily through certain bodies than through others; yet there are no bodies that are known to be either perfect conductors or perfect non-conductors of heat. And indeed, the like observation, though in a much more limited manner, may be made with respect to the conductors of electricity.

In magnetism also, the name of *conductor of that power* has been given to a single substance, namely, to soft iron; but the peculiar nature of iron in that respect, or rather the passage of the magnetic power, will be explained under the article MAGNETISM. We shall now in an orderly manner state the various particulars which have been ascertained with respect to the above-mentioned two classes of bodies; viz. first with respect to electricity, and then with respect to heat.

CONDUCTORS of *Electricity*. In endeavouring to point out the true nature of electrical conductors, it becomes necessary to give a list likewise of the non-conductors of that power, since these two classes of bodies gradually approach each other, in proportion as they are less perfect of their kind, as far as certain substances, which seem to stand in an intermediate state between conductors and non-conductors, so as to participate of both. Glass, sealing-wax, amber,

CONDUCTORS.

fluk, and several other bodies, which, by means of friction with a dry and clean hand, are capable of being excited, so as to exhibit electrical phenomena, are called *electrics*; and these identical bodies have been found to be non-conductors of electricity; hence *electrics* and *non-conductors* mean the very same class of bodies. In the same manner it has been found, that those bodies, which will easily transmit the electric fluid through their substance, cannot be excited in the above-mentioned manner; hence *conductors* and *non-electrics* do also denote the same bodies.

Strictly speaking, as we have already hinted above, there is no substance which may be called a perfect conductor or a perfect non-conductor of electricity; the electric power finding some resistance in its passage through the best conductors, and being in some degree capable of passing through the best electrics, at least under certain circumstances. The following lists contain the conductors and the electrics, or, which is the same thing, the non-electrics and the non-conductors. They are disposed in the order of their perfection; that is, the best conductors and the best electrics are placed at the heads of their respective lists; and those which participate of both, meaning those which are partly electrics and partly conductors, will be found towards the end of each list. In this, however, no great accuracy must be expected; first, because a very accurate discrimination is impracticable when substances are expressed under general denominations; and, secondly, because the precise degree of conducting or non-conducting power in most substances cannot be determined on account of their fluctuating nature.

Conductors.

Gold.
Silver.
Copper.
Platina.
Brass.
Iron.
Tin.
Mercury.
Lead.
Semi-metals.

Metallic ores; of which the best are those which contain a greater proportion of metallic parts, and nearest to a genuine state.

Charcoal, either of animal or vegetable substances. The conducting power of charcoal is very equivocal; for some pieces of it will hardly conduct at all, and others will suffer the passage of the electric fluid over their surface only, and not through their substance. The reason of this difference is not quite understood; but it seems owing to the degree of heat that is applied in the process of making them. See Priestley's second volume of Observations on different Kinds of Air, sect. xiv.

Animal fluids.
Acids.
Saline substances.
Hot water.
Cold water.

Salt water.
All other liquids excepting oils.

Red-hot glass.
Melted resin.
Flame, or the effluvia of flaming bodies.

Ice and snow; but not below a certain temperature; for Mr. Achard, at Berlin, in January 1776, observed that

frozen water, or ice, at the temperature of 25° below 0° of Reaumur's scale (equal to -13° of Fahrenheit's) was become an electric. He tried his experiments in the open air, where he found that a rod of ice two feet in length, and two inches thick, was a very imperfect conductor at the temperature of 6° below 0° of Reaumur's thermometer, and that it would not conduct in the least at 20° below 0°. By whirling a spheroid of ice in a proper machine, he even electrified the prime conductor, so as to attract, repel, give sparks, &c., like any other electric.

Most saline substances, of which the metallic salts are the best.

Earthy and stony substances, of which the hardest are the worst.

Glass filled with boiling water, as mentioned by Kinnelley.

Smoke.

Vapour or steam of boiling water.

All compounds, in which different proportions of the above-mentioned substances enter, are conductors in different degrees.

An imperfect vacuum, or the absence of air produced by the action of an air-pump. But a perfect Torricellian vacuum is not a conductor of electricity. Mr. Walsh, assisted by Mr. De Luc, having made a double barometer, in which the mercury had been accurately boiled, so as to expel all the air from the tube, found that the vacuum in the arched part of this double barometer was not a conductor of electricity, nor any electric light could be seen in it. (Priestley's Experiments and Observations on Elastic Fluids, vol. i.) This remarkable discovery was afterwards confirmed by the experiments of Mr. Morgan. (Phil. Trans. vol. lxxv.)

Electrics.

Glass, and all vitrifications, even those of metals.

All gems, of which the most transparent are generally the best.

All resins and resinous compounds.

Amber.

Sulphur.

Baked wood, if not suffered to imbibe moisture.

All bituminous substances.

Wax.

Silk.

Cotton.

All dry and external animal substances, as feathers, wool, hair, &c.

Paper.

White sugar and sugar-candy.

Air, and other gases.

Oils.

Dry and complete metallic oxides.

The ashes of animal and vegetable substances.

All dry vegetable substances.

All hard stones, of which the hardest are the best.

Soft stones when heated, according to Delaval.

Powders not metallic, according to Delaval.

Ice, at the temperature of -13° of Fahrenheit's thermometer, according to Achard.

According to Mr. Walsh's, and Mr. Morgan's experiments, the Torricellian vacuum ought to be placed at the head of the list; but the singular nature of a vacuum, though a non-conductor, will hardly entitle it to the name of an electric. We must, however, refer all farther observations, respecting *electrics*, to the article of that denomination; the

the above list having been inserted in this place merely to elucidate the nature of conductors.

Thus far we have stated the number of conductors, and their gradation, with respect to common electricity; but that lately discovered branch of this science, which is at present assiduously cultivated under the title of Galvanism, has pointed out a peculiar arrangement of conductors with respect to the order of their capability of conducting that power which affects the limbs of a prepared animal, and of conveying the power of a galvanic, or rather a Voltaic, battery. See the article GALVANISM. Concerning the former of these powers, we transcribe a list, followed by a few remarks, from Cavallo's Treatise on Electricity, 4th ed. vol. iii. p. 20; and with respect to the latter, we subjoin an abridged extract from a paper of Erman, in the *Annales de Chimie*, Feb. 1807.

Conductors of Animal Electricity, according to Dr. Lind's and Mr. Cavallo's experiments, which however are arranged with diffidence by the latter, considering the difficulty of making the arrangement, and that, in this branch of electricity, the metals do not seem to act merely as conductors—The list begins with the best.

“ Malleable platina.

Silver.

Gold.

Quicksilver.

Copper.

Brass.

Tin.

Lead.

Iron.

The human body.

Salt water.

Fresh water.”

“ The metallic ores are not so good conductors as the purified metals themselves, and their conducting power is various according to the nature of the ores, but even the metallic salts are tolerably good conductors.

“ It is very remarkable, that the flame of tallow candle, which is a good conductor of common electricity, will not conduct the animal electricity, when placed in a short interruption made in the circuit of communication. Charcoal, placed in the same situation as the flame of the candle, was also found to be a non-conductor, except when it was actually burning, in which state it conducted tolerably well; but Mr. Volta says that he has found some pieces of charcoal that acted as well as the metals. Dr. Valli observed, that human bodies are not all equally good conductors. Out of four persons in a company, he found that when two of them formed the circuit of communication between the nerve and the muscles of a frog, the motions took place very readily. When a third person formed the circuit, the motions were very weak; but that when the fourth person formed the communication no motion took place. This experiment, he adds, was often repeated with the same success. The effect, however, may be owing to the different dryness of the skin. Vitriolic acid, and what is very remarkable, alcohol, appear to conduct this property rather better than water.

“ The arteries and the veins are not so good conductors as the nerves; for when a blood-vessel forms part of the circuit of communication, the contractions will take place only when nervous ramifications are adhering to it, and if these be carefully separated, the motion will not take place. The same thing may be said of the tendons, the bones, and the membranes; for when either of those parts

is separated from the body, and is introduced in the circle of communication between the muscles and nerves of a prepared frog, no motion will ensue, excepting, indeed, when those parts are full of moisture, and are in immediate contact with the nerve of a prepared frog. Dry nerves are not conductors of animal electricity. Dr. Valli found that the internal substance of a nerve conducts much better than its external, or coat.”

Silver and zinc, professor Aldini says, will produce contractions in the muscles of a frog, many hours after it has become insensible to the action of either of them, separately used.

Mr. Erman, in his paper on two new classes of galvanic conductors, says that the bodies which may be applied to the poles of a galvanic pile are, I. *Non-conductors*. II. *Conductors*. The conductors are either *perfect* or *imperfect*; and the imperfect conductors are so, either with respect to both poles, or with respect to one of the poles of a galvanic battery.

I. The *perfect non-conductors* prevent the communication of the power of both poles effectually; and such are glass, resins, ice, and the vapour of water, sulphur and its flame, amber, but not its flame.

II. The *perfect conductors*, which discharge both poles completely, are the metals, and all in the same degree.

The *imperfect conductors of both poles*. These, though capable of forming the galvanic circuit, exhibit in their extent effects of two different kinds. Fluid water and bodies impregnated with water are of this nature.

The *imperfect conductors of the positive pole only*. These are incapable of forming the galvanic circuit; for when interposed between the two poles of the pile, they insulate the negative power and conduct the positive; whence it follows, that the negative becomes charged, whereas the positive is conducted. The flame of hydrogen gas, and the flame of the hydrocarbonated bodies, have this property.

Lastly, the *imperfect conductors of the negative pole only* insulate the power of the positive, and conduct the power of the negative pole. Of this sort are the flame of phosphorus and of alkaline soaps.

There now remain two other particulars, which demand our examination with respect to the conductors of electricity. These are the method of ascertaining their peculiar degrees of conducting power, and their uses. The simplest method of determining whether any given body be a conductor or not, is to affix an electrometer to the prime conductor of an electrical machine, and when the machine is in action, and of course the electrometer is diverging, to touch the prime conductor with one extremity of the given body, which the operator holds in his hand by the other extremity; for if, in so doing, the electrometer collapses, the body in question is a conductor; but if the electrometer continues to diverge, that body is a non-conductor. Its degree of conducting power may also be, in great measure, estimated from the quickness with which the electrometer loses its divergency. In the performance of this experiment, the operator should take care that the electric fluid does not run over the surface of the body under trial to the hand that holds it, which generally takes place when the machine acts powerfully, and the body in question is not much extended. In this case, it becomes proper to stop the revolution of the glass globe or cylinder, when the body is to be put in contact with the prime conductor. But if the body be very small, it will be sufficient to use a simple electrometer only, which may be easily caused to diverge by means of an excited stick of sealing-wax, and may then be touched with the body in question. Yet all this is not sufficient,

sufficient to discriminate the peculiar powers of substances that are of the same class, such as the various metallic substances, the different stones, &c. And for this purpose various other means may be adopted, according to the nature of the bodies under examination. The best way of determining the peculiar conducting powers of metallic substances, is to have wires of the different metals drawn through the same hole, so as to be precisely of the same diameter, and then melt them by the discharge of a battery; *viz.* take a wire, of about one-fiftieth of an inch in diameter, and connect it with the outside of a battery, containing at least thirty square feet of coated surface, and connect the other extremity of the wire with one branch of the discharging rod. Then, when the battery is charged, touch the wires which proceed from the inside of it with the other branch of the discharging rod, which will force the explosion to pass through the wire that has been interposed between the battery and the discharging rod, generally melting a greater or a smaller part of it, according to the nature of the metal. Thus by repeating the experiment successively with wires of the same length and diameter, but of different metallic substances; charging the battery constantly to the same height, which may be easily accomplished by means of a quadrant electrometer; and measuring the length of each wire that has been melted by the explosion; their various conducting powers may be ascertained; observing that the worst conductors are more easily melted, and *vice versa*. Mr. Henley found that the same charge melted $\frac{1}{4}$ inches of gold wire, 6 of brass, 8 of silvered copper, 10 of silver, and rather more than 10 of iron. In melting wires of a considerable length, as for instance two or three feet, it often happens that the force of the explosion barely renders it red hot, without actually melting it. In this case, it is curious to observe that the redness appears first on that extremity of the wire which communicates with the positive side of the battery, and thence proceeds towards the other end of the wire, which shews an ocular proof of the theory of a single electric fluid; the wire, however, is not rendered red hot at one extremity before the other, in consequence of the progressive motion of the electric fluid through it, but because that fluid loses some of its impetus in going through the wire, so that the wire suffers the greatest effect of the shock on that end which the electric fluid enters; in consequence of which, that same end will be rendered red hot much sooner, and in a greater degree, than those parts which are more remote from it.

When the conducting powers of different fluids are to be ascertained, the best method of performing the experiment is to fill very narrow glass tubes, such as are used for spirit thermometers, with the fluids in question, introducing a pin at each end of the tubes; and to present them successively to the prime conductor, after the manner already described. For other kinds of bodies other methods may be adopted for ascertaining their conducting powers. These, however, need not be particularly described; first, because they may be easily derived from those that have been described above; and, secondly, because they must be varied according to the nature of the bodies in question. After all, it must be acknowledged, that the metals excepted, no very great degree of accuracy can be expected with other substances; since the fluctuation of their conducting powers arises from a variety of slight, and almost imperceptible differences, such as the difference of temperature, of moisture, of admixture with other substances, &c. Thus, glass itself becomes a conductor, when heated to a certain degree; and the very same body will conduct more or less readily, even by being placed nearer to or farther from certain other bodies.

In considering the conducting power of natural bodies, one may naturally ask, whence does that property arise; or how is it, that certain bodies will, whilst others will not, conduct the electric power? The present state of knowledge, however, does not afford a satisfactory answer to this question. Various suppositions have been offered by the late Dr. Priestley and others; but as they are insufficient for the explanation of the phenomena, we shall not attempt to state them in this place.

The uses of conductors are remarkable and extensive, though they are not yet fully ascertained to the entire satisfaction of the speculative philosopher. In the first place, the science of electricity, or the existence of the electric power, would be absolutely unknown, were it not for the difference of conducting and non-conducting bodies; for otherwise the electric fluid which is manifested to us, and operates merely by its passage from one body to another, could neither be confined nor accumulated in any place; in consequence of which, its uniform dispersion throughout the universe would remain inactive and unperceived. But the movements of conducting and non-conducting bodies in the world, their contact, or even their approach without any actual contact, condenses the electric fluid in one place, and rarefies it in another; and this takes place between the clouds and the earth, &c. By the change of their states of existence, some bodies absorb from other bodies; and others deposit upon other bodies considerable quantities of electric fluid. Thus, a perpetual and ample circulation of that fluid is continually kept up amongst all the substances of the terraqueous globe, whence thunder and lightning, vaporization, and probably several other important operations of nature, are derived. In order to understand the action of conductors when opposed to each other, see the nature of electric atmospheres under the article ELECTRICITY.

The greatest advantage which mankind have derived from the knowledge of the present subject, is the adoption of a conductor for the preservation of buildings and vessels against the dire effects of lightning. The identity of electricity and lightning proved by Dr. Franklin, and his subsequent introduction of conductors for preserving buildings, form two of the greatest discoveries of the last century. It was proposed by the above-mentioned philosopher to raise a metallic conductor some feet above the highest part of the building, to continue the same down along the outside of the wall, and below it, deep into the earth, or, which is preferable, to connect it with some well or drain. By these means the house would have little to apprehend from a stroke of lightning; for, since an electrified body is well known to strike the nearest and best conductors that may happen to be in its way, it is evident that the conductor situated in the above-mentioned manner, being of metal, and higher than any part of the building, would naturally be struck by the lightning in preference to any other part, and would conduct it to the ground, without any damage to the building.

This reasonable proposal was no sooner offered by the sagacious Franklin, than it was adopted in America, in Europe, and elsewhere. Numerous facts soon proved the usefulness of such conductors, and extended its adoption; by shewing that several houses, which before had been repeatedly struck by the lightning, escaped unhurt after the application of the conductor; that, in many places, the conductors of houses were actually struck by the lightning, which melted them about their extremities, yet the houses themselves received no injury; and so forth.

Though the conductors were instantly adopted, yet their
most

most useful form, especially with respect to their upper termination, has been much controverted; and it is but lately that the true state of the question has been elucidated. The question was, whether the conductors should terminate in a point, according to Dr. Franklin's original proposal, or in a ball. Mr. B. Wilson exhibited some experiments, in which a point was struck at a greater distance than a ball; whence he concluded, that as the point would attract the lightning from a greater distance, a blunt termination ought to be preferred, since, in certain cases, it would avoid a stroke of lightning, which the pointed termination would not. (Phil. Transf. for 1778). Mr. Nairne, on the other hand, shewed some experiments, in which a ball was struck in preference to a point. And this indeed is confirmed by a great variety of other experiments. In short, a pointed conductor will draw the electric fluid from an incomparably greater distance than a blunt one; but it will draw that fluid gradually, in a stream, or silent manner; whereas the blunt termination will receive it in a full spark, or at once; hence a pointed conductor will tend to diminish the quantity of electricity in a cloud, previous to its coming too near, and thus it may protect a greater extent of building than a conductor with a blunt termination, since the object of fixing a conductor to a house is to protect the house from the effects of lightning, and not the conductor from transmitting the matter of the lightning.

Upon the whole, considering the immense quantity of electricity in a thunder cloud, and the little difference between the action of a blunt or a sharp conductor with respect to that quantity, the difference of those terminations seems to be of less consequence than it was apprehended in the fervour of the dispute. After all the experiments and the discussions made for the purpose, "A conductor," Mr. Cavallo observes, "to guard a building, as it is now commonly used in consequence of several considerations and experiments, should consist of one iron rod, (copper would do much better, it being a more perfect conductor of electricity, and at the same time not being subject to contract rust so soon as iron), about three quarters of an inch thick, fastened to the wall of the building, not by iron cramps, but by wooden ones. If the conductor were quite detached from the building, and supported by wooden posts at the distance of one or two feet from the wall, it would be much better for common edifices; but it is more particularly advisable for powder magazines, powder-mills, and all such buildings as contain combustibles ready to take fire. The upper end of the conductor should be terminated in a pyramidal form, with the edges, as well as the point very sharp; and if the conductor be of iron, it should be gilt or painted for the length of one or two feet. This sharp end should be elevated above the highest part of the building, (as above a stack of chimnies, to which it may be fastened), at least five or six feet. The lower end of the conductor should be driven five or six feet into the ground, and in a direction leading from the foundations; or it would be better to connect it with the nearest piece of water, if any be at hand. If this conductor, on account of the difficulty of adapting it to the form of the building, cannot conveniently be made of one rod, then care should be taken, that where the pieces meet they be made to come in as perfect a contact with one another as possible; for the electricity finds considerable obstruction where the conductor is interrupted. For an edifice of a moderate size, one conductor, in the manner already described, is perhaps sufficient; but, in order to secure a large building from sustaining any damage by lightning, there should be two, three, or more conductors, in proportion to the extent of the building.

"In ships a chain has often been used for this purpose,

whence, on account of its pliability, has been found very convenient, and easy to be managed among the rigging of the vessel; but as the electricity finds a great obstruction in going through the several links, for which reason chains have been actually broken by the lightning, so their use has now been almost entirely laid aside; and in their stead, copper wires, a little thicker than a goose-quill, have been substituted, and have been found to answer very well. One of those wires should be elevated two or three feet above the highest mast in the vessel; this should be continued down the mast, as far as the deck, where, by bending, it should be adapted to the surface of those parts, over which it may most conveniently be placed, and, by continuing it down the side of the vessel, it should be always made to communicate with the water of the sea."

Another precaution must be added to the above directions, which is, that a communication should be made between the conductor, and all other pretty large pieces of metal in the building, such as leaden spouts, large iron clamps, &c.; for otherwise a lateral explosion may take place between those detached pieces of metal, at the time that the lightning is conveyed by the conductor, and thence the building may receive some damage, though not in a very great degree, unless indeed in case of powder mills and powder-magazines. See LATERAL EXPLOSION.

It is owing to this circumstance, that some buildings furnished with a conductor or two, are said to have been struck and to have been damaged by a stroke of lightning. See Phil. Transf. vol. lxxii.

The size of the conductor, as recommended in the preceding paragraphs, has by some been thought too small for the purpose; and an instance is recorded of a conductor of iron, four inches wide, and half an inch thick, which is said to have been made red hot by a stroke of lightning. But with respect to this remark, we shall briefly observe, that should any person think that the conductor, as directed above, is not large enough, the enlargement of its size is attended with no other inconvenience than an increase of expence. However, though a conductor be made red hot, and even melted by a stroke of lightning, yet it will essentially convey that stroke of lightning to the ground without any material injury to the building, as has been sufficiently proved by experiments with artificial electricity, as well as with cases of conductors partly melted by the lightning.

CONDUCTORS of heat. When a congeries of bodies remains long in a given degree of temperature, these bodies will all acquire the same apparent degree of heat; that is, the thermometer placed in contact with any of them, will rise to the same degree; and in this case of equilibrium there is no reason to believe that any heat, or of caloric, passes from one body to another; but if a body, at a certain temperature, be placed amongst bodies of a different temperature, the caloric will, in this case, be communicated from the former to the latter, or *vice versa*; according as the temperature of the former is higher or lower than that of the latter. This communication or passage of heat from one body to another, is made either by *contact* or by *radiation*.—By *contact*, when the bodies, which are contiguous to the hotter one, are progressively heated; *viz.* the nearest first, and then those which are farther off, without any interruption; as when a red-hot piece of iron is placed amongst other pieces of colder iron, the heat is gradually communicated from the red hot one to the others.—By *radiation*, when the heat from a hot body passes through a vacuum, or through transparent bodies, which are not heated by it, yet it elevates the temperature of bodies placed at some distance. Thus, the solar heat radiates freely through
air,

air, glass, water, &c., and heats opaque bodies without sensibly affecting the transparent bodies through which it passes. Thus also, a thermometer suspended under the exhausted receiver of an air-pump, or in the Torricellian vacuum, continues to vary its temperature with that of the surrounding bodies.

In the communication of heat from one body to another, when a third body is interposed, it has been observed that the transition of heat is much quicker when certain bodies are interposed, than when other bodies are placed between; but there are no bodies known which prevent that transition effectually; hence the bodies of the universe are distinguished into more or less perfect conductors of heat, but they afford no instance of a perfect non-conductor.

The transmission of heat from a solid at a higher degree of temperature, to another at a lower one, in a given time, is nearly proportional to the difference of their temperatures. But the velocity with which heat is propagated through the substance of different bodies, varies considerably according to the nature of those bodies. In general, metallic bodies are the best conductors of heat; stones, or hard earthy bodies come next; then the vitreous substances, and the resinous. Dry animal parts, excepting bones, and especially dry and light vegetable bodies, are bad conductors of heat. The conducting power of liquids is of a particular nature, which will be mentioned presently. But the different bodies of the same class differ considerably in conducting power. Thus the metals possess it in different degrees, and their proportional powers were thus estimated by Dr. Ingenhousz. He procured equal cylinders of several metallic substances, and having coated them with wax, he plunged their extremities in hot water, and judged of the conducting power of each, by the length of the wax-coating that was melted. The result of these experiments is expressed in the following Table, which commences with the best conductors. Journ. de Phys. 1789, p. 68.

Silver.	} nearly equal.
Gold.	
Copper.	
Tin.	
Platina.	
Iron.	} much inferior to the others.
Steel.	
Lead.	

In the same paper, the proportional conducting powers of three fluids are stated in the following manner:

	<i>Equal bulks.</i>	<i>Equal weights.</i>
Water - - -	1.	1.
Mercury - - -	2.	4.8
Linseed oil - -	1.111	1.085

The conducting power of the same body does not remain invariably the same in all circumstances; but it differs, according as the body changes its state of existence, so that the conducting power of a body in a solid state is different from that of the same body in a fluid state. And at the time of changing its state of existence, the conducting power in most cases ceases altogether. Thus, at the temperature of 60°, sulphur is a conductor; but when heated to 212°, at which point it melts and becomes volatile, it is no longer a conductor. Thus also, ice conducts at the temperature of 20°, or at any other temperature below the freezing point, which is 32°; but at that point it ceases to be a conductor, because the heat which may be communicated to it is absorbed as an ingredient necessary to its fluid state, which it assumes at, or little above, that point.

Rarefaction or condensation alters the conducting powers of several bodies. Yet the rarefaction of air is by no means accompanied with a proportionate diminution of its conducting power.

Professor Pictet supposes that heat ascends within solid bodies more readily than it descends; viz. that in communicating heat to a solid body by the lateral application of a hotter body, the upper parts of the former are heated sooner than the lower. This effect, however, may with propriety be attributed to the ascending current of heated air which rises along the surface of the body, and causes colder air to approach the lower part of the body; hence the heat is continually carried upwards.

The conducting power of a body changes likewise, in consequence of an alteration of the surface; so that polish and figure are likewise concerned in the reception as well as in the propagation of heat. These particulars, however, together with the reflection and refraction of heat, from the surface or through the substance of bodies, will, with more propriety, be explained under the article HEAT.

Fluids are, upon the whole, very imperfect conductors of heat, and Count Rumford was led, by his experiments, to conclude that heat is not at all propagated through them by contact, as it is in solids. (See Rumford's paper on the Conducting Property of Fluid, &c. Phil. Trans. 1805.) Whatever permits or promotes the motion of the particles of a fluid, contributes to the propagation of heat;—whatever obstructs that motion, retards the propagation of heat through them. The particles of air which come in contact with an heated body, being thereby heated and rarefied, become specifically lighter than the surrounding air, and of course ascend; other air then comes in contact with the heated body, and this also being heated is caused to ascend, and so forth. Thus is heat conveyed from the original hot body, by the air, to a distance from it; but if that motion of the air be obstructed, as by the interposition of partitions of paper, wool, cotton, furs, and the like, then the communication of heat is prevented more or less effectually. It is principally on this account, that furs, feathers, eider down, cotton, and other similar things, form warm coverings; viz. because, by preventing in great measure the motion of the air between their filaments, they prevent at the same time the dissipation of heat.

The like observations are applicable to water, and perhaps to all other fluids. When a vessel full of water is set upon the fire, the particles of water that are close to the bottom of the vessel are first heated and rarefied; in consequence of which they ascend, and other colder particles take their place, which, being heated, likewise ascend, and so on. If the fire be applied to the upper part of the water, the fluid will not be heated, or at most it will in a very slight degree. Count Rumford (see his 7th Essay) confined a piece of ice at the bottom of a pretty tall glass vessel full of water nearly boiling, and noted the time it took up to melt the ice. The experiment then was repeated with this difference, viz. that a similar piece of ice was placed on the surface of the hot water, instead of the bottom. It was found that the ice melted more than eight times quicker in this last situation than in the former. The result of this remarkable experiment is explained in the following manner. When the ice swims on the surface of the hot water, the particles of the latter, that are contiguous to the ice, being cooled by it, descend, and other hot particles of water take their place, which deposit their heat upon the ice, and being thereby rendered specifically heavier than the next particles of water also descend, and so forth. But when the ice is confined a,

the bottom of the vessel, the particles of hot water which come first in contact with it, are cooled, and are rendered specifically heavier, in consequence of which they remain in their place, and no motion will take place within the water; hence the ice is not melted nearly so readily as in the former situation. Now count Rumford contends that it is by means of the above-mentioned motion only that heat is propagated through fluids, and not otherwise. This conclusion was no sooner published to the scientific world, than it was opposed in an able manner by very skillful philosphers. See Dalton's paper. Nich. Journ. vol. iv. p. 75. Traill's paper, *ibid.* for 1805, p. 133; and Murray's paper, *ibid.* vol. i. From these papers we shall make the following abridged extracts, which seem necessary for the elucidation of the subject; and in the first place we shall state Mr. Murray's experiments.

Into a glass cylindrical vessel water was poured, till it covered the bulb of a thermometer; its temperature was 46°, which was likewise the temperature of the air of the room. One ounce of olive oil, heated to 140°, was poured on a small piece of cord, suspended on the surface of the water, and the cord was slowly withdrawn. Any motion of the water was thus avoided. In the course of a minute the thermometer began to rise slowly; in five minutes from the commencement of the experiment, it had risen 4°, in ten minutes 6½°, in fifteen minutes 8°. It then became stationary, and continued so for seven minutes, before it began to fall. Its descent was slow. This experiment was repeated with a hot metallic ball (instead of oil) immersed in the water above the thermometer, and it was attended with a similar effect.

From these results the conclusion might seem just, that the fluid must possess a conducting power. Yet this is rendered doubtful by the circumstance, that in all experiments of this kind, a quantity of caloric must be conveyed by the sides of the vessel. In order to avoid this source of error, Mr. Murray employed a vessel of ice. But water could not be used in this case, because that fluid expands from 40° to 32°; therefore oil and mercury were used.

A quantity of almond oil was poured into the ice vessel, so as to cover the bulb of the thermometer a quarter of an inch. A small cylindrical iron cup, two inches in diameter, and having a flat bottom, capable of holding two ounces by measure, was suspended so as merely to touch the surface of the oil, and was filled with boiling water. At the beginning of the experiment, the thermometer stood at 32°. In a minute and a half it had risen to 34½°, in three minutes to 34½°, in five minutes to 36½°, in seven minutes to 37½°. At this point it became stationary, having risen 5½° in seven minutes. The temperature of the water in the cup had in this time fallen to 66°. The thermometer, after remaining stationary at 37½° for six minutes, began to fall, and it continued to descend at the rate nearly of a degree in a minute and a half, till it returned to 32°. The experiment was repeated with this variation, *viz.* that the thermometer was placed lower, so that half an inch of oil stood over its bulb. It was also repeated with mercury instead of oil. But in both cases the results were similar to that of the first experiment.

"This rise," Mr. Murray says, "it appears to me impossible to ascribe to any other cause than to a power in the fluid to conduct caloric. Thus it is evident, that the sides of the vessel could not convey to the fluid in contact with the bulb of the thermometer any part of the caloric it received. Ice, in common with any other solid, may, at temperatures below its melting point, conduct caloric; but as it cannot possibly exist with a temperature above 32°, it cannot communicate any temperature above that to a fluid in contact with it, and consequently it could not contribute in the

above experiment to raise the thermometer above that temperature. Caloric does not radiate through transparent fluids, and it cannot even be supposed capable of passing by radiation through an opaque fluid as mercury.

If it be proved that oil and mercury are capable of conducting caloric, it will be admitted as sufficiently probable, that other fluids may have a similar power. Of these two, mercury, it is probable from these experiments, is the best conductor, as the rise of the thermometer took place in it much more rapidly than in the oil."

Dr. Traill's experiments for ascertaining the conducting powers of divers fluids, were performed in the following manner.

A cylindrical vessel was turned out of wood, having its sides half an inch thick, its height four inches and its diameter two. It has a moveable wooden top or cover, perforated with a hole in its centre, a little more than an inch in diameter, into which an iron cylinder, of one inch in diameter, could be easily introduced. This cylinder is supported by a slight flanch, or shoulder-piece, and can be taken up by means of a string attached to its top. When the iron bar is in its place, its flat lower extremity is half an inch distant from the bulb of a delicate mercurial thermometer, which is fixed by wax in a hole perforating the cylinder near its bottom. This thermometer is bent to a right angle, so that its bulb and part of its stem lie in the axis of the wooden cylinder. This shape was preferred, because the stem could be little affected by the caloric transmitted by the sides of the vessel, till after the bulb was acted on by the caloric of the iron bar.

A variety of experiments was performed with this apparatus in the following manner: The temperature of the room being steadily 67° Fahr. therm.; during the trials, a kettle of water was kept boiling over the fire. Its temperature was between 210° and 212°, and in this the cylinder of iron was suffered to remain, at each experiment, for fifteen minutes. The liquid to be examined, and all the apparatus (but the iron bar) were at each experiment ascertained to be at 67°. The liquid was poured into the wooden vessel, till it could rise 1/16 of an inch on the side of the iron cylinder when in its place. The wooden top was put on, and the iron was drawn out of the kettle of boiling water by means of the attached string, and instantly let down through the hole of the cover. The time the thermometer took to rise through 3° (*viz.* from 67° to 70°) was accurately marked by means of a stop-watch, and the results of the experiments on several fluids, are exhibited in the following table.

Liquids.	Minutes.	
	Minutes.	Seconds.
Water	7	5
Cow-milk	8	25
Proof spirit	8	nearly
Alcohol. Lond. Pharmac.	10	45
Transparent olive oil	9	50
Mercury	9	15
Solution of sulphate of iron. Salt 1. Water 5.	8	
Saturated solution of sulphate of alumine	9	40
Saturated solution of sulphate of soda	6	30
Aqua potass. pura. London Pharm.	8	15
Saturated solution of sulphate of soda, but the liquid not touching the iron cylinder, by 1/16 of an inch, or nearly so	19	20

"If I am not deceived," says Dr. Traill, "we may conclude, from what I have above adduced, that liquids, as well as solids, are conductors of caloric; that the transmission of it through them follows a particular law depending on the properties of the particular liquid; but which is not in the exact ratio of any of their mechanical properties, though nearer that of their density, than any other."

A circumstance, deserving the attention of the speculative philosopher, respecting the conductors of electricity and of heat, has been observed; *viz.* that most of those bodies which are good conductors of the one, are likewise good conductors of the other. This law, however, is not without exceptions. Thus, metallic bodies are good conductors of both; but charcoal is a good conductor of electricity, though a very bad conductor of heat.

The last particular, which we shall briefly notice, with respect to the conductors of heat, is their use. This, on the least examination, will be found to be very extensive. Nature and art avail themselves of these peculiar properties of bodies, and without them both animal and vegetable life could not subsist. The atmospherical fluid which envelops the earth, is a very bad conductor of heat, undoubtedly created for the purpose of not dissipating the heat of the earth and terrestrial bodies. The coverings of animals, such as furs and feathers, being extremely bad conductors, confine the heat on the animal body. The bark and ligneous part of plants, in consequence of their imperfect conducting powers, tend to prevent the freezing of vegetable juices. The industry of man has not omitted to use the worst conductors of heat for coverings, for the defence of his habitations, for the confinement of heat in certain furnaces, &c. In short, numerous and admirable effects are deduced by Providence, and several essential advantages are obtained by art, from a proper application of the various conducting powers of natural bodies.

CONDUCTORS, in the *Military Art*, are assistants to the commissary of stores in conducting depots and magazines from one place to another. They take charge of the ammunition waggons in the field, make their reports to the commissary, and are under his authority and command.

CONDUCTOS *ad profectendum*, in *Law*. See *CAPAS*.

CONDUIT, a canal, or pipe, for the conveyance of water, or other fluid matter.

In the earth are several subterraneous conduits, through which the waters pass that form some *SPRINGS*; and through which also pass the vapours which form *METALS* and *MINERALS*.

Artificial conduits for water are made of lead, stone, cast iron, potter's earth, &c. See *PLUMBERY*.

In the province of New Mexico, there is said to be a subterraneous conduit, in form of a grotto, extending six hundred miles in length. See *DUCT. TUBE*, &c.

CONDUITE *d'une Troupe*. A *troop* that marches with always an officer, who commands independently of the other officers that may accompany it.

CONDUSKEEG, in *Geography*, a settlement of America, in the district of Maine and Hancock county, containing 567 inhabitants.

CONDYLÆ, in *Ancient Geography*, a town of Arcadia, near Caphia, and N.W. of Orchomenæ. In this town was a temple of Diana, and near it a grove. Pausanias.

CONDYLE, in *Anatomy*, an appellation bestowed on several projections of the bones.

CONDYLOMA, from *κόνδυλος*, *digitii articulus*, in *Surgery*. By this term is understood almost every hard excres-

cence or sarcoma, that appears in the parts about the anus and the pudenda of both sexes; which is generally painful, or at least troublesome, and sometimes of a venereal origin. According to the different forms which these excrescences assume, they are termed *condylomata venerea, verrucæ, framboesias*, &c.; however they do not essentially differ, being all of the same nature, and requiring the same mode of treatment. They are distinguished from the hemorrhoids by their situation, irregular form, the constant profuse which they produce, their generally fungous texture, and the foul matter which is frequently discharged from their surface, or by the venereal symptoms with which they are accompanied. In some cases they are not harder than the parts upon which they are situated; sometimes, however, they are harder than the most complete ferrinus. With respect to their colour, they are, in some cases, of a pale white, in others more or less red. Sometimes they are found single; but generally the whole of the parts about the anus becomes covered with them. Frequently they are not larger than common warts; which, when the disease has proceeded to a great height, become more numerous, and adhere to or are in contact with each other. In other cases, these excrescences are from the beginning broad and flat, and frequently of the size of a large bean split in half. Sometimes they hang, like figs, on a slender stalk. These excrescences are in general more troublesome than dangerous; however, the syphilitic virus by which they may have been produced is what is most to be feared.

In the cure of these excrescences, the principal object is to remove the cause, especially when of a venereal kind; and they are either local affections, or, which is sometimes the case, effects of a depraved state of the body. After the appropriate internal remedies (see *DYPHILIS*) have been administered, they frequently dry up of themselves, and when they remain, they must be treated with topical corrosive applications. When these excrescences are of a softer consistence, and their surface sore or ulcerated, we may mix *Aq. calcis*, with *Spir. vin. Camph.* and *Tinct. myrrhæ*, and apply this mixture several times a day to the excrescences, by means of a hair-pencil, or cover them with compresses dipped in it. Still greater effects are produced by the fine powder of faine sprinkled frequently upon them; this powder may also be mixed into an ointment with precipitate of mercury, and spread upon the excrescences. Or they may be sprinkled once or twice a day with the powder, and a saturnine cerate with opium afterwards applied. In various cases, the following corrosive wash of Mr. Pienk has been found the most effectual remedy: *R. Spir. Vin. rect. Acet. vin. concentrat. aâ ʒss. Merc. sublim. corrosiv. ʒj. Alum. crud. Camph. Ceras. aâ ʒss. M. D. S.* To be rubbed twice or thrice a day upon the excrescences, which are to be covered during the intervals with *Ungt. ex Hydrargyro*.

Frequently the excrescences disappear without suppurating, and the sound skin is not injured. Mercurial fumigations with cinnabar are likewise recommended as powerful remedies. The aqua phagedænica has sometimes been found very effectual in removing very small venereal warts.

If the excrescences do not yield to the use of any of these remedies, but remain hard, callous, and fungous, we may apply the following: *Triturate Merc. sublim. corrosiv. ʒss. in a marble mortar, and add gradually Spir. nitr. fumant. ʒss.* The application of this remedy, which is to be applied every day, or every other day, must be performed with the utmost caution, by means of a hair-pencil, with which it is to be rubbed upon the summit of the excrescence. We may also employ the *lunar caustic*, also the *lap. infern.* or *Butyr. antimon.*, which are likewise to be applied in a very cautious manner; and we ought particularly to take care

are not to let any part of them come into contact with the restum, which would produce very dangerous consequences. The extirpation by means of ligatures may be employed when the number of the excrescences is but small, and they hang by small stalks to the surface; for otherwise it is a painful remedy. The most certain method of removing them is by means of the knife, only they frequently grow again within a short time; nor ought this remedy to be employed in venereal cases, till a sufficient quantity of mercury has been administered. In cutting them off, all the adjacent diseased parts must be taken away: and in order to prevent inflammation, the blood may be suffered to flow for some time, after which the parts may be covered with lint, and treated as a common wound.

CONDYLON, in *Ancient Geography*, a fortress of Greece, between Connas and Tempé, towards Thessaly.

CONE, in *Geometry*, a solid body, having a circle for its basis, and terminated at the top in a point, or vertex. See *Plate I. Conics, fig. 4.*

The cone is generated by the motion of a right line, KM, round an immoveable point, K, called its *vertex*, along the circumference of a plane, called its *basis*, MN: or it may be conceived as generated by the revolution of the triangle, KLM, about the right line, KL, which is called the *axis* of the cone, and KM its *latus* or *side*. If the axis be perpendicular to the base, it is said to be a *right cone*: and if inclined, or oblique, an *oblique* or *scalenus* cone. *Scalenus* cones are again divided into *obtusè-angled*, and *acutè-angled*.

An *equilateral* cone, is a right cone, whose side is equal to the diameter of the base.

Euclid defines a cone a solid figure, whose base is a circle, as CD (*fig. 5.*), and is produced by the entire revolution of the plane of a right-angled triangle CAB, about the perpendicular leg AB.

If this leg, or axis, be greater than CB, half the base, the solid produced is an *acute-angled* cone; if less, it is an *obtusè-angled* cone; and, if equal, a *right angled* cone.

But Euclid's definition only extends to a *right cone*; that is, to a cone whose axis is at right angles to the base; and not to oblique ones, whose axis is not at right angles to the base.

For a more general and comprehensive description of a cone, which may take in both right and oblique ones, suppose an immoveable point A (*fig. 6.*), without the plane of the circle BDEC; and suppose a right line, AE, drawn through that point, and produced infinitely both ways, to be moved quite about the circumference of the circle; and the two superficies that will arise from this motion are each called *conic superficies*; but, taken conjunctly, they are called *superficies vertically opposite*, or only *opposite superficies*. The immoveable point, A, common to both the superficies, is called the *vertex*; the circle BDEC, the *base*; the right line AC, drawn through the vertex A, and C, the *centre of the base*, and if infinitely produced, the *axis*; and the solid, comprehended under the conical superficies and the base, is a *cone*.

CONE, *Properties of this.*—1. *The area or surface of every right cone, exclusive of its base, is equal to a triangle whose base is the periphery, and its height the slant side of the cone.*

Take the very small arc IK (*fig. 7.*), and draw AI, AK. Then the part of the surface AIK coincides with the small isosceles triangle AIK, whose base is IK, and height AI. In like manner, the whole surface of the cone may be supposed to consist of such triangles whose common height is AI, and bases so many KPs as are contained in the circumference of the base, all which triangles are equal to the triangle whose height is AI, and base, the sum of

all the KPs, or the circumference BKDB. Hence, the curve surface of a right cone is equal to half the rectangle of the side AB, and circumference of the base, BKDB. For the half of that rectangle is equal to a triangle of the same base and height. Moreover, the curve surface of a right cone is equal to a circle, whose radius is a mean proportional between the side AB, and the radius of the base BC. For the conic surface is = $\frac{AB \times BKDB}{2}$, and the

area of the base BD = $\frac{BC \times BKDB}{2}$ (see *CIRCLE*).

Let the radius, R, represent the mean proportional between A B and B C, or let $R = \sqrt{AB \times BC}$; and the area of the circle whose radius is R = A. Then the conic surface : circle BD :: $\frac{AB \times BKDB}{2}$: $\frac{BC \times BKDB}{2}$::

A B : B C :: A B × B C : B C²; and the circle B D : circle A :: B C² : R² or A B × B C : consequently the conic surface : circle A :: A B × B C : A B × B C, which is a ratio of equality: therefore the conic surface = circle A, whose radius is $\sqrt{A B \times B C}$. Hence also, the curve superficies of a right cone is to the area of its circular base, as AC (*fig. 5.*), the length of the hypotenuse of the right-angled triangle describing it, is to CB, the base of the same triangle: that is, as the slant side of the cone, to the semidiameter of the base.

Hence also, the surface of a right cone is equal to a sector of a circle described on the slant side of the cone, as a radius, whose arc is equal to the periphery of the base of the cone: and has therefore the same proportion to its periphery, which the diameter of the base has to twice the side of the cone. Hence we have a method of describing a net or cage that shall just cover a cone.—Thus, with the diameter of the base AB (*Plate, Conics, fig. 8.*), describe a circle, and produce the diameter to C, till AC be equal to the side of the cone. To 2 AC and AB, determined in numbers, and 360°, find a fourth proportional: and with the radius CA, on the centre C, describe an arc DE equal to the number of degrees found: the sector CDE with the circle AB will be a net for the right cone.

If, then, the side of a truncated cone be set off from A to F, and an arc GH be described with the radius CF; by finding a fourth proportional to 360°, to the number of degrees of the arc GH, and to F C; and thence determining the diameter of the circle IF, we shall have a net or cover of the truncated cone.

For CDBAE is a net for the entire cone; CGFHH for the cone cut off; therefore, DBEHIG for the truncated cone.

2. *Cones and pyramids, having the same bases and altitudes, are equal to each other.*

Now, it is shewn, that every triangular prism may be divided into three equal pyramids; and therefore, that a triangular pyramid is one third of a prism, standing on the same base, and having the same altitude.

Hence, since every multangular body may be resolved into triangular ones, and every pyramid is a third part of a prism, having the same base and altitude; since a cone may be esteemed an infinite-angular pyramid, and a cylinder an infinite-angular prism; a cone is a third part of a cylinder, which has the same base and altitude. Hence, cones of equal bases are as their heights; cones, and also frustums of cones, of equal altitudes, are as the bases: cones are to one another in the compound ratio of the bases and heights: and in equal cones, the bases and heights are reciprocally proportional.

Here we have a method of measuring the surface and Solidity of a cone. Thus, for the solidity: find the solidity of a prism, or cylinder, having the same base with the cone, or pyramid, or, multiply the base by the altitude: then divide by 3: the quotient will be the solidity of a cone, or a pyramid. Thus, *v. gr.* if the solidity of a cylinder be 605592960, the solidity of the cone will be found 201864320.

For the surface: that of a right cone is had by multiplying the semi-periphery of the base into the side, and adding the product to the base.

All cones, which have their altitudes and the diameters of their bases reciprocally proportional, are in the triplicate ratio of their altitudes, being to each other in the same proportion with prisms of equal base and altitude, of which they are like parts. See PRISM.

Suppose, *e. gr.* the diameter of the cone NM (fig 4.) 56, the periphery will be 175.9256, and the base 2403.0144. Suppose the altitude or axis KL, 216; since $LM = \frac{1}{2} NM = 28$, and $KM^2 = KL^2 + LM^2 = 60516 + 784 = 61300$, $KM = 247.5$, &c. Consequently the superficies of the cone, exclusive of the base, is 21771,288; and the whole together 24234,3224.

The solidity of an oblique cone is obtained in the same manner with that of the right cone: but it is much more difficult to find its surface, since it cannot be reduced to the measure of a sector of a circle, because all the lines drawn from the vertex to the base are not equal. See a Memoir on this subject, by M. Euler, in the *Nouv. Mem. de Petersburgh*, tom. i. Dr. Barrow has demonstrated, in his *Lectures Geometricæ*, that the solidity of a cone with an elliptic base, forming part of a right cone, is equal to the product of its surface by a third part of one of the perpendiculars drawn from the point in which the axis of the right cone intersects the ellipse; and that it is also equal to one third of the height of the cone multiplied by the elliptic base: and therefore that the perpendicular is to the height of the cone, as the elliptic base to the surface.

For the measure of the surface, and solidity of a truncated cone, or frustum, ABCD (fig. 8). Its altitude CH, and the diameters of its bases AB and CD, being given, find their circumferences; to the square of the altitude CH, add the square of the difference of the radii AH, and from the aggregate extract the square root, which will give the side AC: the semi-sum of the peripheries, multiplied by that side, gives the superficies of the truncated cone or frustum.

To find the solidity: as the difference of the semi-diameters AH, is to the altitude of the truncated cone or frustum CH, so is the greater semi-diameter AF to the altitude of the entire cone FE. This being found, subtract the altitude of the truncated cone GF, which will leave that of the cone taken off, EG.

Find the solidity of the cone CED and AEB; subtract the other from this; the remainder will be the solidity of the truncated cone or frustum ACDB. Or, add into one sum the areas of the two ends of the frustum and the mean proportional between them; multiply that sum by the perpendicular height, and $\frac{1}{3}$ of the product will be the solidity. For the method of finding the surface and solidity of a cone, &c. by fluxions; see SUPERFICIES and SOLIDITY.

CONe, *Ungula of.* See UNGULA.

For the sections of the CONE, see CONIC SECTION.—For the ratio of CONES and CYLINDERS, see CYLINDER.—For the centre of gravity and of oscillation of a CONE, see CENTER.

CONES of the higher kinds, are those whose bases are circles of the higher kinds; and are generated by supposing a right line fixed in a point, on high, though conceived capable of being extended more or less, on occasion; and moved or carried round the said circle of the higher kind.

CONe of rays, in *Optics*, includes all the several rays which fall from any point of a radiant, on the surface of a glass.

CONe, *duble, or spindle*, in *Mechanics*, is a solid formed of two equal cones joined at their bases. If this be laid on the lower part of two rulers making an angle with one another, and elevated above the horizontal plane, it will move towards the raised ends, and seem to ascend, though it really descends. Let ABD (*Plate XVI. Mechanics, fig. 7.*) be the common base of the two cones, its centre C will be the centre of gravity of the whole solid: therefore, if DF represents one of the rulers elevated to an angle FDG, whose sine FG is less than the semidiameter of the cone CD, it is plain that the centre of gravity C at the position of the cone in D, is more distant from the centre of the earth, to which all heavy bodies tend, than in its position between the legs of the ruler at F; and therefore it will descend, as on an inclined plane CFE, from C to F, where it will stop, being supported on the raised ends of the rulers.

CONe, in *Assaying*. See MELTING-cone.

CONe, in *Botany*, a hard dry seed-vessel of a conical figure, consisting of several woody parts; and is, for the most part, scaly, adhering closely together, and separating when ripe.

CONe-stone, in *Natural History*, the name given by many to a species of *Tubulus marinus*, not known to us in its recent state, but frequently found fossil in the Swedish stones used in pavements.

CONe and key. *Bracon*, lib. ii. cap. 37. num. 3. says, *Femina in tali etate (i. e. 14. et 15. annorum) potest disponere domui suæ, et habere cone et key.*

The words come from the Saxon *colne*, i. e. *calculus*, and *key*, *clavis*; so that a woman was then held to be of competent years when she was able to keep the accounts and keys of the house: and *Glan*, lib. vii. cap. 9. has somewhat to the same purpose.

CONe, in *Conceology*. See CONUS.

CONECTE, THOMAS DE, in *Biography*, a monk of the order of the Carmelites, born in Bretagne, towards the close of the fourteenth century, and distinguished as the most popular and impressive preacher of his time. In his discourses he did not confine himself to subjects of religion and morality, but he attacked with vehemence the reigning follies and fashionable foibles of the age. The head-dress of the ladies in particular was the subject of his repeated remonstrances. At this period, says Bayle, "the head-dresses were of such a prodigious height, that the highest top-knots now are but dwarfs to them." Conecte reformed that excess, and obliged the ladies to dress themselves modestly and with a strict regard to decorum. It was not, however, so much by the force of the reasons with which he represented the evangelical duties, as by exciting boys and the commonalty to insult those of the other sex, who would not introduce a reform into their dress. Whether, however, he aimed at vice or folly, he was so famed as an orator, that no churches were sufficiently spacious to contain the crowds, that followed him wherever he went; he therefore chose as theatres for the display of his eloquence, public squares and other places where immense scaffolds were erected, from which he could make himself heard by many thousands.

sands at the same time. When he travelled from place to place, it was on a mule attended with many monks and priests on foot. As soon as he arrived in the vicinity of any town, the most considerable persons for rank and property came out to meet him, in order to conduct him to the house provided for his lodging, which was commonly the best in the place. His labours were not confined to his own country; from France he proceeded to the Netherlands, and Italy, exciting every where the same attention which he experienced in his native land. At Venice he gained so much reputation, that the ambassadors from that republic to the pope, invited him to accompany them to Rome. But the freedom and asperity of his declamations against the corruption of the clergy and the court, roused the resentment, and passions of the papal see; he was accordingly tried and condemned for heresy, and burnt at Rome in the year 1434. His motives were questioned by some of his contemporaries, but the readiness with which he submitted to a cruel death, in defence of his conduct, rather than retract the charges which he had exhibited against the profligacy of the Romish hierarchy, was sufficient evidence of his sincerity in a good cause. Bayle.

CONEGLIANO, GIO BATTISTA CIMA, called *Il*, from the place of his nativity, a small city in the state of Venice, became, under the tuition of Giovanni Bellini, a painter of considerable eminence; and indeed so entirely did Conegliano possess himself of the style of Bellini, that the works of the scholar are frequently confounded with those of the master; even by good judges. It was however much the custom with the older Venetian painters to subscribe their names to their works; many therefore of this artist are still known, as well by the inscription as by the mountainous view of the town of Conegliano with which he usually enriched his back grounds. A juvenile performance of this master with the date 1493, is in the duomo of Conegliano: a more excellent picture by him is in the church of Santa Maria dell'Orto, at Venice. It represents St. Peter, St. Paul, St. Mark, and St. Jerome, with a magnificent architectural back-ground. But in the opinion of Lanzi, the chef-d'œuvre of Conegliano is an altar-piece in the duomo at Parma, the subject of which however he has neglected to mention. This master is supposed to have died shortly after 1517. Lanzi. Storia Pittorica. Zanetti, Pittura Veneziana.

CONEGOCHEAQUE CREEK, in *Geography*, a creek of America, which rises near Maricburg, in Franklin county and state of Pennsylvania, runs southerly in a winding course, and after supplying a number of mills, discharges itself into the Potowmack at William Port, in Washington county, Maryland; 19 miles S.E. of Hancock, and 8 miles S. of the Pennsylvania line.

CONEI or COWNE, GEORGE, a native of North Britain, and a zealous catholic, went to reside at Modena, in Italy, at an early age. He afterwards settled at Rome, and was celebrated, during the pontificate of pope Paul V., for his profound knowledge of the Greek and Latin languages. His own good character recommended him to the patronage of the cardinals Montalto and Barberini. The latter being nephew to pope Urban VIII., Canei soon obtained so much of the favour and confidence of the pontiff as to be entrusted with the office of nuncio to Maria Henrietta, queen of England, which he discharged completely to the satisfaction of the papal court. As a reward for his conduct he would have been raised to the dignity of cardinal, had not death cut off his prospects. He died in 1640, at the age of forty-two; leaving behind him, among other works

of merit. "The Life of Mary Stuart;" "De Institutione principis;" "De Duplici Statu Religionis apud Scotos," &c. &c.

CONEMAUGH RIVER, and *Little Conemaugh*, in *Geography*, are the head waters of Kilkennantas, in Pennsylvania. After passing through Laurel hill and Chestnut ridge, Conemaugh takes that name, and discharges itself into the Alleghany, 29 miles N.E. of Pittsburgh. It is navigable for boats, and there is a portage of 18 miles between it and the Franktown branch of Juniata river.—Also, a town of Pennsylvania, 15 miles E. of Fort Ligonier.

CONENTOS, LAS, a city of La Plata or Paraguay, in South America, in the diocese of Buenos Ayres.

CONEPATL, in *Zoology*, an American animal of the weasel kind mentioned by Hernandez; and also by Ray under the title of *Tesquipatl*. It is described as bearing a strong resemblance to the racoon in shape, but variegated with two long streaks of white, one on each side of the ridge of the back, which run even into the tail. This animal is said to be of a harmless disposition, but of a stinking smell, and when pursued, or provoked, will discharge its excrements at the person who offends it to fix or eight feet distance; these have a very bad smell and spoil peoples cloaths by leaving indelible yellow spots on them. Little more is known of this animal than is above related. It inhabits New Spain, and was placed by Linnæus in his Systema as the same species with his *Viverra Memphisita*, the memphitic weasel, and chinchel of Buffon. Gmelin considers it as a distinct species, and describes it specifically under the name of conepatl. This animal may prove to be a variety only of the striated weasel, or perhaps only of the memphitic weasel to which Linnæus at first assigned it. See *Viverra*.

CONERFREIT, in *Geography*, a town of Germany, in the circle of Bavaria, and Upper Palatinate; 34 miles N.N.E. of Amberg.

CONESSI, or CONESTI, in the *Materia Medica*, a bark brought from the East Indies. It is frequent in Ceylon, and Malabar, where the natives take it in diarrheas, henteries, and dysenteries. We use it in powder for the same purposes, the dose being from half a dram to a dram. It is proper to give a dose of ipecacuanha before taking it.

This tree grows also on the Coromandel coast, in the East Indies, and is not unlike the *cadogopa* of the *bortus Malabaricus*. The bark should be fresh powdered, and the electuary prepared with syrup of oranges every day or every other day. Med. Ess. vol. iii. art. 4.

CONESTEO, in *Geography*, a north-western branch of Tioga river in the state of New York, America.

CONESTOGA, a township of America, in the county of Lancaster and state of Pennsylvania.

CONESUS, a small lake of America, in the county of Genesee and state of New York, which conveys its waters N.W. to Genesee river.

CONFARREATION, a ceremony among the ancient Romans, used in the marriage of persons whose children were destined for the honour of the priesthood.

Confarreation was the most sacred of the three modes of contracting marriage among that people; and consisted, according to Servius, in this, that the *pontifex maximus* and *flamen dialis* joined and contracted the man and woman, by making them eat of the same cake of salted bread; whence the term, *far* signifying meal or flour.

Ulpian says, it consisted in the offering up of some pure wheat bread; rehearsing, at the same time, a certain formula,

formula, in presence of ten witnesses. Dionysius Halicarnassus adds, that the husband and wife did eat of the same wheat bread, and threw part on the victims.

CONFECTION, in *Pharmacy*, a kind of compound remedy, of the consilience of a soft electary, or electuary.

Confections and electuaries are composed chiefly of powders, mixed up with syrups or honey, into such a consistence, that the powders may not separate by keeping. They are chiefly the milder medicines, and such as are not very ungrateful to the palate, that enter into the composition of the electuaries: for as they are taken somewhat "ad libitum," it would be unsafe to trust this mode of exhibition of the more active drugs. The lighter powders require about twice the weight of syrup to be brought to the proper consistence of an electuary. The ordinary dose is a piece about the bulk of a nutmeg. See **ELECTUARY**.

Several electuaries were formerly distinguished by the name of confections; some of which, in the medical language, are *corroborative*, and others *purgative*.

Of the number of the corroborative confections, were those of *alkermes*, of *hyacinth*, and the *anacardine*: a purgative one is the confection *Hamech*. The confection of *alkermes* has its name from the principal ingredients therein; which is the *kermes*, or *alkermes*, or scarlet-grain. The other ingredients were pearls, musk, cinnamon, ambergris, leaf-gold, juice of pippins, and rose water. It was ranked among the best cardiacs, and frequently used for the palpitation of the heart, or syncope; and sometimes in the small-pox and measles.

The confection of *hyacinth* was said to have nearly the same virtues with that of *alkermes*; but, besides, it was frequently used as an astringent. It consisted of nearly triple the number of drugs; whereof the precious stone, called the *hyacinth*, was esteemed the principal; the chief of the rest were, red coral, bole armoniac, terra sigillata, myrrh, the fanials, burnt hartshorn, camphire, sapphires, emerald, topaz, and most of the ingredients of the confection of *alkermes*. The *anacardine* confection was composed chiefly of *anacardiums*; whence the name. The other drugs were long pepper, black pepper, most kinds of myrobalans, castoreum, &c. It was used to purge the blood, and deemed proper in cold diseases.

The confection *Hamech*, took its name from that of its inventor, an Arabian physician. Its ingredients were, poly-pody, myrobalans, agaric, fenna, tamarinds, red roses, manna, colocynth, &c. It was applied as a drastic for the purging of the grosser humours and viscidities; it was also of some reputation in vertiges and cancers. But all these, though we have thought it proper to mention them, are excluded from the modern dispensatories.

CONFECTION AROMATICA. See the next article.

CONFECTION CARDIACA, a name given in the late London Dispensatory to the so much esteemed medicine commonly known by the name of the *confectio Raleighiana*, and now denominated *confectio aromatica*. The composition is also altered, as well as the name, and is ordered now to be made in the following manner: Take zedoary, in coarse powder, and saffron, of each half a pound, and of distilled water, three pints. Macerate for twenty-four hours, and then press out and strain. Evaporate the strained liquor to a pound and a half, and add of compound powder of crabs-claws, sixteen ounces by weight; cinnamon and nutmeg, of each two ounces by weight; cloves, one ounce by weight; lesser cardamom, half an ounce by weight; and double refined sugar, two pounds.

Powder the spices together very finely, and adding the sugar, make a confection. This is an improvement of the *confectio cardiaca* of the former dispensatory. The essential oil of the cardamom appeared, on an experiment made at the Hall, to be lost in the evaporation of the tincture; and, therefore, the cardamom is now more properly added in powder.

CONFECTION DAMOCRATIS. See **MITHRIDATE**.

CONFECTION FRACASSORII. See **DIASCORIDIUM**.

CONFECTION JAPONICA, was prepared of Japan earth, three ounces; tormentil root, nutmeg, and oilbanum, of each two ounces; opium, dissolved in Lisbon wine, a dram and a half; simple syrup and conserve of roses, of each fourteen ounces. An electuary of these ingredients supplied the place of *diacordium*; and the dose was from a scruple to a dram.

CONFECTION OPIATA, confection of opium, is prepared in the following manner: Take of hard purified opium, powdered, six drams by weight; long pepper, ginger, and caraway, of each two ounces by weight; syrup of white poppy, boiled to the consistence of honey, three times the weight of the whole. Mix the purified opium with the heated syrup, and add the rest in powder.

CONFECTION PAULINA, a name given in the late London Dispensatory to the composition which used to be called *confectio archigenis*. It was ordered to be made in the following manner: Take costus or zedoary, cinnamon, long pepper, black pepper, strained storax, galbanum, opium, and Russia caltor, of each two ounces; of simple syrup, boiled to the consistence of honey, an equal weight to thence the species. Pemberton's London Pharm. p. 339.

CONFECTOR, among the *Ancient Romans*, a sort of gladiator, hired to fight in the amphitheatre against beasts; thence also denominated *bestiarius*. See **GLADIATOR**.

The confectors were thus called *ad conficiendis bestias*, from their dispatching and killing beasts.

The Greeks called them *αυροβοτοι*, q. d. *daring, rash, desperate*; whence the Latins borrowed the appellations *parabolani*, and *parabolarii*. The christians were sometimes condemned to this sort of combat.

CONFECTS, or **CONFITS**, a denomination given to fruits, flowers, herbs, roots, and juices, when boiled and prepared with sugar, or honey, to dispose them to keep, or render them more agreeable to the taste.

The ancients only confited with honey; at present, sugar is more frequently used. Confects half-sugared are those only covered with a little sugar, to leave more of the natural taste of the fruit.

Confects are reduced to eight kinds; viz. *liquid confects*, *marmalades*, *jellies*, *pastes*, *dry confects*, *conservees*, *candies*, and *drages*, or *sugar-plums*.

Liquid confects are those whose fruits, either whole, in pieces, in seeds, or in clusters, are confited in a fluid transparent syrup, which takes its colour from that of the fruits boiled in it. There is a good deal of art in preparing these well; if they be too little sugared, they turn; and if too much, they candy. The most esteemed of the liquid confects are plums, especially those called mirabels, barberries, quinces, apricots, cherries, orange flowers, little green citrons from Madeira, green cassia from the Levant, myrobalans, ginger, cloves, &c.

Marmalades are a kind of pastes almost liquid, made of the pulp of fruits, or flowers, that have some consistence; such as apricots, apples, pears, plums, quinces, oranges and ginger. Marmalade of ginger is brought from the Indies by way of Holland: it is esteemed good

deliberate separately, he presides in the college of kings, and the duke of Nassau in the college of princes.

XI. The fundamental statute is to be framed by the prince primate.

XII. The French emperor is protector of the confederation, and names the successor of the prince primate.

XIII. to XXI. Enumerate the cessions made by members of the league: thus, Nassau cedes to Berg the town of Dous and its territory; Bavaria acquires the imperial city of Nuremberg and its territory; and

XXII. The prince primate receives Frankfort on the Mayne, and its territory, as his property.

XXIII. and XXIV. Enumerate the lordships over which the members of the confederation exercise the rights of sovereignty.

XXV. They also enjoy the sovereignty over the imperial knightdoms included within their boundaries.

XXVI. The rights of sovereignty consist in legislation, administration of justice, military conscription or recruiting, and levying taxes.

XXVII. Regulates the patrimonial or private property of the subordinate princes and counts. Their domains cannot be sold or given to any prince out of the confederation, without being first offered to the prince under whose sovereignty they are situated.

XXVIII. These subordinate princes and counts preserve the privilege of being tried by their peers. Their fortune cannot be confiscated, but their revenues may be sequestrated during the life-time of the criminal.

XXIX. and XXX. Regulate the payment of debts.

XXXI. The subordinate princes or counts may take up their residence where they choose, and draw their rents or capitals without any reserve.

XXXII. Public functionaries not retained by the new sovereign, receive a pension proportionate to the situation they held.

XXXIII. The same takes place with respect to religious orders losing their income.

XXXIV. The confederates renounce all reciprocal claims, except the eventual right of succession.

XXXV. Between the French emperor and the confederated states there shall be federatively and individually an alliance, by virtue of which every continental war in which either is engaged shall be common to all.

XXXVI. In the event of any power making preparations for war, the contracting parties, in order to prevent surprise, shall, upon the requisition of the minister of one of them at the assembly of the league, arm likewise. And as the contingent of the allies is subdivided into four parts, the assembly shall decide how many are to be called into activity. The armament, however, shall only take place upon the summons of the French emperor to each of the confederates.

XXXVII. The king of Bavaria binds himself to fortify Augsburg and Lindau, and to form and maintain artillery and baking establishments in the said places.

XXXVIII. The contingent of each confederate is: France 200,000 men, Bavaria 50,000, Wirtemberg 12,000, Baden 8000, Berg 5000, Darmstadt 4000, Nassau, Hohenzollern; and others 4000.

XXXIX. Admits of the accession of other German princes; and,

XL. as the concluding article, stipulates the exchange of the ratifications.

Of the two principal articles of the new constitution of the confederation of the Rhine, one relates to the establish-

ment of a superior court of appeal, in which all causes between the sovereigns and their subjects shall be finally decided. The other stipulates that the manufactures of each state shall be allowed to be freely imported into all the other states of the confederacy. Several new roads are to be made in order to facilitate commerce.

CONFERENCE, in its first and primary sense, denotes mutual discourse, and more especially such discourse on serious and important subjects. It also denotes an appointed meeting for discussing some point, by personal debate; of this kind was that held at Ratibon, in 1601, at the joint desire of Maximilian, duke of Bavaria, and Philip Lewis, elector Palatine, between some eminent Lutheran doctors on one side, and three celebrated Jesuits on the other. The dispute turned upon the two great points, to which almost all the contentions between the Protestants and the Roman Catholics are reducible, *viz.* the rule of faith and the judge of controversies. In 1615, another conference was held at Newberg between James Heilbronner, a learned Lutheran, and James Keller, a celebrated Jesuit, by the appointment of Wolfgang William, prince Palatine, who had a title before that time embraced the Romish faith. But the most famous of all these conferences was that held in the year 1645 at Thorn, by the express order of Uladissus IV. king of Poland, between several eminent doctors of the Romish, Lutheran, and reformed churches. As this meeting was intended to heal the divisions that prevailed among these churches, and to discover some method for healing their differences, and for effecting their reunion, it was on this account called the "Charitable conference." But the issue of this conference was very far from being favourable to the projected union. Some time after this, Ernest, landgrave of Hesse, in order to give a plausible colour to his apostacy from the Protestant religion, and make it appear to be the result of examination and conviction, obliged Valerianus Magnus, a learned capuchin, to enter the lists with Peter Habereorn, a reformed minister, in the castle of Rheinfield. Besides these public conferences on the continent, there were others of a more private nature held, during the 17th century, between the doctors of the contending churches. The most remarkable of these was the famous dispute between John Claude, the most learned of the Reformed divines in France, and Jaques Benigne de Bossuet, whose genius and erudition placed him at the head of the Romish doctors in that country. This dispute, held in the year 1683, terminated, like all the rest, in widening the breach instead of healing it. Neither of the contending parties could be persuaded to yield; but, on the contrary, they both returned from the field of controversy more riveted in their own opinions, and more averse from those of their adversaries. Another conference was held at Leipzig, in 1631, between three Saxon doctors on the one side, and some of the most eminent divines of Hess.-Cassel and Brandenburg on the other, with a view of representing, with fidelity and precision, their respective doctrines, and for the purpose of discovering the obstacles which prevented the union of the Lutheran and Reformed churches. The conference, however, though amicably conducted, broke up without having contributed in any respect to promote the salutary work of peace. The conference held at Cassel in 1661, by the order of William VI., landgrave of Hesse, between two professors at Rintelen, on the side of the Lutherans, and two others of the university of Marburg on that of the Reformed, was attended with much greater success than that of Thorn above mentioned: for, though it did not bring about a perfect uniformity of opinion, it produced an effect, which

was in reality, much better, a spirit of Christian charity and forbearance.

The most famous conferences of a similar kind, held in England, were those of *Hampton-Court* in 1604, and of the *Savoy* in 1661. The former was held by order of James I., on pretence of finding expedients, which might terminate the religious disputes between the church and the puritans, and reconcile both parties. The professed design of this conference was to examine the objections of the puritans against the doctrine, government, and discipline of the established church, and to rectify its abuses. But the progress and result of it evidently shew, that it was the design of the king to make an ostentatious display of his learning, and to mortify the puritans, who had favourable expectations from James's education in Scotland, and his professed attachment to the church established in that country, but who found, in the event, that he had conceived invincible prejudices against them. The disputants on both sides were nominated by the king. For the church, there were nine bishops, and about as many dignitaries; and for the puritans, there were only four ministers. This conference continued three days, viz. Jan. 14th, 16th, and 18th. The first day's conference was with the bishops and deans; the puritan ministers not being present; when the king made a speech in commendation of the hierarchy of the church of England, congratulated himself, that he was now come into the "promised land," &c. &c.; and informed them, that the reason of his consulting them by *themselves* was to receive satisfaction from them: 1. About some things in the Common Prayer. 2. Concerning excommunication in the ecclesiastical courts. 3. About providing some well qualified ministers for Ireland; that if any thing should be found meet to be redressed, it might be done without their being confronted by their opponents. After some alterations of no great importance, agreed on between the king and the bishops, with regard to the confirmation of children, the absolution of the church, private baptism, and baptism by women, and excommunication for lesser crimes, his majesty's scruples were satisfied; and thus ended the first day's conference. On the second day, Jan. 16th, the four ministers on the side of the puritans, together with Patrick Galloway, minister of Perth in Scotland, and two bishops and six or eight deans on the other side, were convened. The king, seated in his chair, with his nobles and privy counsellors around him, informed the puritanical ministers that he was ready to hear their objections against the establishment. Upon which Dr. Reynolds, one of their number, in the name of his brethren, humbly requested: 1. That the doctrine of the church might be preserved pure, according to God's word. 2. That good pastors might be planted in all churches, to preach in the same. 3. That the book of Common Prayer might be fitted to more increase of piety. 4. That church government might be sincerely ministered according to God's word. In the discussion of these points, Bancroft and the king took an active part. At the close of this day's debate, his majesty highly incensed at the complaints stated by Dr. Reynolds, told the ministers, that he found they were aiming at a Scots presbytery; "which," says he, agrees with monarchy as well as God and the devil; there Jack and Tom and Will and Dick shall meet and censure me and my council. Therefore I reiterate my former speech: "Le Roi s'aviviera." Stay, I pray, for one seven years before you demand; and then, if you find me grow purple and fat, I may perchance hearken unto you. For that government will keep me in breath, and give me work enough. I remember how they used the poor lady, my mother, in Scotland, and me in my minor-

ity." Then turning to the bishops, he put his hand to his hat and said "I beseech you, I may thank you that these puritans plead for my supremacy; for if once you are out and they in place, I know what would become of my supremacy, for *no bishop, no king*." When Dr. Reynolds said he had nothing more to offer, the king said, "if this be all your party have to say, I will make them conform, or I will hurry them out of this land, or else worse." On the termination of this day's conference, some asserted that the puritans had been grossly insulted and ridiculed, and that they had not been allowed freedom of speech; but the bishops and courtiers flattered the king's wisdom and learning, and called him the Solomon of the age. Bancroft fell upon his knees, and said, "I protest my heart melteth for joy, that Almighty God of his singular mercy, has given us such a king, as since Christ's time has not been." Chancellor Egerton said, "he had never seen the king and priest so fully united in one person." The king was no less satisfied with his own conduct, and boasted of his victory over the puritans. At the third day's conference, Jan. 18, the bishops and deans were first called into the privy-chamber with the civilians, to satisfy the king about the high commission and the oath *ex officio*; and when the king expressed his satisfaction with the latter, the old archbishop (Whitgift) was so transported as to exclaim, "undoubtedly your majesty speaks of the special assistance of God's spirit." A committee of bishops and privy-counsellors was then appointed to consider of lessening the charges in the high commission, for planting schools and proper ministers in the kingdom of Ireland, and on the union of England and Scotland. After which Dr. Reynolds and his brethren were called in, not to dispute, but only to hear the few alterations or explanations in the Common Prayer Book, that had been adopted; but when they expressed their wish that something further might be done, or at least that the surplice and cross might not be urged, the king replied with a stern countenance, interrupting the bishops who were about to answer, "We have taken pains here to conclude in a resolution for uniformity, and you will undo all by preferring the credit of a few private men to the peace of the church; this is the Scots way; but I will have none of this arguing; therefore let them conform, and that quickly too, or they shall hear of it; the bishops will give them some time, but if any are of an obstinate and turbulent spirit, I will have them enforced to conformity." Thus ended this conference, and the opportunity for conciliation and union was lost; and this was chiefly owing to the king's pedantry and love of adulation, to his high and arbitrary principles, and to his inveterate hatred of the Puritans.

The *Savoy* conference was held in pursuance of the declaration of Charles II. Oct. 25, 1660, concerning ecclesiastical affairs, when 12 bishops and nine assistants were appointed on the part of the episcopal church of England, and as many ministers on the side of the presbyterians, to assemble at the bishop of London's lodgings at the Savoy; "to review the book of Common Prayer, comparing it with the most ancient and purest liturgies; and to take into their serious and grave consideration the several directions and rules, forms of prayer, and things in the said book of Common-Prayer contained; and to advise and consult upon the same, and the several objections and exceptions which shall be now raised against the same; and if occasion be, to make such reasonable and necessary alterations, corrections, and amendments, as shall be agreed upon to be needful and expedient, for giving satisfaction to tender consciences, and the restoring and continuance of peace and unity in the churches under his majesty's government and direction."

They were to continue four months from the 25th of March 1501, and then present the result of their conferences to his majesty under their several hands. When the conference opened on the 15th of April, some difficulties occurred about the proper mode of proceeding; some of the presbyterian party were for insisting only on a few matters of importance, judging that if these were gained, and an union followed, it might be more easy to obtain the others afterwards. But the majority, by the influence of Mr. Baxter, were for extending their desires to the utmost, and thought themselves bound by the words of the commission, to offer every thing which they thought might conduce to the peace of the church; but when they were put in mind, that the king's commission gave them no power to alter the government of the church, nor to insist upon archbishop Usher's model, nor so much as to claim the concession of his majesty's late declaration, they were much discouraged; for they were now convinced that all they were to expect were a few amendments in the liturgy and Common-Prayer Book. They wished also to have consulted their absent brethren, and to have received from them a commission in form; but this was denied. Instead of drawing up a few supplemental forms and making some amendments to the old liturgy, Mr. Baxter composed a new one, in the language of scripture, which he called "The Reformed Liturgy;" not with a design entirely to set aside the old one, but to give men liberty to use either according to their own choice and approbation. This was presented to the bishops in the conference, together with exceptions to the "old liturgy." This gave great offence, partly because a liturgy, composed by a single person in fourteen days, was set in competition with one which had been received in the church for a whole century; and partly, because it was inconsistent with the commission, and the bishops' declaration of varying no further from the old standard than should appear to be necessary; and, therefore, the reformed liturgy was rejected at once without examination. When the presbyterians presented their exceptions to the liturgy, they accompanied them with "a petition for peace," beseeching the bishops to yield to their amendments; to free them from the subscriptions and oaths in his majesty's late declaration, and not to insist upon the re-ordination of those who had been ordained without a diocesan bishop, nor upon the surplice, the cross in baptism, and other indifferent ceremonies, enforcing their petition by various arguments and motives. These exceptions were canvassed, and produced a variety of alternate objections and replies. The bishops, however, would make no concession to the prejudices of the presbyterians; upon which they sent them a large expostulatory letter, in which, after having repeated their objections, they lay the wounds of the church at their door. The term for the treaty being almost spun out in a paper controversy, about 10 days before the commission expired, a disputation was agreed on, to argue the necessity of alterations in the present liturgy. Three of each party were chosen to manage the argument. The dispute, however, terminated without effect. From arguments the presbyterian ministers descended to intreaties, and besought the bishops to compassionate scrupulous minds, and not to despise their weaker brethren; to all which the bishops replied, that they were only commissioned to make such alterations in the liturgy as should be necessary, and such as should be agreed upon. Mr. Baxter says, that the bishops would not abate the smallest ceremony, nor correct the grossest error, for the peace of the church. Thus the king's commission expired July 25, and the conferences ended without any prospect of accommodation. It was agreed at the conclusion, that each party

might represent to his majesty, that they were all agreed upon the ends of the conference, which were the welfare, unity, and peace of the church, but still disagreed as to the means of procuring them. The bishops thought they had no occasion to represent their case in writing, but the presbyterian commissioners met by themselves, and drew up an account of their proceedings, with a petition for that relief which they could not obtain from the bishops. Hume's Hist. vol. vi. 10. 13., vol. vii. 369.

CONFERVA, in Botany, a name occurring in Pliny for a water plant, supposed to be *C. rivularis* of Linnæus, so called, he says, a *conferrumianum*, because it closely adheres together, Linn. gen. 1207. Schreb. 1672. Juss. 6. Vent. 2. 32. Clafs and order, *cryptogamia alga*. Nat. Ord. *Alga*. Linn. Juss. Vent.

Gen. Char. Fibres simple, uniform, capillary, filamentous." Linn. "Filaments capillary, simple or branched, jointed; joints numerous, often unequal." Lam. Vent. "Seeds produced within the substance of the capillary or jointed frond, or in closed tubercles united with it." Dr. Smith.

Species. I. Simple.

* Immersed.

+ In salt water.

1. *C. confervicola*. Conferva upon conferva. Dillw conf. 8. Dill. Musc. 552. tab. 85. fig. 21. "Filaments simple, minute, somewhat crowded, acute; partitions obscure; joints cylindrical, unequal in length." Dillw. *Filaments* rarely more than an eighth of an inch long, of a dark glaucous colour, tapering. Common in the latest months of autumn on various tuci and confervæ. 2. *C. flaccida*. Dillw. 49. "Filaments simple, very slender, minute, flaccid; partitions transparent; joints very short." Growing in loose patches of a green colour, about half or three-fourths of an inch long. Joints scarcely half so long as broad. Parasitical on confervæ, and the smaller tuci in the neighbourhood of Swansea. 3. *C. fucicola*. Vellej Mar. Plant. Pl. 4. Dillw. 66. With. 4. 156. "Filaments clustered, simple, obtuse; partitions transparent, slightly contracted; joints rather long." Dillw. *Filaments* very numerous, thickly clustered at the root, diverging while in the water, from four to six lines long, of a dirty yellow or brown colour, somewhat glossy when dried. Joints about twice as long as broad, filled with minute granules. Parasitical on fucus vesiculosus, and sometimes on nodosus. 4. *C. curta*. Dillw. 76. "Filaments clustered, simple, somewhat cartilaginous or horny, erect, short, attenuated at both ends; partitions transparent, slightly contracted; joints rather short." *Filaments* seldom more than three or four lines long, of an olive-brown colour, obtuse, growing in roundish stiff tufts. Joints not much longer than thick. Parasitical on fucus. 5. *C. carnea*. Dillw. 84. "Filaments simple, clustered, somewhat knotty, flesh-coloured; joints rather short, attenuated at both ends; juice collected into solitary globules." *Filaments* from a quarter to half an inch long, rather obtuse. Partitions dark-coloured. Joints sometimes about twice the length of the diameter, sometimes little more than the length; colourless, except where the juice is collected. Parasitical in loose tufts on other confervæ. 6. *C. capillaris*. Linn. Sp. Pl. 14. Lam. 14. Dill. p. 25. tab. 5. fig. 25. A. Dillw. 9. (C. limum; Flor. Den. 771. *C. palustris*, five filum marium Anglicum. Rai. Syn. p. 60. n. 16.) "Filaments simple, cylindrical, rather rigid, curled, entangled, brittle; partitions transparent; joints cylindrical, short; capsules sessile." *Filaments* three or four feet long, about the thickness of large thread, pale yellowish green, entangled, but never adhering together; perfectly flaccid after it has been exposed a few minutes to the

the air. *Partitions* quite transparent, with a thin blackish line on each side. *Joints*, when dry, generally appearing alternately compressed. Found in the ditches and stagnant pools of salt marshes. 7. *C. tortuosa*. Dillw. 46. "Filaments simple, rather rigid, entangled, slender; partitions transparent; joints cylindrical, rather long." Resembling the preceding species in miniature. *Filaments* as fine as human hair, less brittle than those of *C. capillaris*; joints nearly twice as long as broad. Found in salt-pools, and on rocks in the sea. 8. *C. arca*. Dillw. 80. "Filaments simple, rather rigid, nearly straight; partitions glassy-transparent, contracted; joints oblong, short." *Filaments* several from the same root, from six to fifteen inches long, sometimes nearly the thickness of a crow quill, generally about that of large thread, dark or bluish green, brittle. *Joints* not so long as broad, rounded at each end. On stones in the sea.

†† *In fresh water.*

9. *C. foetida*. Dillw. 60. "Filaments simple, slender; partitions ring-like; joints rather long, transparent." *Filaments* very long, extremely slender, entangled. *Joints* about four times as long as thick. In ponds, pools, and ditches frequent. In ponds forming a semi-transparent cloud-like mass round the grass or reed on which it grows, of a yellowish-green colour. In small currents, floating, in denser masses, on the surface. 10. *C. inflata*. Smith Eng. Bot. 1670. *Conjugata inflata*; Vaucher conf. 68. tab. 5. fig. 8. "Filaments simple; joints three times as long as broad; when fertile, swelling and elliptical." *Filaments* but the seventh part of an inch in diameter, transparent, almost colourless. *Joints* at first exactly cylindrical, marked with green colouring matter in spiral lines; afterwards swelling, elliptical, each protruding a lateral tube, so as to unite with similar tubes of a neighbouring plant. The colouring matter of one joint passes into the other, its spiral appearance being entirely lost. At length each joint which has received it swells still more, growing quite elliptical, and filled with a solid green body, which M. Vaucher has proved to be a single seed, producing in due time a solitary young plant. These appearances cannot be perceived without the aid of a microscope. Found by Mr. W. Boner at Hensfield in Sussex. 11. *C. punctalis*. Dillw. 51. "Filaments simple, slippery, very slender; partitions obscure; joints rather short, cylindrical; juice finally collected into solitary globules." *Filaments* from one to two inches long, so slender, as, when single, scarcely to be distinguished by the naked eye. In ditches and pools not infrequent. 12. *C. bipunctata*. Dillw. 2. Smith Eng. Bot. 1610. Roth Cat. Bot. ii. p. 204. (*C. bellina*; Muller in Nov. Act. Pet. iii.) "Filaments slippery, yellowish, joints short, cylindrical, with two spots." *Joints* remarkable in having each two dark spots, frequently furnished with a green longitudinal streak running through them; these spots sometimes fill nearly the whole, sometimes only a small portion of the joint, and, when verging upon decay, assume a stellated appearance; but are not visible without the aid of a microscope. 13. *C. nitida*. Dillw. 4. Flor. Dan. tab. 519. (*C. rivularis*; Hudf. Flor. Ang. 1. β. *C. ferrea* crassior & varie. extensa. Dillw. p. 13. tab. 2. fig. 2. *C. decima*; Mull. nov. act. Pet. iii. *C. fetiformis*; Roth. Cat. Bot. Fasc. 1. p. 171. 2. p. 103. *Byssus palustris confervae* des. Mich. Gen. tab. 89. fig. 6.) "Filaments simple, shining, slippery; joints rather long, cylindrical; granules of the fructification doubly spiral." *Filaments* a foot or more long, about the thickness of a human hair, dark green, growing at the bottom of the water in loose irregular patches, not sufficiently matted as to contain air bubbles, nor so much entangled as in many others. 14. *C. spiralis*. Dillw. 3. Smith Eng. Bot. 1656. Roth Cat. Bot. ii. p. 202. (*C. quinina*; Mull. act. nov. Pet.

iii.) "Filaments simple, slippery; joints cylindrical, rather long; granules of the fructification, simply spiral." *Filaments* longer and more slender than those of *nitida*, anatomising like those of *C. inflata*. 15. *C. jugalis*. Dillw. 5. Flor. Dan. tab. 883. (*C. fcalaris*; Roth. Cat. Bot. ii. p. 196.) "Filaments simple, flaccid, often conjugate by pairs; granules of the fructification doubly spiral; finally collected into globules." In pools and ditches. Mr. Dillwyn strongly suspects, that *C. nitida* (n. 13.), is only the present plant in an earlier period of its growth. 16. *C. geniflexa*. Dillw. 6. Roth. Cat. Bot. ii. p. 199. (*C. serpentina*; Mull. nov. act. Pet. iii.) "Filaments simple, very slender, brittle, here and there knee-bent and conjugate; joints rather long, cylindrical; granules collected into lines." *Filaments* as far as can be judged, considering their brittleness, not more than one or two inches long, anatomising occasionally at very uncertain distances, and only where they are geniculate, not regularly paired as in *C. jugalis*, but connecting themselves with any other that is near them, and manifesting a strong affinity to the next species. In pools and ditches. 17. *C. reticulata*. Linn. Sp. Pl. 11. Lam. 21. Smith Eng. Bot. 1687. Dillw. p. 20. tab. 4. fig. 14. (*Hydrodictyum*; Vaucher Conf. 88. tab. 9.) "Filaments united into the form of a tubular net." *Filaments* green, tubular, forming a very delicate net, open at both ends; meshes generally with five sides, sometimes with four or six. M. Vaucher found the old plants in a stationary condition during winter; but in spring the joints swelled, and gave out simple cylindrical masses of green matter. Each mass soon became a reticulated tube, which in two or three months grew to the full size of the parent plant. It grows loosely, floating in still water; but not very common. 18. *C. rivularis*. Linn. Sp. Pl. 1. Lam. 1. Dillw. 29. Smith Eng. Bot. 1654. (*C. compacta*; Roth. Cat. Bot. i. p. 170. *C. fluviatilis terrea, vulgaris & fluitans*; Dillw. p. 12. tab. 2. fig. 1. *C. Pinni* Rai. Syn. p. 58.) "Filaments simple, dark green, slender, very long, very densely compact, frequently twisted; joints rather short." *Filaments* often two or three feet long. 19. *C. hucus*. Dillw. 47. Smith Eng. Bot. 1655. "Filaments simple, slender, glaucous, slippery; joints shortish; granules collected in fasciae." *Filaments* seldom more than three inches long, tapering. On rocks and stones in clear rapid rivulets. 20. *C. diffusus*. Dillw. 63. "Filaments simple, straight, brittle; partitions but little contracted, often loose; joints short, with a dark spot in the middle." *Filaments* from three to six inches long, less than a human hair in diameter, dark green, often breaking at the partitions and remaining connected at one extremity; joints about half as long as thick. In ditches on reeds and other aquatic vegetables. 21. *C. pectinalis*. Dillw. 24. Smith Eng. Bot. 1611. Mull. nov. act. Pet. iii. (*C. bronchialis*; Roth. Cat. Bot. i. p. 186.) "Filaments simple, transparent, broken, acuminate; partitions often loose; joints very short, crystalline-transparent in the middle." *Filaments* seldom half an inch long, dirty green, to the naked eye resembling decayed vegetable matter, when entire gradually tapering to a point, and bearing some resemblance to the antennae of a lobster, frequently breaking at the partitions, and remaining connected at one extremity. *Joints* appearing coloured at each end by a green fluid, which, as the plant approaches to decay, collapses, sometimes forming into small globular masses, and sometimes disappearing entirely. In rivers and stagnant waters, adhering to decaying wood and vegetables. 22. *C. flocculosa*. Dillw. 28. Roth. Cat. Bot. p. 192. tab. 4. fig. 4. and tab. 5. fig. 6. "Filaments most commonly simple, minute; partitions loose; joints prismatic, alternately refracted." *Filaments* seldom more than a quarter of an inch long

CONFERRA.

varying from a pale to a greenish brown. *Joints* with a double line running through the middle, and frequently with some transverse bands; as they adhere to each other only in a single point, and always at alternate ends, they give the plant the appearance of a string of parallelograms, united at the corners. It might be taken for a much broken piece of *C. pectinatis*, but the joints cannot be so disposed as to form one regular line. In pools and slow streams, adhering to decaying vegetables and to other conferræ, especially to *C. glomerata*. 23. *C. fontinalis*. Linn. Sp. P. 2. Lam. 2. Flor. Dan. tab. 651. fig. 2. Dillw. 64. (*C. minima* byssif. facie; Dill. p. 14. tab. 12. fig. 3.) "Filaments simple, cylindrical, truncate, dark green, fasciated; partitions obscure; joints very short." *Filaments* without any apparent root, equally obtuse at both ends. Common in rivers, pools, and ditches, generally floating in irregular masses on the surface. 24. *C. limosa*. Dillw. 20. (*C. gelatinosa*, omnium tenerrima et minima aquarum limo innascens; Dill. p. 15.) "Filaments simple, very slender, short, mucous, densely compact, bluish green, slippery; partitions indistinct." Common on the muddy edges of rivers, ditches, and ponds, representing to the naked eye, except at the margin, where it is fibrous, a widely expanded, thin, shapeless gelatinous mass, sometimes floating at the top of the water. In either case the only mode to examine it, is to carry it home, without allowing it to dry, and to put it in a pan of water, where, in the space of a night, it will shoot out an immense number of threads, visible to the naked eye only from their number; these viewed through a microscope appear obtuse at each end, and crossing each other without any regular order. Mr. Dillwyn is inclined to think that this is only the last species in a younger state; the principal difference is in the size and colour; in *C. fontinalis* the filaments are much larger, browner, and not glossy; the joints also are far more distinct, and more regularly disposed. 25. *C. violacea*. Hudf. Flor. Ang. p. 592. (*C. confragosa*; Lightf. Flor. Scot. p. 976. Dill. p. 15. tab. 2. fig. 4.) "Filaments simple, equal, violet." *Filaments* about half an inch long, of a beautiful violet or indigo colour, of a slippery mucous substance, so extremely fine as to be undistinguishable by the naked eye, and so crowded together as to form, when moist, a gelatinous mass, and when dry, a membranous lamina. Found by Lightfoot on the rocks in the waterfalls of the mountain of Goatfield in the Isle of Arran, and said by Dillenius to grow in Alpine rivulets near Llanberis. 26. *C. e-lino-lata*. Smith Eng. Bot. 1378. "Glaucous, stems simple, spreading every way from a centre, and forming a globe." Sent by the Rev. Mr. Davies from a lake in Anglesea. It covers the surface of the water in the months of June and July, and consists of innumerable minute globules of a glaucous or verdigrise green, all nearly of a size. When examined with a microscope each globule appears to be composed of a number of simple cylindrical short filaments apparently springing from a solid centre. Under a very high magnifier these filaments are found to be formed of short uniform joints, each of which is of an equal thickness throughout, but the upper ones gradually diminish in size. Mr. Davison Turner suggests that this minute vegetable ought probably to be referred to Roth's new genus *uvularia*, to which *ulva incrassa* and *U. pruniformis* of English botany belong. Those species are of a pulpy substance, clothed with jointed filaments.

**Not immersed.*

27. *C. ericetorum*. Dillw. 1. Smith Eng. Bot. 1553. Roth Cat. Bot. ii. p. 206. "Filaments simple, slender, prostrate, densely entangled; partitions scarcely contracted;

joints about as long as they are broad." *Filaments* from half an inch to an inch long, of a dull purple colour, covering the moist sandy earth in large patches. Common on moist heaths. 28. *C. muralis*. Dillw. 6. Smith Eng. Bot. 1554. "Filaments simple, very slender, prostrate, densely entangled, somewhat rigid; joints very short, slightly swelled; partitions obsolete." *Filaments* about an inch long, scarcely discernible by the naked eye, covering the substances on which they grow with a fine close green mat. Common upon damp walls, flowers, and neglected shady walks. 29. *C. decorticans*. Dillw. 26. "Filaments simple, closely interwoven, glaucous; partitions obscure; joints short." *Filaments* growing in large patches so intimately interwoven as to peel off in flakes, bearing a considerable resemblance to a piece of silk or ribbon. It differs from *C. muralis* in its much greater tenacity and darker colour. Not frequent on damp walls and flowers.

II. Compound.

* *Immersed.*

† *In salt-water.*

30. *C. polymorpha*. Linn. Sp. Pl. 17. Dillw. 44. (*C. marina* geniculata nigra palmata; Dill. p. 32. tab. 6. fig. 35. *Ceramium fastigiatum*. Roth Cat. Bot. ii. p. 175.) "Filaments dichotomous, fastigiate, somewhat cartilaginous; joints short; capsules on the upper branchlets, egg-shaped, sessile." *Filaments* about the thickness of horse hair, repeatedly dichotomous, with rather acute angles, of a dark purple colour when young, afterwards becoming black. Common on the larger fuci, most commonly on *F. nodosus*, in thick tufts, two or three inches long. 31. *C. lanuginosa*. Dillw. 45. "Filaments nearly simple, very minute; of a rusty colour; joints rather long, pectinid in the middle; capsules sessile, unilateral." In the sea, adhering to other conferræ. 32. *C. nigra*. Hudf. Flor. Ang. p. 595. "Filaments equal, branched, very long; branches alternate, many-cleft, very short." *Filaments* five inches long, black, fissile; branches fasciculated. On the Yorkshire coast. 33. *C. byssoides*. Dillw. 58. Eng. Bot. 547. "Filaments more than twice pinnated; branches and branchlets alternate; uppermost ones extremely short, somewhat fasciculate; partitions from the union of the veins; joints rather long; capsules egg-shaped, sessile." *Filaments* extremely flaccid, zig-zag, transparent, beautifully striated by longitudinal veins, each of which arch over at or near the same place, and appear to form the partition. Common on most of our shores, from three to five inches long, varying in colour from a reddish brown to a light or purplish red. 34. *C. parasitica*. Hudf. Flor. Ang. p. 604. Eng. Bot. 1429. "Filaments branched; branches doubly and alternately pinnated; capsules axillary, solitary, oblong." *Filaments* an inch long or more, purplish brown, slender, cylindrical, with the same jointed and tubular structure as the preceding. Parasitic on fuci, found rarely on the coast of Yorkshire, Devonshire, and Cornwall. Dr. Smith observes that the last two species have the jointed structure of conferræ, but agree better with the character of fuci in their fructification. The same observation will apply to several of the following species. 35. *C. nigrescens*. Hudf. Fl. Ang. p. 602. Smith Eng. Bot. 1717. "Filaments much branched; branches alternate, elongated; ultimate ones short, crowded, awl-shaped; joints rather broader than long, compound." *Filaments* from four to six inches long, blackish. *Joints* a little contracted, consisting of a circular double series of numerous parallel tubes, similar to those of *C. byssoides*. Mr. Stackhouse is said to have found the fructification in small lateral nodules on the coast of Scotland, Devonshire, and Cornwall. 36. *C. fistula*. Hudf. 603. "Fila-

"Filaments much branched; branches and branchlets a ternate, simple." *Filaments* three or four inches long, dark brown or reddish; branches long; branchlets short, dilant, *Fruifications* terminal and lateral, sessile, small, roundish, clustered. 37. *C. mertensii*. Smith Eng. Bot. 999. "Filaments much branched; branches opposite, pinnated; joints short; capsules minute, acorn-shaped, on short peduncles." In habit resembling *fungus wigii*. *Filaments* about three inches long, pale yellow, pinnated from their very origin; pellucid; branches short, ditichous, horizontal, generally simple. *Partitions* darker, and thence visible. *Capsules* visible on γ with a good glass. Found on the beach near Yarmouth. Mr. Dawson Turner. 38. *C. fusoides*. Hudf. Fl. Ang. p. 603.—Dillw. 75. Eng. Bot. 1743. "Filaments capillary, somewhat cartilaginous, much branched; partitions from the union of the nerves; joints compound, shortish, striated; capsules solitary, egg-shaped, sessile." *Filaments* from two or three inches to a foot long, reddish-brown, becoming darker and almost black with age, remarkably thick and bulky in its growth, ultimate branches awl-shaped, all alternate. *Joints* of the stem and principal branches three times as long as broad; of the branchlets about as long as broad, each consisting of a simple circular series of numerous parallel tubes. *Capsules* terminal and lateral, small, obtuse, discharging their seeds at the summit. On rocks and stones in the sea, frequent. 39. *C. atrorubescens*. Dillw. 70. "Filaments branched, striated; branches elongated, generally alternate, branchlets short, awl-shaped, fasciculated; capsules egg-shaped, peduncled." *Filaments* from four to nine inches long, the thickness of small thread, growing separately, varying from a light purple to a dusky red, and becoming black with age or by drying, striated under the microscope by longitudinal spiral veins, which arch over at or near the partitions, and at first sight appear to form them. *Joints* in the principal branches often more than twice as long as broad, in the branchlets about equal in length and breadth. *Capsules* either lateral or terminal. In the sea, adhering to rocks, stones, and shells. 40. *C. rosea*. Smith Eng. Bot. 966. Dillw. 17. (Ceranium roseum. Roth Cat. Bot. ii. p. 182.) "Filaments repeatedly branched; branches and branchlets alternate, approximate; partitions transparent, a little contracted; joints oblong; capsules unilateral, sessile, somewhat globular." *Filaments* from an inch and a half to three inches long, in their thickest parts nearly as fine as human hair, so fine near their tips as to be scarcely visible, very flaccid, when floating in water resembling beautiful feathers, rose-coloured. In the sea, on rocks, fuci, and other substances. 41. *C. coccinea*. Hudf. Flor. Ang. p. 603. Eng. Bot. 1035. Dillw. 36. (C. plumosa. Lightf. 995. Ellis Philos. Transf. vol. lvin. 425. tab. 18. fig. c. c. d. D. Ceranium bifurcum. Roth Cat. Bot. ii. 169. tab. 4.) "Filaments somewhat cartilaginous, much branched; main stem rough with hairs; branches alternate, more than twice alternately pinnated; extreme branchlets fasciculated, pencil-shaped; partitions obscure; joints short; capsules egg-shaped." *Main stem* nearly as thick as common twine, solitary, mostly of a darker red than the branches. *Partitions* scarcely perceptible in the main stem and larger branches, but very apparent in the smaller ones, dividing them into short transparent joints. *Capsules* bright red early in spring, becoming gradually darker, and in May discharging the seeds by an aperture at the tip. On rocks and stones in the sea common. 42. *C. turneri*. Smith Eng. Bot. 1037. "Repeatedly branched, very slender, tufted; ultimate branches all pectinated on the upper side; joints transparent, cylindrical; capsules globular, sessile between the teeth of the branches, unilateral." Pectinated branchlets opposite;

Capsules deep red, scattering the seeds over the branches. *Seeds* large. In the sea, off the Isle of Wight. 43. *C. plumosa*. Ellis Phil. Transf. vol. lvi. p. 426. Dillw. 50. "Filaments much branched; branches alternate, pinnated; pinnæ opposite; ultimate branchlets unilateral; joints longish; capsules short, pedicelled." Whole plant deep red, pellucid. *Partitions* dark. *Capsules* very numerous, unilateral on the ultimate branchlets, discharging the seeds at the tip. In the sea, adhering to conservæ. 44. *C. tetrica*. Dillw. 81. "Filaments repeatedly pinnated; pinnæ and pinnulæ alternate; ultimate ones curved; joints rather long; capsules generally only one on each ultimate branchlet, globular, peduncled." *Stems* several from the same callus, forming thick entangled tufts of a brownish-red colour, six or eight inches long, about the thickness of horse hairs. On rocks and fuci in the sea. 45. *C. diaphana*. Lightf. Flor. Scot. 996. Hudf. Flor. Ang. 653. Dillw. 38. Smith Eng. Bot. 1742. (C. nodulosa. Hudf. Flor. Ang. 600. C. marina nodosa lubrica, ramossissima et eleganter rubens. Dill. 35. tab. 7. 40.) β C. purpurascens. Hudf. "Filaments capillary, repeatedly forked, divaricated; ultimate divisions like a pair of forceps; partitions obsolete; joints short, pellucid in the middle, deep red at each end; capsules lateral, solitary, globular." From two to six inches high, presenting to the naked eye the appearance of a series of small heads, alternately coloured and pellucid. Common in the sea, on rocks, stones, and fuci. 46. *C. rubra*. Hudf. Flor. Ang. 600. Smith Eng. Bot. 1166. Dillw. 34. (C. nodulosa. Lightf. Flor. Scot. 944. C. geniculata, ramossissima lubrica longis sparsive ramulis. Dill. 35. tab. 6. fig. 38. A. Ceranium virgatum. Roth Cat. Bot. i. 148. tab. 8. fig. 1.) "Filaments repeatedly branched, thread shaped, thickly jointed; ultimate branches bristle-shaped, forked; capsules somewhat globular, sessile, solitary, lateral." Eighteen or twenty inches high, light red or purple, very liable to bleach. *Filaments* one or more from the same callus, about the size of sewing-silk; partitions dark red, more or less contracted; joints beautifully reticulated, pellucid towards the centre. Common on rocks and stones in the sea. 47. *C. tetragona*. With. Bot. Arr. 34. 495. Dillw. 65. Eng. Bot. 1690. "Filaments much branched; branchlets fasciculated, short, generally simple; joints ovate-cylindrical; capsules sessile, somewhat globular." Seldom more than two inches long. *Stems* several from one callus, straight, branched on all sides, forming an irregular ovate general outline, of a light purplish-red colour; branches square. Parasitical on fungi. 48. *C. elongata*. Hudf. Flor. Ang. 599. Dillw. 33. (Fucus distichus. Hudf. Flor. Ang. 589.) "Filaments much branched, cartilaginous; branches and branchlets elongated, diffuse, bristle-shaped veined; partitions obscure; joints very short; capsules egg-shaped, sessile." Exceeding in size every other British conservæ. *Main stem* as thick as common twine, purplish-red; branchlets paler; partitions dark-coloured. *Capsules* scattered sparingly on the ultimate branches. On rocks, oyster-shells, &c. 49. *C. littoralis*. Linn. Sp. Pl. 6. Lam. 6. Dillw. 31. (C. marina capillacea longa, ramossissima, mollis, Dill. 23. tab. 4. fig. 19.) "Filaments much branched, very slender, zig-zag, thickly matted; branches and branchlets acuminate; partitions obscure; joints cylindrical, short." *Filaments* from six to nine inches long, of a dull olive-green colour; branches generally alternate, making an acute angle with the stem. *Capsules* globular, scattered irregularly on the branches, rarely found. On rocks and fuci, common. 50. *C. conoides*. Dillw. 27. Smith Eng. Bot. 1700. "Filaments capillary, zig-zag, branched; branches scattered, sharp-pointed, but little spreading; partitions scarcely visible." Nearly allied to the preceding. *Filaments* seldom

more than an inch long, purple-brown. lying one over another, on the round pebbles in the sea. so as to have a striking resemblance to an infant's head. 51. *C. tomentosa*. Hudf. Flor. Ang. 594. Dillw. 56. (*C. marina* tomentosa, minus tenera et ferruginea. Dill. 19. tab. 3. fig. 13.) "Filaments much branched, very slender, thickly matted, divaricated, extreme branchlets simple; joints long." *Filaments* from three to five inches long, of a pale greenish or russet-brown colour; branches so slender as to be scarcely visible without a microscope, issuing at right angles. *Joints* at least three times as long as thick. *Partitions* dark brown. Frequent, generally parasitical on *fucus vesiculosus*. 52. *C. allida*. Hudf. Flor. Ang. 595. (*C. marina* tomentosa, tenerior et albicans. Dill. 19. tab. 3. fig. 12. *C. tomentosa* ß. Roth.) "Filaments much branched, very slender, equal; branches simple, fasciculated, white." *Filaments* scarcely separately visible to the naked eye, pale green, soft, resembling cotton. Found in salt water, ditches, and pools in the island of Selsey in Sussex. 53. *C. fetacea*. Hudf. Flor. Ang. 599. Smith Eng. Bot. 1689. Dillw. 82. (*C. marina* gelatinosa, corallinæ inlar geniculata, tenuior. Dill. 33. tab. 6. fig. 37.) "Filaments alternately and repeatedly branched, taper-pointed, fasciculated, slippery; joints a little swelling, at least four times as long as broad; lateral shoots bearing tufts of filaments containing many globular seeds. Seldom exceeding four or five inches in length, of a rich crimson colour. On rocks and stones in the sea, not unfrequent at the latter end of summer and beginning of autumn. 54. *C. borrieri*. Smith Eng. Bot. 1741. "Filaments capillary, repeatedly branched; branches alternate, spreading in two directions, zig-zag; ultimate ones fattigiate; joints cylindrical, about twice as long as broad." *Filaments* in tufts, about two inches long, of a delicate pink colour, turning orange when dry. *Fertilisation* unknown, but conjectured by Dr. Smith to resemble that of *C. fetacea*. Gathered on Yarmouth beach by W. Borrer, etcq. F. R. S. 55. *C. stricta*. Dillw. 40. "Filaments somewhat dichotomous, fasciated, veined; joints long." *Filaments* in thick bundles, many from the same root, seldom more than three inches long, of a dull crimson colour, repeatedly divided. *Joints* about three times as long as broad. On rocks in the sea, at Dover and Swansea. 56. *C. rothii*. Turton's Syst. Nat. 6. 1806. Dillw. 73. Eng. Bot. 1702. (*C. violacea*. Roth. Cat. Bot. i. 190. tab. 4. fig. 1.) "Filaments erect, dichotomous, short, densely tufted, crimson; branches alternate; joints very short." *Filaments* very slender, from three to twelve lines long. *Joints* cylindrical, about twice as long as broad. On rocks by the sea-shore. 57. *C. corallinoides*. Linn. Sp. Pl. 15. (*C. marina* gelatinosa corallinæ inlar geniculata crassior. Dill. 33. tab. 6. fig. 36.) "Filaments dichotomous; joints thicker at the top." *Filaments* bright red or white, slippery, very tender, almost disappearing when dry. On stones on the sea-shore. 58. *C. tubulosa*. Hudf. Flor. Ang. 600. (*C. marina* filitulosia. Dill. 34. tab. 6. fig. 39. *Ulva* confervoides. Linn.) "Filaments much branched; joints oval, alternately compressed." *Filaments* from two to four inches long, yellowish green; branches knotted, hollow. On rocks, stones, and fuci. 59. *C. catenata*. Linn. Sp. Pl. 16. Lam. 16. (*C. ramosa*, geniculis longioribus cateniformibus. Dill. 27. tab. 5. fig. 27.) "Filaments branched, green; joints oblong, forming a kind of chain, with links alternately broader and narrower." On the coasts of Carolina, the Bahama islands, and the south of Europe. 60. *C. scoparia*. Linn. Sp. Pl. 9. Lam. 9. Smith Eng. Bot. 1552. Dillw. 52. (*C. marina* pennata. Dill. 24. tab. 4. fig. 23.) "Filaments much branched, rigid; branches fasciculated, ultimate divisions alternate, acuminate; partitions obscure; joints short."

Whole plant of a brownish olive, changing when dry to a russet-brown colour. *Filaments* from two to six or nine inches long; upper branches longer and more clustered than the lower, giving the plant a brush-like appearance. *Joints* about as long as thick. Frequent on the sea coast on stones and pebbles. 61. *C. pennata*. Hudf. Flor. Ang. 604.—Dillw. 85. "Filaments branched; upper branches pinnated; pinnae nearly opposite, nearly horizontal, approximate, stiff and straight; partitions obscure; joints short; tubercles fissile, spherical." Often confounded by botanists with the preceding. *Filaments* in bushy tufts from half an inch to two inches long, olive green, brown when dry. On rocks, fuci, & corallines. 62. *C. verrucosa*. Smith Eng. Bot. 1688. "Branches irregularly scattered and subdivided, scarcely jointed, studded with rough warts." *Filaments* three or four inches long, pale reddish brown, capillary, but uneven, somewhat twisted, not perceptibly jointed, except in the youngest shoots, where an interruption of colour is sometimes perceived at intervals. Found on the coast of Hampshire and Cornwall. 63. *C. villosa*. Hudf. Flor. Ang. 603.—Smith Flor. Ang. 546.—Dillw. 37. "Filaments branched; branches and branchlets opposite, distant; joints very short; partitions obscure, villous." *Stem* from six inches to three feet high, greenish yellow, seldom more than thrice divided; hairs in whorls on about every fourth or fifth joint, extremely slender, brittle; partitions not readily discoverable except in the verticillated hairs. On submarine rocks and stones. 64. *C. ciliata*. Ellis in Philof. Trans. vol 57. p. 425. tab. 18 f. 4. H.—Dillw. 53. (*C. plicata*; Roth Cat. Bot. 2. 225. tab. 5. fig. 2.) "Filaments dichotomous, incurved at the tips in a forceps-like manner; partitions beset with verticillated cilia, reddish at each end, pellucid in the middle; capsules somewhat globular, lateral." *Filaments* in bushy tufts, seldom more than two inches long, varying from a bright to a purplish red. On rocks, stones, and fuci, frequent. 65. *C. equisetifolia*. Lightf. Flor. Scot. 984.—Smith Eng. Bot. 1479.—Dillw. 54. (*C. imbricata*; Hudf. Flor. Ang. 603, and multicauda. Hudf. 603, as appears from an authentic specimen communicated by Dr. Goodenough to Mr. D. Turner.) "Filaments much branched; branches acuminate, elongated; branchlets verticillated, short, dichotomous; joints of the branchlets long." From three to eight inches long, the thickness of a crow's quill, bright red when young, afterwards dull brown. *Stem* and branches very where clothed with numerous whorled branchlets, which, being longer than the joints, are tiled upon each other, and give the plant a rough spongy appearance. On rocks and stones in the sea, not unfrequent. 66. *C. spongiosa*. Hudf. 596.—Dillw. 42. (*Fucus hirtutus*; Linn. Mant. 134.—*Mucus marinus* hirtutus; Morif. 3. 650. tab. 9. fig. 6.) "Filaments branched, branchlets very short, simple, imbricated on all sides; joints short; capsules oblong, pedicelled." Seldom more than three inches long, olive-coloured. *Branchlets* not whorled but disposed without any regular order, not dichotomous. *Capsules* small, on rather long pedicels, discharging the seeds at the summit. Rocks in the sea, not uncommon. 67. *C. verticillata*. Lightf. Flor. Scot. p. 984.—Smith Eng. Bot. 1718.—Dillw. 55. (*C. Myriophyllum*; Roth in Schrabers Journ 3. 335.) "Filaments cartilaginous, variously branched; branchlets at the partitions, verticillated, very short, incurved, frequently forked; joints about as broad as long." Four or five inches long, of a dull olive colour. On rocks and stones in the sea. 68. *C. arbutula*. "Primary filaments thick, not jointed, naked near the bottom, much branched above; branchlets crowded, somewhat verticillated,

lated, short, branched, jointed; joints cylindrical, short." About three or four inches long, of a beautiful deep-red brown colour when fresh, dull brown when dry without glos. On submerfed calcareous rocks in the north of Ireland. 69. *C. cancellata*. Linn. Sp. Pl. 10. Lam. 10.—Hudf. Flor. Ang. p. 596.—Dill. 24. tab. 4. fig. 22. "Filaments branched; joints short, much divided, digitate." Three or four inches long, of a pale dirty colour, irregularly branched; branches an inch and half or two inches long; branchlets capillary, numerous, incurved, leaving a hollow space between them and the branch. On stones and rocks in the sea. 70. *C. repens*. Dillw. 18. Smith Eng. Bot. 1608. (*C. fulva*; Hudf.?) "Filaments minute, creeping, densely matted; partitions scarcely contracted; joints cylindrical, twice as long as they are broad." Seldom more than three or four lines long, the thickness of human hair, of a more or less vivid red colour, investing the larger fuci and confervæ in minute dense tufts like velvet or plush; branches and branchlets generally unilateral. 71. *C. flexuosa*. Dillw. 10. "Filaments dichotomous, rather rigid; branches zig-zag; branchlets generally simple, very slender, alternately unilateral, spreading; joints cylindrical; partitions obsolete." Filaments in closely entangled masses, from four to eight inches long, finer than human hair, pale yellowish green in the branchlets, very dark green in the main shoots. On the sea coast and in salt-water pools at Yarmouth. 72. *C. late virens*. Dillw. 48. "Filaments much branched, rather rigid, curved; branchlets twice alternately unilateral; partitions pellucid; joints long." Filaments from three to six inches long, light green, irregularly branched, growing in a bushy manner. On rocks, fuci, and corallines on the Welsh coast. 73. *C. diffusa*. Dillw. 21. Roth Cat. Bot. 2. 207. tab. 7. "Filaments branched, diffuse; branches somewhat dichotomous, zig-zag, remote; branchlets short, approximate, obtuse; partitions pellucid; joints rather long." Filaments in loosely entangled bundles, from two to six inches long, pale green, more rigid than in most other species, not collapsing when drawn out of the water. On rocks in the sea. 74. *C. rufescentis*. Linn. Sp. Pl. 20. Lam. 20. Dillw. 23. Smith Eng. Bot. 1699. (*C. glauca*; Roth Cat. Bot. 2. 208. tab. 6. *C. trichodes ramiflor.* Dill. 28. tab. 5. fig. 29.) "Filaments much branched, fasciculated, rigid, straight, obtuse; joints long, even; partitions but little contracted, colourless." From three to six inches long, dull green, in dense tufts upon rocks, pebbles, or dead shells. 75. *C. pellucida*. Hudf. p. 601. Smith Eng. Bot. 1716. "Filaments erect, much branched; branches mostly ternate, cylindrical; joints even, cylindrical, four times as long as broad." Filaments about six inches long, green, shining, pellucid, somewhat wiry and elastic to the touch, naked and stem-like towards the bottom. On the coast about Yarmouth. 76. *C. feniculacea*. Hudf. p. 594. Dill. 16. tab. 2. fig. 8. "Filaments square, much branched; branches and branchlets very long, scattered." Filaments irregularly divided like the leaves of fennel, soft and greenish when young, brownish and stiffer when old. On the shores of Cornwall and the Isle of Man. 77. *C. aruginosa*. Linn. Sp. Pl. 7. Lam. 7. (*C. marina capillacea brevis, viridissima mollis*; Dill. 23. tab. 4. fig. 20.) "Filaments branched, soft, shorter than the human finger, very green." Filaments numerous, very fine, shining and silky when dry, retaining their elegant cereulean green colour. On fuci, not very common. 78. *C. vagabunda*. Linn. Sp. Pl. 18. Lam. 18. (*C. marina trichodes, lance inflar expansa*; Dill. 30. tab. 5. fig. 32.) "Filaments zig-zag, much branched; branch-

lets very short, horizontal." Floating in the water without root, pale green, joints so small towards the extremities, as scarcely to be seen with a common lens. In salt water marshes and ditches. 79. *C. sericea*. Hudf. p. 601. (*C. trichodes virgata sericea*; Dill. 31. tab. 4. fig. 33.) "Filaments much branched, elongated; branchlets crowded, very slender." From four to eight inches long, pale green in salt water, fine green, softer and smoother in fresh water. On submarine rocks; also in the new river near London and other fresh water rivulets.

†† In fresh water.

80. *C. dichotoma*. Linn. Sp. Pl. 8. Lam. 8. Smith Eng. Bot. 932. Dillw. 15. (*C. dichotoma fetis porcinis similis*; Dill. 17. tab. 3. fig. 9. *Ceraminum dichotomum*. Roth Cat. Bot. i. 153.) "Filaments fasciculated, straight, fastigiate, dichotomous, hollow, somewhat jointed; partitions obsolete; joints very long, capsules elliptical, sessile." Filaments in dense masses, about two feet long, considerably thicker than horse-hair, dark green, most dichotomous near the top; angles of the divisions acute; partitions scarcely perceptible, except in the dried plant. Capsules scattered, sometimes single, sometimes five or six together. In ditches common; also according to Dillenius in ditches, between Greenwich and Woolwich, filled every tide with the brackish water of the Thames. 81. *C. furcata*. Hudf. Flor. Ang. p. 592. (*C. capillacea, filamentis bifidis et trifidis*.) "Filaments branched at the extremity; branches simple." Filaments long, simple, the greatest part of their length, once or twice branched at the end, of a dull pale colour, white when dry. 82. *C. fraida*. Flor. Dan. tab. 946. Dillw. 14. (*C. divaricata*; Roth Cat. Bot. i. 179. tab. 3. fig. 1.) "Filaments much branched, matted; branches and branchlets divaricate; older joints oblong; younger ones cylindrical; capsules sessile, roundish." Filaments from one to four inches long, the thickness of human hair, dark green, rather rigid, generally floating, in densely entangled masses, on the surface of stagnant water; branches abruptly terminated, so as to give the plant a broken appearance. 83. *C. vivipara*. Dillw. 59. "Filaments dichotomously branched; branches zig-zag, bulbiferous at the partitions; bulbs terminated by a long hair; joints long; capsules lateral, sessile." Filaments in small, slender, bushy tufts, commonly not more than two lines long, never exceeding half an inch, yellowish green; joints five times as long as thick. Capsules at some of the partitions; bulbs at the others. In boggy rivulets on stones, moss, and other substances. 84. *C. gelatinosa*. Linn. Sp. Pl. 13. Lam. 13. Smith Eng. Bot. 689. Dillw. 32. (*C. fontana nodosa spermatifera ranaum inflar major et fusca*; Dill. 36. tab. 7. fig. 42. *Chara batrachosperma*; Weis Gott. 33. tab. 1. *Batrachospermum moniliforme*; Roth Cat. Bot. 2. 187.) "Filaments much branched, beaded, slippery; branchlets very slender, pencil-shaped, somewhat vertically lated, very compound, bearing the fruit; partitions obscure, joints rather short; capsules roundish with many seeds." From one to six inches long, resembling frogs spawn, dark purple or yellowish green. β minor et viridis; Dill. 37. tab. 7. fig. 43. δ Hudf. *C. filamentis nodosis et cæruleis*; Dill. fig. 43. But from some specimens gathered in an alpine lake on Saowden, Mr. D. Turner is dubious whether it be not a distinct species; its stems being quite hard, and its moniliform appearance very faint. In clear springs and streams. 85. *C. mutabilis*. Roth Cat. Bot. 1. 197. Dillw. 12. Smith Eng. Bot. 1740. (*C. gelatinosa* γ Hudf. *C. itagnalis, globulis virefcentibus mucosus*; Dill. 38. tab. 7. fig. 44.) "Filaments much branched, gelatinous, somewhat beaded; branchlets compound,

pound, twisted; partitions contracted; joints short." Vanius in length from half an inch to three inches, and from a light to a dark green. Main stems remarkably pale and pectinate; branches darker. Joints short. In pools and ditches, not uncommon. 86. *C. atra*, Hudf. p. 597. Smith Eng. Bot. 67. Dillw. 11. (*C. fontana*, nodosa, lubrica, filamentis; *musculus nigris*; Dill. 3, tab. 7. fig. 46.) "Filaments much branched beaded, somewhat gelatinous; branchlets bristly-shaped; joints dilated towards the tip, ciliated; edge verticillated, imbricated." Varying in colour, during different stages of its growth, from a pale to a dark green, and finally becoming black. In clear rivulets and springs, but rare. 87. *C. fluviatilis*. Linn. Sp. Pl. 12. Lam. Pl. Dillw. 29. (*C. lubrica*, fetosa, equifolia facie; Dill. 3, tab. 7. fig. 47. *C. nodosa*, *faunus molans*; Dill. 37. tab. 48. *C. torulosa*. Roth Cat. Bot. 1. 202.) "Filaments branched, rather rigid; branches and branchlets generally alternate, attenuated each way; partitions swollen, tubercled; joints long, dilated at both ends." *Filaments* six or eight inches long, dull olive or greenish purple; sometimes nearly simple, when they are shorter, thicker, and more rigid. Dill. 48. Dillwyn has seen these different filaments growing from one root. In rapid, rocky streams. 88. *C. lubrica*. Dillw. 77. "Filaments much branched, slender, very long, shining, slippery; branches thorn-like; joints rather short." *Filaments* from six inches to near a foot long, green, with a slight tinge of blue, branches scattered, forming an acute angle with the stem. In clear rivulets attached to stones and wood in large gelatinous masses. 89. *C. proterva*. Dillw. 67. "Filaments much branched; branches diffuse, much lengthened out, pellucid at the tip; joints rather long." *Filaments* from two lines to a half or three quarters of an inch long, light green. In rivulets and springs, on stones and aquatic plants. 90. *C. glomerata*. Linn. Sp. Pl. 19. Lam. 19. Flor. Dan. tab. 65. fig. 2. Dillw. 13. (*C. fontinalis ramosissima glomeratim congesta*. Dill. 28. tab. 5. fig. 31. *C. cristata*; Roth Cat. Bot. 1. p. 193. 2. p. 220.) "Filaments much branched; branches alternate; branchlets unilateral, fasciculated, pencil-form; partitions pellucid; joints cylindrical, rather long." *Filaments* from two or three inches to a foot long, yellowish green. On stones and wood in clear rivers and streams. 91. *C. rigida*. Hudf. Flor. Ang. 594. (*C. fluviatilis fibrillosa subrigida*; Dill. 21. tab. 4. fig. 16.) "Filaments much branched, rather rigid; branchlets alternate, very short." *Filaments* several from the same base, so as to have a clustered appearance, and sometimes to cover the pebble to which they are attached, dull green, often inclining to brown. Somewhat hairy; branchlets most numerous near the summits of the filaments. In clear streams. 92. *C. canaliculata*. Linn. Sp. Pl. 4. Lam. 4. (*C. rivulorum capillacea densiflora conglobis ramulis*; Dill. 21. tab. 5. fig. 15.) "Filaments most branched near the base; branches long." *Filaments* one or two inches long, slender, deep green, simple or but little branched above the middle, of a spongy soft substance, densely matted together so as to resemble a piece of velvet, soft and herbaceous when fresh, but when dry blackish, and acquiring almost a stony hardness from the mud adhering to it. In pure streams and mill-pool water spouts. 93. *C. bulbosa*. Linn. Sp. Pl. 3. Lam. 3. (*C. palustris bombeyana*; Dill. 18. tab. 3. fig. 11.) "Filaments branched, matted inclosing air bubbles." *Filaments* from three to nine inches or a foot long, slender, dull yellowish green. In clear waters, soft, somewhat silky, and of a livelier green; in stagnant muddy waters, paler, tomentous, resembling dirty cotton. Professor Martens is of opinion that *C. fracta* is the plant intended by Linnæus, and since called *C. bul-*

lofa; but Mr. Dillwyn observes that the specimen in Dillæus's herbarium, here described, is certainly another species, and agrees with Mr. D. Turner in thinking, that several distinct plants which have the property of retaining bubbles of air have been confounded by authors, and consequently that the confervæ bulbosa are a family and not a species. These confervæ when dried have been used as wadding for stuffing garments, and have been woven into coarse household linen. 94. *C. dispersa*. Flor. Dan. tab. 820. Dillw. 22. "Filaments branched, jointed, fasciated with transverse lines; branches and branchlets distorted; partitions obsolete; joints short." *Filaments* about half an inch long, extremely slender, of a beautiful dark green colour varying to a lighter colour as they approach to decay; branches seldom numerous, but with a very peculiar twist at their ramifications. Parasitical in short thick tufts on decaying grass, attached to small pieces of which it frequently floats on the surface of the water. Hitherto found in Great Britain, only by Mr. Dillwyn, in a boggy pool on Sketty Burroughs, near Swansea. 95. *C. agagropia*. Linn. Sp. Pl. 21. Lam. 21. Smith Eng. Bot. 1377. Dillw. 87. "Filaments much branched, clustered into a globe and divaricating from the centre; branches and branchlets nearly unilateral, straight, obtuse; joints long, cylindrical." From the size of a pea to three or four inches in diameter, always pretty exactly spherical, hollow within, without any solid body, or root, to which the filaments might originally have been attached. The specific name alludes to the hairy balls found in the stomach of goats. In lakes lying in great abundance at the bottom of the water. 96. *C. nana*. Dillw. 30. "Filaments branched, very minute; branches and branchlets generally alternate, acuminate; partitions pellucid; joints cylindrical." *Filaments* seldom much more than half a line long, of a pale brown colour tinged with brown, resembling *C. littoralis* in its ramification, and remarkably acuminate branches. Parasitical on decayed confervas, &c. in rocky rivers. 97. *C. typhlodermis*. Dillw. 83. "Filaments nearly simple, densely matted; partitions obscure; joints short." The extreme tenacity and entangled growth of the filaments makes it impossible to ascertain their length; their colour is a dull olive green. Observed in a bottle which contained a solution of gum dragon in water, the surface of which was covered with a mass of filaments so densely interwoven as to form a film about two lines in thickness, bearing a considerable resemblance to the skin of a mole. 98. *C. ochracea*. Dillw. 62. Roth Cat. Bot. 1. 65. tab. 5. fig. 2. "Filaments much branched, very slender, very brittle, closely compact, constituting an ochraceous jelly, which at length breaks into fragments of separate filaments." The filaments are so extremely fragile that the slightest touch or any considerable agitation of the water breaks them into a thousand pieces, which at first remain suspended, and afterwards sink to the bottom in the form of an ochraceous powder. In this state only can the plant be examined, but the fragments are so small that it is impossible to ascertain their original length, and under the highest magnifiers their thickness scarcely seems equal to that of the human hair. In pools and ditches common, of a dull yellow colour. 99. *C. laeta*. Dillw. 79. Roth Cat. Bot. 1. p. 216. 3. p. 292. (*C. pusilla*; Roth Flor. Germ. 1. 524.) "Filaments much branched, gelatinous, slippery; branches rod-like, alternate from each partition; partitions contracted; joints very long, glassy-transparent." *Filaments* growing in gelatinous masses at the bottom of ditches and rivulets, from half an inch to three or four inches long, of a dirty white colour; branches clustered, so as to give them a brush-like appearance; partitions of a dusky colour. *Joints* at least ten times longer than

than thick. 100. *C. myoceros*. Dillw. 19. Smith Eng. Bot. 1555. "Filaments very densely matted, branched; branchlets simple, generally unilateral, in pairs, incurved." *Filaments* sometimes quite simple, generally branched, seldom more than half an inch long, as fine as the finest wool. On the rocky beds of torrents in the vale of Beddgelert, in Caernarvonshire, matting the stones with a velvety covering, three or four lines in diameter, of a dark glossy brown colour, soft to the touch, which, when taken out of the water, might be compared to the skin of a mouse. 101. *C. vesicata*. Dillw. 74. Müller in Nov. Act. Pet. 3. "Filaments branched, somewhat jointed, rigid; vesicles innate, solitary, elliptical, broader than the filament; capsules generally in pairs, pear-shaped on short peduncles." *Filaments* in bushy masses at the bottom of the water, so extremely brittle that their length cannot easily be ascertained, yellowish green, cylindrical, filled with minute granules which issue from them when broken; very rough to the touch; branches few, distant, generally making an obtuse angle with the stem. *Stems* and *branches* frequently swollen, with bladder-like vesicles, four or five times thicker than the filaments, resembling those of *fucus nodosus*. *Partitions* irregularly disposed, always at a great distance from each other. 102. *C. amphibia*. Linn. Sp. Pl. 5. Lam. 5. Dillw. 41. (*C. amphibia fibrillosa* et *spongiosa*; Dill. 22. tab. 4. fig. 7. B and C). "Filaments somewhat jointed, branched, densely matted; branches spreading, remote; branchlets, when not immersed, collecting into sharp bristly points; partitions but little contracted; capsules sessile, somewhat elliptical." β . branches elongated (*C. furecata*; β . Huff. Ceramium coespitosum; Roth Cat. Bot. 1. p. 154. 2. p. 186. *C. palustris filamentos brevioribus et crassioribus*; Dill. 17. tab. 3. fig. 10.) Filaments very various in length, according to the situation, bright green, becoming ash-coloured with age; α is the plant as it grows on the edges of ditches, and in shallow water, where it is not wholly immersed. In such situations, it frequently occurs in masses, so densely matted as to hold water like a sponge, with its surface beset by erect branches, which give it a bristly appearance. In floods, when the waters overflow the plant, the length of the filaments is gradually increased, and forms Mr. Dillwyn's β ; but when the waters subside, the filaments, again exposed to air, take of course an horizontal direction, and again throw out erect spreading branchlets, which, on being dried, collapse so as to form rather stiff points. In rivers, the branches are frequently carried out by the force of the stream to a great length, and in that case do not assume a bristly appearance when exposed to air; probably owing to the less spongy nature of the mass, in consequence of which the water is not so readily transmitted to the upper surface, as to enable it to make fresh shoots. The plant has a mouldy ungrateful smell, and is much used as a shelter by aquatic insects.

** Not immersed.

103. *C. atrovirens*. Dillw. 25. "Filaments rather rigid, branched; branches divaricated, somewhat unilateral, attenuated at both ends, rather obtuse; partitions pellucid; joints very short, marked with three points." *Filaments* from a quarter to half an inch long, growing in thick bushy tufts, of a blackish green colour, not unrequently intermixed with mucus. On the wet rocks, forming the banks of the river Dylais, near Neath. 104. *C. frigida*. "Filaments not jointed, creeping, branched; Dillw. 16. (Ceramium Dillwynii; Roth.) "Filaments not jointed, creeping, branched; branches alternate; capsules sessile,

round." *Filaments* about an inch long, a little finer than human hair, of a pale green colour, growing in loose irregular patches, two or three inches in diameter, very slightly adhering to the soil. On the ground in moist shady places, particularly in turnip fields, with a northern exposure, during the winter and early months of spring. The frigidia of Dr. Roth is a different plant, referred by him to Dill. tab. 4. fig. 17, A. 105. *C. umbrosum*. Dillw. 61. Roth Cat. Bot. 1. 191. tab. 4. fig. 3. (*C. arcuaria*; Roth Cat. Bot. 2. 217?) "Filaments branched, creeping, fragile, short-obtuse; branches curved, simple, somewhat unilateral; joints long, sometimes cylindrical, sometimes inflated." Growing in smaller patches, and of a darker colour, than *C. frigida*. *Filaments* scarcely half an inch long; joints varying greatly in shape and length. 106. *C. pallida*. Dillw. 78. "Filaments dichotomous, curved, zig-zag, fastigate angles of the divisions roundish; joints very long." *Filaments* considerably finer than human hair, a light yellowish brown, matted together into dense leathery masses, about an inch long, and the thickness of a shilling; joints at least eight or ten times broader than thick. Found on some yellow ochre, in a pot of singlass size. 107. *C. multicaespularis*. Dillw. 71. "Filaments minute, creeping, olive-coloured; branches erect, generally simple, short, thickened towards the top, and bearing the capsules; capsules clustered, spherical." *Filaments* very minute, thickly entangled, growing in small irregular patches. *Joints* in the creeping item very long; in the branches shortest at the base, and longest towards the summit. *Capsules* terminating the branches, discharging the seeds at the orifice. On clayey banks, in high exposed situations. 108. *C. rubiginosa*. Dillw. 72. Smith Eng. Bot. 1701. "Filaments creeping, branched, entangled, alternately bipinnate; branches divaricated, tapering, acute; joints elongated, cylindrical." *Filaments* creeping in loose entangled masses, among mosses, over dead stalks and sticks, and along the ground, of a brown chestnut colour; branches from a quarter to half an inch long; pinnæ and pinnulæ variously curved, nearly at right angles with the stem and branches; partitions almost black; joints in the stem and main branches three or four times longer than broad. On hedge banks. 109. *C. rubiginosa*. Dillw. 68. "Filaments much branched, rigid, rather erect; branches zig-zag, spreading, matted together so as to form nearly a solid mass; joints long." *Filaments* very minute, growing in irregular patches, about an eighth of an inch in thickness, of a rusty brown colour, entirely destitute of gloss. *Joints* visible only under the highest powers of the microscope, about four times longer than broad. On rotten wood, secluded from the light. 110. *C. volutina*. Dillw. 77. Smith Eng. Bot. 1556. "Filaments creeping, branched, matted; branches erect, alternate, or unilateral, curved, obtuse; joints slightly swelling, at least twice as long as broad." Distinguished by its sweet scent. (See *Byssus volutina*.) Jointed structure first discovered by Mr. J. D. Sowerby. 111. *C. aurea*. Dillw. 35. "Filaments branched, gold-coloured, minute; branches long, spreading, rather rigid, somewhat incurved; partitions pellucid; joints longish." (See *Byssus aurea*.) Jointed structure, first discovered by Mr. Dillwyn. 112. *C. purpurea*. Dillw. 43. "Filaments dichotomous, flexible, minute; dichotomous, branches approximate; partitions obscure; joints longish." (See *Byssus purpurea*.) 113. *C. licheniola*. Smith Eng. Bot. 1609. "Filaments red, upright, crowded, alternately branched; roughish; joints swelling, about as long as broad." *Filaments* scarcely a line long, forming thick tufts, and appearing to the naked eye like brick-dust. Parasitical on crustaceous lichens.

Jchens. 114. *C. musficola*. Smith Eng. Bot. 1738. "Filaments rusty brown, upright, crowded, much and irregularly branched; joints cylindrical, twice as broad as long." Filaments two or three lines long, crooked, divaricated, of equal thickness throughout, glossy, like human hair under a microscope; branches ascending, obtuse, frequently unilateral. Paratitcal on orthocornum striatum.

Obf. The term confervæ occurs, we believe, first in the Natural History of Pliny, and was applied by him to a fresh water species of the present genus. The name was extended to two or three species by the elder modern botanists. But this part of the science was not at all studied before the time of Dillenius, who, in his admirable "Historia Muscorum," has described and figured forty-eight species, partly marine, and partly growing in fresh water. These he has distributed under three orders, as he calls them, viz. 1. Equabili filo protensa seu non geniculata. 2. Geniculata; and 3. Nodosa; dividing the first order into simple and branched; succeeding authors, for a considerable time, seem to have supposed that Dillenius had exhausted the subject. Linnæus has given only twenty-one species, adding only *C. ægropila* to those which are already described by that great cryptogamist, omitting such as he was not able to identify, and considering some as mere varieties. La Marck, in *Encyclopédie Methodique*, has done nothing more than copy the Linnæan species, in exactly the same order. Hudson, in the second edition of his "Flora Anglica," has introduced several species, not known either to Dillenius or Linnæus. Lightfoot, in his "Flora Scotica," has also made one or two additions. But it is not more than six or seven years since rapid advances have begun to be made in the knowledge of confervæ. Mr. D. Turner and Mr. Dilwyn are now diligently employed in the investigation of the British species; several foreign botanists, professor Roth in particular, are successfully engaged in the same pursuit; and we are informed by Bosc, in "Nouveaux Dictionnaire d'Histoire Naturelle," that professor Draparnaud of Montpellier is now busy in preparing a Monographie Confervarum, and has already determined several hundred species. We have been induced to confine ourselves, with a single exception, to the British species; partly by our inability to procure all the works which are necessary for a complete account of what has hitherto been done by foreign botanists; but chiefly by the consideration, that the species which belong to the Flora of the British islands, are the only ones accessible to the greater part of our readers. Our knowledge of these plants is indeed still very imperfect, and no generic character has yet been formed, which is sufficiently discriminating and comprehensive. The jointed structure of the filaments has generally been considered as an essential character; but we have been led by the high authority of Mr. Dilwyn to admit one species (n. 104.) which has not this conformation. We have already seen that the fructification of several species does not consist of *closed tubercles*, as it is described even in Dr. Smith's last improved generic character, but of *capsules opening at the apex*, and discharging the seeds in a manner similar to that observed in many fungi. These have been separated by Dr. Roth into a distinct genus which he calls *ceranium*; and it is probable that further researches will prove the propriety of making other separations. M. Vaucher of Geneva thinks, that he has discovered five different modes of propagation in the plants usually called confervæ; which has induced Decandolle to form them into six genera. *Conferva*. Filaments cartilaginous or herbaceous, divided by partitions; seeds enclosed between the partitions, and not escaping but

by the destruction of the tube itself. *Ceranium*. Filaments membranous, cartilaginous, without partitions; capsules monoperiform, adhering to the external surface of the filaments. *Vaucheria*. Filaments herbaceous, simple or branched, without partitions; seeds attached to the exterior side of the filaments, and generally peduncled. *Batrachospermum*. Filaments knotty, jointed, gelatinous; knots formed of filaments, simple or compound, between which are found seeds or spores (æyexis) detaching themselves, and consisting of filaments already jointed. *Chantrania*. Filaments solid, knotty; knots separating and becoming new plants, in the way of slips or cuttings. *Hydrolytium*. Tube cylindrical, closed at the two extremities, and anastomosing into pentagonal meshes; filaments of the pentagon swelling at their extremities, separating and becoming themselves cylindrical tubes, closed at the ends, and composed of pentagon meshes. The last three genera, according to his ideas, have no proper seeds.

See some curious experiments by Dr. Priestley on a species of conferva or water-moss of a peculiar kind, the manner of its production, and its effect, by the concurring action of light upon it, in dephlogisticating or dephurating the air to which it has access, and thereby increasing the quantity of it; in "Observations on Air," vol. iv. p. 335, &c. vol. v. § 2, 3, 4, 5. The seeds of this plant, says Dr. Priestley, float every where; in the air, on the earth, on the sea, on the Alps, in the plains, under the poles and the equator, in summer and winter, and in all seasons; and they are received into the water, insinuating themselves into vessels of water through the smallest apertures, where they germinate. Dr. Ingenhoufz made a variety of experiments on this singular substance; from which he concludes, that the water itself, or some substance in the water, is converted into this kind of vegetation. It is a real transmutation, which may appear incomprehensible to the philosopher, but which, in reality, is not more extraordinary than the change of grass and other vegetables into grease in the bodies of granivorous animals, and the change of the aqueous juice of the olive into oil. Dr. Priestley, however, observes, that the change of water into an organized plant is a thing of a very different nature from these, and tends to revive the long exploded doctrine of evocative or spontaneous generation. Dr. Girtanner of Gottingen (see *Annales de Chemie*, No. 100.) traces its formation from azot, which is a constituent principle of bodies, in the following manner. When water is exposed to the sun the light decomposes it, and disengages the oxygen in a large quantity. The hydrogen then retains the last portions of the oxygen; azot is formed, and announces itself by its green colour; the water is more and more decomposed; more of the oxygen, which, in the opinion of this writer, is the principle of life and irritability in organized nature, becomes fixed; and this azot, produced from water by means of the sun, is an organized body, the "conferva fontinalis;" a plant which lives, expands, and perpetuates its species. The influence of the solar light is, he conceives, absolutely necessary for this conversion of water into a plant or organized azot. No degree of heat can supply its place. Mr. Senger of Reck, in Westphalia, has lately discovered, that the conferva affords next to sage, one of the fittest materials for the making of paper; in consequence of which he obtained the honour of a gratuity from the court of Berlin, and also a patent for the manufacture of paper from this substance. From his experiments it likewise appears, that the conferva, after a previous preparation, might be made a substitute for cotton-wool, and a succedaneum for feathers in beds.

CONFESS and *avoid*, in *Law*, a species of **REPLICATION**, in which the plaintiff introduces some new matter or distinction, consistent with his former declaration; as, in an action of trespass upon lands of which the plaintiff is seized; if the defendant shews a title to the land by descent, the plaintiff may either deny the fact, or *confess and avoid* it, by replying, that such descent happened, but that the defendant hath since demised the lands to the plaintiff for the term of life. Blackf. Com. vol. iii. p. 310.

CONFESSION, **CONFESSIO**, in *Rhetoric*, the same with what is otherwise called **PARHOMOLGY**.

CONFESSION, in a *Civil Sense*, a declaration or acknowledgment of some truth, though it be against the interest of the party who makes it; whether it be in a court of justice, or out of it. It is a maxim, that in civil matters, the confession is never to be divided, but always taken entire; and that a criminal is never condemned on his simple confession, without other collateral proofs; nor is a voluntary extra-judicial confession admitted as any proof. A person is not allowed to accuse himself, according to that rule in *law*, *non auditer perire volens*.

CONFESSION of Action, in *Law*, is a species of plea to the action, in which the merits of the complaint are answered, by confessing either wholly, or which is most common, in part. A confession of the whole complaint is not very usual, for then the defendant would probably end the matter sooner; or not plead at all, but suffer judgment to go by default. Yet sometimes, after tender and refusal of a debt, if the creditor harasses his debtor with an action, it then becomes necessary for the defendant to acknowledge the debt, and plead the tender: adding that he has always been ready, "tout temps prêt," and still is ready, "uncore prêt" to discharge it: for a tender by the debtor, and refused by the creditor, will, in all cases, discharge the debts, (1 Vent. 21.) but not the debt itself; though in some particular cases the creditor will totally lose his money. (Litt. § 338. Co. Litt. 200.) But frequently the defendant confesses one part of the complaint (by a "cognovit actionem" in respect of it,) and traverses or denies the rest; in order to avoid the expence of carrying that part to a formal trial, which he has no ground to litigate. A species of this sort of confession is "the payment of money into court;" which is for the most part necessary upon pleading a tender, and is itself a kind of tender to the plaintiff; by paying into the hands of the proper officer of the court as much as the defendant acknowledges to be due, together with the costs hitherto incurred, in order to prevent the expence of any farther proceedings. This may be done upon what is called a "motion;" which is an occasional application to the court by their parties or their counsel, in order to obtain some rule or order of court, which becomes necessary in the progress of a cause; and it is usually grounded upon an "affidavit" (the perfect tense of the verb "affido") being a voluntary oath before some judge or officer of the court, to evince the truth of certain facts, upon which the motion is grounded: though no such affidavit is necessary for payment of money into court. If, after the money paid in, the plaintiff proceeds in his suit, it is at his own peril; for, if he does not prove more due than is so paid into court, he shall be non-satisfied and pay the defendant's costs; but he shall still have the money so paid in, for that the defendant has acknowledged his due. Blackf. Com. vol. iii.

CONFESSION of Indictment, is a prisoner's acknowledgment of the offence, when he is brought to the bar to be arraigned: upon a simple and plain confession, which the court is backward in receiving and recording, nothing re-

mins; but to award judgment. This confession is made before the judge; in consequence of which, the prisoner submits to the legal penalty annexed to his crime; or the prisoner, by confession, becomes an approver, or accuser of others. See **APPROVEMENT**.

There was also a third sort of confession, formerly made by an offender in felony, not in court before the judge, but before the coroner in a church, or other privileged place, upon which the offender, by the ancient law of the land, was to abjure the realm. 3 Inst. 192. See **ABJURATION**.

There is also a confession indirectly implied, as well as directly expressed, in criminal cases; as if the defendant, in a case not capital, doth not directly own himself guilty of the crime, but by submitting to a fine owns his guilt; upon which the judge may accept of his submission to the king's mercy. (Lamb. lib. iv. c. 9.) By this indirect confession, the defendant shall not be barred to plead "Not guilty" to an action, &c. for the same fact; the entry of it is, that the defendant "puts himself on the king's mercy;" and of the direct confession, "that he acknowledges the indictment." This last confession carries with it so strong a presumption of guilt, that being entered on record, on indictment of trespass, it stops the defendant to plead "Not guilty" to an action brought afterwards against him for the same matter; but such entry of a confession of an indictment of a capital crime, it is said, will not stop a defendant to plead "Not guilty" to an **APPEAL**, it being in case of life. And where a person upon his arraignment actually confesses himself guilty, or unadvisedly discloses the special manner of the fact, supposing that it doth not amount to felony, where it doth; the judges, upon probable circumstances, that such confession may proceed from fear, weakness, or ignorance, may refuse it, and suffer the party to plead "Not guilty". 2 Hawk. P. C. c. 31. § 2.

A confession may be received, and the plea of "Not guilty" be withdrawn, though recorded. (Kel. 11.) The confession of the defendant, whether taken upon an examination before justices of peace, in pursuance of the 1 and 2 P. & M. c. 13. or 2 and 3 P. & M. c. 10. upon an offender's being bailed or committed for felony; or taken by the common law, upon an examination before a secretary of state, or other magistrate, for treason or other crimes, is allowed to be given in evidence against the party confessing; but not against others. Also two witnesses of a confession of high treason, upon an examination before a justice of peace, were sufficient to convict the person so confessing, within the meaning of 1 Ed. VI. c. 12. and 5 & 6 Ed. VI. c. 11. which required two witnesses in high treason; unless the offender should willingly confess, &c. But the stat. 7 W. c. 3. requires two witnesses, except the party shall *willingly*, without violence, confess, &c. *in open court*. 2 Hawk. P. C. c. 41. § 3.

A demurrer amounts to a confession of the indictment as laid, so far, that if the indictment be good, judgment and execution shall go against the prisoner. (Bro. 86. S. P. C. 150. H. P. C. 246.) And in criminal cases, not capital, if the defendant demurs to an indictment, &c. whether in abatement, or otherwise, the court will not give judgment against him to answer over, but final judgment. (2 Hawk. c. 32. § 7.) See **ABATEMENT**. Where a prisoner confesses the fact, the court has nothing more to do than to proceed to judgment against him. "Confessus in judicio pro judicato habetur." 11 Rep. 30. 4 Inst. 66. 2 Hawk. P. C. c. 32.

CONFESSION, in *Theology*, denotes the verbal acknowledgment which a penitent makes of his sins to God: in a

more partial and restricted sense, it is a declaration of a person's sins, made to a priest, in order to obtain absolution for the same. The Romish church makes confession a part of the sacrament of penance.

Confession was anciently public and general, in the face of the church; though the Romanists have since altered it, and made it private and auricular.

Confessors are to be buried in eternal silence, under pain of the greatest punishment to the priest who reveals them. Bellarmin, Valentin, and some other Romish controversial writers, endeavour to trace up auricular confession to the earliest ages; and thus contend for a point given up by the rest. M. Fleury owns, that the first instance of auricular confession he can meet with, is that of St. Eloi, who, being grown old, made a confession to a priest of all his sins from his youth upwards.

Secret confession was first decreed and established in the 4th council of Lateran, under Innocent III., in 1215, cap. 21. And the decree of this council was afterwards confirmed and enlarged in the council of Florence, and in that of Trent (sess. 14. cap. 5.), which expressly ordains, that confession was instituted by Christ, and that by the law of God it is necessary to salvation; and that it has been always practised in the Catholic church. Hard. Concl. tom. vii. p. 35. and tom. x. p. 92. See **POPERY**.

The Indians, according to Tavernier, have a kind of confession; and the same may be said of the Jews: these last have formulas for those who are not capable of making a detail of all their sins: the ordinary form is in alphabetical order, each letter containing a capital sin. This they usually rehearse on Mondays and Thursdays, and on fast-days, and other occasions; some every night and morning. When any of them find themselves near death, they send for ten persons, more or less, one of them a rabbin; and in their presence recite the confession. See Leo de Modena.

CONFESSION of faith, denotes a list, or enumeration and declaration of the several articles of belief, in a church. See **ARTICLES of faith**.

In the council of Rimini, the Catholic bishops found fault with dates in a confession of faith, and observed that the church never used to date them.

CONFESSION, Augsburg or Augustan. See **AUGUSTAN Confession**.

CONFESSIONAL, or CONFESSORIAL, in *Church History*, a place in churches, usually under the main altar, wherein were deposited the bodies of deceased saints, martyrs, and confessors.

CONFESSIONAL is also used in the Romish church for a little box, or desk in the church, where the confessor takes the confessions of the penitent.

CONFESSO, Pro-CONFESSO. See **PRO-CONFESSO**.

CONFESSOR, a Christian, who has made a solemn, and resolute profession of the faith, and has endured torments in its defence. A mere saint is called a confessor, to distinguish him from the roll of dignified saints; such as *apostles, martyrs, &c.*

The title of confessors was given in the early ages of the church, and particularly towards the commencement of the first century of the Christian era, to those, who, in the face of death, and at the expence of honour, fortune, and all the other advantages of the world, had confessed with fortitude, before the Roman tribunals, their firm attachment to the religion of Jesus.

In ecclesiastical history we frequently find the word confessors used for martyrs; in after-times, it was confined to those who, after having been tormented by the tyrants, were permitted to live and die in peace. And at last it was also

used for those who, after having lived a good life, died under an opinion of sanctity. According to St. Cyprian, he who presented himself to torture, or even to martyrdom, without being called to it, was not called a *confessor*, but a *professor*; and if any out of a want of courage abandoned his country, and became a voluntary exile for the sake of the faith, he was called *exterris*.

The veneration that was paid to both martyrs and confessors in the early ages of the Christian church is hardly credible. The distinguishing honours and privileges they enjoyed, the authority with which their counsels and decisions were attended, would furnish ample matter for an interesting history. Without doubt it was both wise and just to treat with respect, and to invest with extraordinary privileges, those Christian heroes, since nothing was more adapted to encourage others to suffer with cheerfulness in the cause of Christ. Nevertheless, as the best and wisest institutions were generally perverted by the weakness or corruption of men, from their original purpose; so the authority and privileges granted, in the beginning, to martyrs and confessors, became, in process of time, a support to superstition, an incentive to enthusiasm, and a source of innumerable evils and abuses. See **MARTYR**.

CONFESSOR is also a priest, in the Romish church, who has a power to hear sinners in the sacrament of penance, and to give them absolution. See **SHROVE-TIDE**.

The church calls him in Latin *confessorius*, to distinguish him from *confessor*, which is a name consecrated to saints. The confessors of the kings of France, from the time of Henry IV. have been constantly Jesuits: before him the Dominicans and Cordeliers shared the office between them. The confessors of the house of Austria have also, ordinarily, been Dominicans and Cordeliers; but the latter emperors have all taken Jesuits.

CONFESSOR to his Majesty. See **CLERK of the closet**.

CONFIDENCE, in *Military Language*, denotes a firm reliance on the skill, courage, conduct, &c. of an individual. It is of the first importance for the commander of an army to have the entire confidence of the officers and soldiers under his command. This was remarkably the case with Hannibal, Julius Cæsar, &c. among the ancients, and with the marshal de Turenne, John duke of Marlborough, &c. among the moderns. A general, in whom his troops have confidence, may gain a victory without employing much military skill; and on the other hand, the most skillful general may lose one, who has lost the confidence of his army.

CONFIGURATION, the exterior surface, that bounds bodies, and gives them their particular figure.

That which makes the specific difference between bodies, is the different configuration, and the different situation of their parts. A short, or a long light, depend on the different configuration of the crystalline.

CONFIGURATION of the planets, in *Astronomy and Astrology, is a certain distance or situation of the planets in the zodiac, whereby they are supposed to aid, or oppose each other. See **ASPECT** and **SATELLITES**.*

CONFIGURATIONS of salts, a term used by some to express the combinations of the particles of the salts of plants, and other substances, into certain figures, on evaporating the water in which they had been dissolved, so hastily as not to admit of their shooting into their own regular crystals. See **CRYSTALLIZATION**.

CONFINEMENT to the realm. See **NE EXEAT REGNUM**.

CONFIRMATION, in a general sense, the act of ratifying or rendering a title, claim, pretension, report, or the like, more sure and indisputable.

CONFIRMATION,

CONFIRMATION.

CONFIRMATION, in *Law*, denotes the conveyance of an estate, or right in *esse*, which a person hath in or to lands, &c. from one man to another that hath the possession or some estate in it, whereby a voidable estate is made sure and unavoidable, or a particular estate is increased, or possession made perfect; and it is particularly used for the strengthening or homologating an estate of one already in possession of it by a voidable title. Thus, if a bishop grant his chancellorship by patent, for term of the patent's life; this is no void grant; yet it is avoidable by the bishop's death, except it be strengthened also by the confirmation of the dean and chapter. 1 Inst. 205.

CONFIRMATION is also defined to be the approbation or assent to an estate already created: which as far as it is in the power of the confirmer, makes it good and valid; so that the confirmation doth not regularly create an estate, yet such words may be blended in the confirmation as may create and enlarge an estate; but this takes place by the force of such words as are foreign to the business of confirmation, and by their own force and power, tend to create the estate. Gilb. Ten. 75. A confirmation, says judge Blackstone, is of a nature nearly allied to a release; and the words of making it are these "have given, granted, ratified, approved, and confirmed." (Litt. § 515. 531.) An instance of the first branch of the above definition is, if tenant for life lease for 40 years, and dieth during that time; here the lease for years is voidable by him in reversion; yet, if he hath confirmed the estate of the lessee for years, before the death of the tenant for life, it is no longer voidable but sure. (Litt. § 516.) The latter branch, or that which tends to the increase of a particular estate, is the same in all respects with that species of release, which operates by way of enlargement.

Madox says, that most ancient confirmations, made after the conquest, often run like feoffments; and are distinguishable from them, chiefly by some words inserting a former feoffment or grant. In former times, when feoffees were frequently disseised of their lands upon some suggestion or other, charters of confirmation seem to have been in great request. Possessors of lands, &c. seemed not to have thought themselves secure against the king, or the great lords who were their feoffors, or in whose lands their fees lay, unless they had repeated confirmations from them, their heirs or successors. And these ancient confirmations seem to have been sometimes made, either by precept or writ from the king, or other lords, to put the feoffees, or their heirs or successors into seisin, after they had been disseised, or to keep them in their seisin undisturbed, or else by charter of express confirmation. Confirmation is "*perficiens, crescens, or diminuens*;" *perficiens*, as if feoffee upon condition make a feoffment, and the feoffor confirm the estate of the second feoffee;—*crescens*, which always enlarges the estate of a tenant; as tenant for years to hold for life, &c.—and *diminuens*, as when the lord of whom the land is holden, confirms the estate of his tenant, to hold by a less rent. 9 Rep. 142.

The lord may diminish the services of his tenant by confirmation; but not reserve new services, so long as the former estate in the tenancy continues; and therefore if he confirm to the tenant, to yield him a hawk, &c. yearly, it is void. (Litt. § 539. 1 Co. Inst. 296.) Leases for years may be confirmed for part of the term, or for part of the land, &c.; but an estate of freehold, being entire, cannot be confirmed for part of the estate. (5 Rep. 81.) There may be a confirmation implied by law, as well as express by deed; where the law by construction confirms a grant made to another purpose: and a confirmation may enlarge an estate,

from an estate held at will to term of years, or a greater estate, from an estate for years to an estate for life; from an estate for life, to an estate in tail, or in fee; and from an estate in tail to an estate in fee-simple. (1 Inst. 305. 9 Rep. 142. Dyer. 263.) But if the confirmation be made to lessee for life or years, of his term or estate, and not of the land, this doth not increase the estate; though if the lessee confirm the land, to have and to hold to the lessee and his heirs, this will enlarge the estate, and so of the rest. Co. Litt. 299. Plowd. 40.

In every good confirmation, there may be a precedent rightful or wrongful estate in him to whom made, or he must have the possession of the thing as a foundation on which the confirmation is to be established; the confirmer must have such an estate and property in the land, that he may thereby be enabled to confirm the estate of the confirmee; the precedent estate must continue till the confirmation come, so that the estate to be increased comes into it; and it is required that both these estates be lawful. Co. Litt. 296. 1 Rep. 146. Dyer. 109. 5 Rep. 15. If tenant for life make a lease for years to one person, and afterwards lease the land to another person for years; and he in reversion confirms the last lease, and after that the first lease, this is not good; the second lessee hath an interest before by the confirmation of him in reversion. But in a like case, confirmation of the first lease, after the second was confirmed, has been held good; for the lease takes no interest by the confirmation, but only to make it durable and effectual. Moor. c. 150. 1 Inst. 296. Plowd. 10. If a disseisee confirm the land to the disseisor but for one hour, one week, a year, or for life, &c. it is a good confirmation of the estate for ever; and if he confirm the estate of the disseisor without any word of heirs, he hath a fee-simple; and if a disseisee make a gift in tail, and the disseisee doth confirm the estate of the donee, it shall enure to the whole estate. (Co. Litt. 291, 297, 299.) But where the estate is divided it is otherwise; and if there be an estate for life, the remainder over, there the confirmation may be of either of the estates; and if the lessee of a disseisor of a lease for 20 years, make a lease for 10 years, the disseisee may confirm to one of them and not to the other. (1 Cro. 472. 5 Rep. 81.) The tenant in tail of land hath a reversion in fee expectant; in this case, the confirmation of the estate tail will not extend to the reversion: &c. (Co. Litt. 297, 298.) If lessee for years, without impeachment for waste, accept a confirmation of his estate for life, he hath by this lost the privilege annexed to his estate for years. (8 Rep. 76.) Acceptance of rent in some cases makes a confirmation of a lease. (2 Danv. 128, 129.) What a person may defeat by his entry, he may make good by his confirmation. (Co. Litt. 300.) But none can confirm, unless he hath a right at the time of the grant: he who hath but a right in reversion cannot enlarge the estate of a lessee. (2 Danv. 140, 141.) As confirmation is to bind the right of him who makes it, but not alter the nature of the estate to him to whom made, it shall not discharge a condition. (Poph. 51. 1 Rep. 147.) A confirmation will take away a condition annexed by law; and by confirmation, a condition after broken in a deed of feoffment is extinguished. (1 Co. Rep. 146.) Confirmations may make a defeasible estate good; but cannot work upon an estate that is void in law. (Co. Litt. 295.)

A confirmation of letters patent, which are void as they are against law, is a void confirmation. (1 Lil. Aur. 295.)

Grants and leases of bishops, not warranted by the l. t. 32 Hen. VIII. c. 28. must be confirmed by dean and chapter;

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chapter: and grants and leases of parsons, &c. by patron and ordinary. (1 Inst. 247, 300, 301.) Bishops may grant leases of their church-lands for 3 lives, or 21 years, having the qualities required by the fore-cited act, and concurrent leases for 21 years, with confirmation of dean and chapter. (See 1 Eliz. c. 4, 19.) If a prebend leases parcel of his prebendary, and the bishop, who is patron, confirms it; this shall not bind the succeeding bishop, without confirmation of dean and chapter, because the patronage is parcel of the possessions of the bishopric; but it shall bind the present bishop, &c. (2 Dav. 139.) If a parson grants a rent, the confirmation of the patron and bishop is sufficient without the dean and chapter, and shall be good against the succeeding bishop. (Ibid. 140.) The dean of Wells may pass his possessions, with the assent of the chapter, without any confirmation of the bishop. (Ibid. 175.) See LEASE.

To the grants of a "sole corporation," as parson, prebendary, vicar, and the like, the patron must give his consent; because such a sole corporation has not the absolute fee; but a "corporation aggregate," as dean and chapter, master, fellows and scholars of a college, &c. or any sole corporation that has the absolute fee, as a bishop with consent of the dean and chapter, may by the common law make any grant of their possessions without their founder or patron. (1 Inst. 300 b.)

A confirmation, as we have already observed, is in nature of a release, and in some things of a greater force: and in this deed, it is good to recite the estate of the tenant, as also of him that is to confirm it, and to mention the consideration; the words *ratify and confirm*, are commonly used; but the words *gives, grants, demises*, &c. by implication of law, may enure as a confirmation. (1 Inst. 295. West. Symb. 1. p. 457.)

CONFIRMATION, in *Rhetoric*, is, according to Quintilian, the third part, but according to Cicero, the fourth, of an oration, wherein the orator undertakes to prove, by laws, reasons, authorities, and other arguments, the truth of the propositions advanced in his narration. Cicero, *De Invent. lib. i. cap. 14. 24.* *Quint. Inst. Orat. l. iii. c. 9.*

Confirmation is either *direct*, or *indirect*: he first confirms what the orator has to urge for strengthening his own cause; the second, properly called *confutation*, refels the opposite arguing of the adversaries. The two parts together are sometimes placed under the head or title of CONFUTATION.

As to the forms of reasoning used by orators, for the purpose of confirmation, the Greek writers distribute them under four heads; *viz. Syllogism, Enthymeme, Induction, and Example.* (See each article, and also ARGUMENT and ARGUMENTATION.) Cicero reduces the rhetorical modes of reasoning to two, which he calls *ratiocination and induction*, comprising both syllogism and enthymeme under ratiocination, and example under induction; so that the difference lies in their manner of dividing them. As to the use of these modes of reasoning, it is proper to vary them in a discourse, and not to adhere too closely to the same form; for want of variety in this, as well as in other cases, will soon create disgust. With regard to the disposition of arguments, or the order of placing them, some advise to put the weaker, which cannot wholly be omitted, in the middle; and such as are stronger, partly in the beginning, to gain the esteem of the hearers, and render them more attentive; and partly at the end, because what is last heard, is likely to be retained longest; and if there are but two arguments, to place the stronger first, and then the weaker; and after that to return again to the former, and insist principally upon that. But this must be left to the prudence of the speaker,

and the nature of the subject. Nevertheless, it can never be proper to begin with the strongest and to gradually descend to the weakest; for this would be a kind of anticlimax in reasoning, which would be likely to destroy its effect. Arguments ought not to be crowded too close upon one another; for then their force would be weakened, and the attention of the hearers would be so distracted, that they could not have sufficient time duly to consider them. Besides, more arguments than are necessary should not be used, because the fewer they are, the more easily they are remembered. In this respect the observation of a great master of eloquence is very just, that "arguments ought rather to be weighed than numbered." *Cic. de Orat. lib. ii. c. 76.*

The confirmation is, as it were, the life and soul of the oration: in this the main stress of the argumentation lies. Whence Aristotle, properly enough, calls it *συστησις, fides*.

CONFIRMATION OF BISHOPS. See BISHOP.

CONFIRMATION, in *Theology*, is the ceremony of laying on of hands, for the conveyance of the Holy Ghost. When the apostles at Jerusalem heard that many of the inhabitants of Samaria had embraced the Gospel, and had been baptized, they sent thither Peter and John, who laid their hands on these new converts, and prayed that they might receive the Holy Ghost, and the Holy Ghost descended upon them. (*Acts, viii. 14, &c.*) And when the men of Ephesus had been baptized, "Paul laid his hands upon them, and the Holy Ghost came upon them." (*Acts, xix. 6.*) And St. Paul, in his epistle to the Hebrews, (*vi. 2.*) mentions the doctrine of the laying on of hands immediately after the doctrine of baptism. Upon these authorities was founded the practice, which prevailed in the primitive church, of persons receiving from the bishop immediately after baptism, a solemn benediction, accompanied with imposition of hands, unction upon the forehead with the holy chrism (made of oil and balsam), the sign of the Cross, and a prayer for the descent of the Holy Ghost.

Among the ancients it was conferred immediately after baptism; and was esteemed, in some measure, to be a part thereof: whence the fathers call it the *accomplishment* of baptism. The ground of the practice was an opinion of the imperfection of baptism, which in their apprehension only prepared persons for the reception of the graces of the Holy Spirit, which were actually conferred in confirmation. To this purpose Tertullian says, "when we come out of the water, we are anointed with a blessed ointment, according to that ancient rite by which men used to be anointed for the priest's office with oil out of a horn, ever since the time that Aaron was anointed by Moses; so that Christ himself had his name from chrism." (See CHRISM.) Then we have the imposition of hands on us, which calls down and invites the Holy Ghost." (*Tertull. de Baptism. c. 7.* King's Hist. of the Prim. Church, chap. v. p. 80, &c.) This ceremony was called confirmation, as it completed the admission of the person into the Christian church, and qualified him to partake of the Lord's Supper. It was not confined to adults, but infants also received confirmation as soon as they were baptized, and an opportunity offered of presenting them to the bishop.

Among the Greeks, and throughout the East, it still accompanies baptism; but the Romanists make it a distinct independent sacrament. The first express institution of this ceremony as a sacrament occurs in the decree of pope Eugenius in 1439, in which he says, "the second sacrament is confirmation, the matter of which is chrism blessed by the bishop, and though the priest may give the other unction, the bishop only can confer this." Peter Lombard, however, who lived in the 12th century, seems to have been the first

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who reckons seven sacraments, and mentions confirmation as one of them. Although this ceremony was generally performed by bishops, yet in some countries, and at some periods, it was performed by presbyters; but in that case it was necessary that the chrism should have been previously consecrated by the bishop. St. Cyprian, and many of the fathers, speak of it in such terms as to imply, that the administration of it was confined to the bishop alone. Jerome tells us, that in his time, confirmation was always performed in the Latin church by bishops, as it had been in earlier times; and some have supposed that the custom of receiving the imposition of hands after baptism, to be performed by the bishop alone, commenced in the time of this father; though he himself did not think that the Holy Spirit was given by the imposition of the hands of the bishop only: and he says, they are not to be lamented, who, being baptized by presbyters or deacons in little villages, and castles, have died before they were visited by bishops. Hilary says, that in Egypt the presbyters confirmed in the absence of the bishop: the same was also determined by the council of Orange: and this was the practice of the Greek church, which did not allow confirmation to be a sacrament. From one of the canons of the council of Nîmes we learn, that, in the time of Cyprian and of Augustine, confirmation was performed by bishops. Hence Fleury, and many of the moderns, lay it down as a distinguishing character between the offices of a priest or deacon, and that of a bishop, that the former might baptize, but the latter alone might anoint and confirm; by virtue of their succession to the apostles, to whom it originally belonged. But from some passages in St. Gregory, &c. others gather, that the priests, on occasion, had likewise the power of confirming.

It has been alleged, that, as confirmation always succeeded baptism, and made a necessary part of it, and several of the primitive Christians esteemed both necessary to salvation, it must have been performed by presbyters as well as by bishops; because the bishop of a church might be absent for a very considerable time, as was the case with Cyprian, or the see might be vacant: and as presbyters baptized, it is reasonable to conclude that they also confirmed. Lord King has shewn that confirmation and absolution were the same thing; and that presbyters, sometimes with the bishop, and sometimes without the bishop, did absolve by imposition of hands: and he has cited several ancient authorities in order to prove, that confirmation was frequently repeated with respect to the same persons. (Hist. Prim. Church, p. 91, &c.)

It is certain, among the Greeks, the priest who baptizes, also confirms: which practice, Lucas Holstenius shews, is of so old a standing among them, that it is now generally looked on as belonging properly, and of right, to the priest: though some will have it to have been borrowed by them from the bishops. Hence, some of the Latin divines acknowledge, that though the bishop be the ordinary minister of confirmation, yet, that the priest, in his absence, may also confer it, in quality of minister extraordinary.

The council of Rouen, held in 1072, decrees that confirmation must be conferred fasting, both on the side of the giver, and that of the receiver.

The ancients, and in this respect they are followed by the moderns, did not think this rite of confirmation so absolutely necessary, that the want of it would exclude from the kingdom of heaven those who had already been baptized; but they attributed to it so much importance, that they punished the neglect of it with marks of disgrace and

public censure; and denied the privilege of ecclesiastical promotion and holy orders to such persons as had voluntarily and carelessly omitted it.

"After this example of the primitive Christians," says Dr. Tomline, the bishop of Lincoln, "our church requires all who have been baptized to appear publicly in the congregation, and renew their baptismal vow according to the form prescribed in our liturgy." The order of confirmation requires, "that none shall be confirmed but such as can say the Creed, the Lord's Prayer, and the Ten Commandments, and can also answer to such other questions as in the Short Catechism are contained, &c." The bishop then questions them, whether they renew the solemn promise and vow that was made in their name at their baptism; ratifying and confirming the same in their own persons, and acknowledging themselves bound to believe and to do all those things which their god-fathers and god-mothers then undertook for them? The bishop in his general prayer declares before God that he hath vouchsafed to regenerate these his servants by water and the Holy Ghost, and hath given unto them forgiveness of all their sins; and then laying his hand upon the head of every one severally, offers a prayer for each individual. Moreover, in the collect which forms a part of this service, he prays for those that are confirmed, saying, "upon whom, (after the example of thy holy apostles), we have now laid our hands, to certify them (by this sign) of thy favour and gracious goodness towards them." The order forbids any to be admitted to the holy communion, but those who have been confirmed, or who are ready and desirous to be confirmed. This order of confirmation does not mention the proper age of the person to be confirmed.

This ceremony, says the bishop, "falls within the authority of the church, and may be considered as included in the general precept of doing all things 'in order and unto edifying;' especially since the now universal practice of infant baptism makes confirmation more necessary than it was in the primitive church, when chiefly adults were baptized. It seems highly reasonable that they, who, at the time of their baptism, were incapable of making any engagement, should, when they arrive at a proper age, ratify and confirm those promises which were made in their name: And to give this ordinance the greater solemnity, it is performed only by the higher orders of the church, the archbishops and bishops. Thus far our church receives confirmation, confining it to prayer and imposition of hands, without the chrism, or the sign of the cross, and believes it to be derived from the practice of the apostles. But as it is not a regular constitution of Christ and his apostles, like baptism and the Lord's supper, with a written command that it should be continued in future ages, and a promise that it will be attended with inward grace, we reject it as a sacrament. There is, indeed, not a single precept upon the subject in the New Testament; nor is there any scriptural authority for the use of the chrism or the sign of the cross; and Bingham thinks that the chrism made no part of confirmation before the latter end of the second century; though other writers attribute an earlier date to it. It must be admitted by all, that imposition of hands was not peculiar to confirmation (see Matt. xix. 13. Mark, x. 16. Luke, iv. 40); and that no separate efficacy is ascribed to it distinct from the prayers which accompanied it; and prayer and imposition of hands are not sufficient to constitute a sacrament: we, therefore, consider confirmation as nothing more than a solemn manner of persons' taking upon themselves their baptismal vow; and as such, it is a ceremony of high importance, calculated to impress youthful minds with a just sense of the great obligations of the Christian profession, and to

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excite in them an earnest endeavour "faithfully to observe such things as they, by their own confession, have assented unto." Elements of Christian Theology, vol. ii. p. 416.

It has been urged, however, that this ceremony, with respect to the real importance and utility of it, was peculiar to the days of the apostles; and though it is retained among Protestants, it is doubted whether it be a necessary instrument of grace.

Some have thought it a remnant of the popish sacrament of confirmation; and that there is no more authority for retaining this remnant, than for any thing that is omitted in the ceremony. It has been said that the texts of scripture, repeatedly alleged in favour of this rite, have no weight. To this purpose it has been argued, that Peter's and John's going down to Samaria to pray, and to lay their hands on those whom Philip had baptized, furnishes no precedent, no direction, no institution, nor command for our bishops, to do likewise. The end for which the apostles did it, as it is expressly said (Acts, viii. 15, 17.), was, "that they might receive the Holy Ghost;" i. e. its miraculous gifts, such as prophesying, speaking with tongues, &c. necessary for forming them into a church; in proof of which it is urged, that they were something visible and obvious to sense; something which excited the wonder and ambition of the wicked forerger; for it is said, "When Simon saw that through laying on of the apostles' hands the Holy Ghost was given, he offered them money." Besides, Dr. Whitby has observed, that if they laid not their hands on *all* who were baptized, it makes nothing for confirmation; if they did, then Simon Magus also was confirmed, and received the Holy Ghost: which is not admissible. Our bishops, it has been said, disclaim the powers exercised by the apostles. As for the open and solemn renewal of the baptismal covenant before God, which baptized persons ought to make, when they come to years of discretion, this, it is said, is done in the sacrament of the Lord's Supper, which Christ himself has appointed, and which is the *only* institution his wisdom has thought fit to appoint for this purpose. It has also been alleged that the ceremony of confirmation, however solemnly practised, has a tendency, the more from the solemnity of its administration, to cherish in men's minds a presumptuous and false hope, and to decide them into wrong notions as to the safety of their state, and as to the terms of acceptance and favour with God. What warrant, it has been asked, has the bishop to pronounce a man's "sins all forgiven," and himself "regenerated by the Holy Ghost," upon no other grounds than his being able to repeat the Lord's Prayer, Creed, and Ten Commandments, and the answers of the Short Catechism? Can it be said, that this is the Christian doctrine concerning the terms of acceptance and favour with God? Are good vows and resolutions, declared in the church, infallible or proper proofs of a regeneration by the Holy Ghost? Is a man's professing that he repents, and promising that he will live a godly life, that actual repentance and amendment of life, which *alone* can ensure the divine pardon and favour? The multitudes, it is further said, who come to be confirmed, are taught to consider the bishop, in the exercise of that part of his office, as an ambassador of Christ, a successor of the apostles, and a special minister of God; and therefore, when they hear this sacred person, solemnly declaring that they are fully justified, pardoned, and regenerated by the Holy Ghost, can they be blamed if they believe it, and rest satisfied with regard to the safety and happiness of their state? And as full remission of sins, and the favour of God are to be had on such easy terms, is it matter of wonder, that thousands should eagerly flock from all quarters to accept it?

Or that persons of very vile and profligate characters should too often thrust themselves in to partake of this benefit, and be seen receiving upon their knees episcopal absolution, and solemn assurances of God's favour and peace?

It has been further argued by those who object to the continued practice of this ceremony of confirmation in the Christian church, that Tertullian is the most ancient author who has mentioned it, and that in his time, a great variety of superstitions, and ridiculous and foolish rites, had been introduced and actually subsisted in the Christian church. Confirmation was then always performed, as we have already mentioned, (not as it is with us, but) immediately after baptism. The expression in our order of confirmation, by which the bishop declares to God, "that he hath vouchsafed to regenerate these his servants by water and the Holy Ghost, and to give them the forgiveness of all their sins," was probably taken from some ancient liturgy, and was suitable and well adapted to the practice of those times, but is incongruous and unsuitable to ours. Then, as Dr. Cave observes, (Primitive Christianity, pt. 1. p. 194, 288.) "although infants were undebatedly taken into the church by baptism, yet the main body of the baptized were adult persons; who, flocking over daily in great numbers to the faith of Christ, were received in at this door. Usually they were for some considerable time catechized, and trained up in the principles of the Christian faith; till having given testimony of their proficiency in knowledge, and of a sober and regular conversation, they became candidates for baptism," or, as lord King says, (Inquiry into the Constitution, &c. pt. i. p. 102.) "the catechumens enjoyed not the privileges of the faithful, till they had, in a sense, merited them, which was when, through a considerable time of trial, they had evidenced the sincerity of their hearts, by the sanctity and purity of their lives. And then, as Origen says, *we initiate them in our mysteries, when they have made a proficiency in holiness, and according to the utmost of their power have reformed their conversation.* When they had changed their manners, and rectified their irregular carriage, then they were washed with the water of baptism, and not before. For, as Tertullian observes, *we are not baptized that we may cease to sin; but because we have already ceased.*" In these circumstances, it is said, the bishop or the presbyter might use an expression similar to that already cited with propriety; but the case is different, say the objectors to the permanent use of this rite, with the multitudes who flock to modern confirmations. Pierce's *Vindicia Frat. Diss. Towgood's Dissent* justified.

CONFISCATE, in *Law*, is applied to goods forfeited to the exchequer, or public treasury.

The word is derived from *secus, a hamper, panier, or basket*, wherein the emperor's money used to be kept.

The title to goods, which are not claimed by any other, is given by law to the king. If a man, indicted for stealing the goods of another, in which case they become, in effect, the proper goods of him indicted, be asked about them in court, and disclaim them; he thereby loses the goods, though he be afterwards acquitted of the theft; and the king shall have them as confiscated; but otherwise, if he had not disclaimed them. Thus also, when goods are found in the possession of a felon, if he disavows them and afterwards is attainted for other goods, and not for them, the goods which he disavows are confiscate to the king; but if he had been attainted for the same goods, they would have been said to be "forfeited and not confiscated." So if an appeal of robbery be brought, and the plaintiff leaves out some of his goods, he shall not be allowed to enlarge his appeal; and because there is none to receive the goods so left out, the

king shall have them as confiscate, according to the rule, "Quod non capit christus, capit nescius." Staundf. P. C. l. 3. c. 21. See FORFEITURE.

CONFISCATION, a legal adjudication of goods or effects to the fisc, or treasury.

Thus, the bodies and effects of criminals, traitors, &c. and merchandizes that are contraband, prohibited, or brought aboard or ashore, without paying the duties, when seized, are confiscated.

It is an axiom in law, that he who confiscates the body, confiscates also the effects, to the profit of the king, or the lord of the fee, *i. e.* he who is condemned to lose his life, must also lose his goods; yet the widows of criminals do not lose their dowries, nor their share in the goods of the community, by the forfeiture of their husbands. See FORFEITURE.

CONFLAGRATION, a general burning of a city, or other considerable place. In which sense, Nero is said to have procured the Christians to be accused of the conflagration of Rome, which was done by his own order.

But the word is more ordinarily restrained to that grand period, or catastrophe of our world, wherein the face of nature is expected to be changed by a deluge of fire, as it was anciently by that of water. The ancient Chaldeans, Pythagoreans, Platonists, Epicureans, Stoics, Celts, and Etrurians, appear to have had a notion of the conflagration; though whence they should derive it, unless from the sacred books, it is difficult to conceive; except perhaps, from the Phœnicians, who themselves had it from the Jews.

The Celts, whose opinions resembled those of the eastern nations, held, that after the burning of the world, a new period of existence would commence. The ancient Etrurians, or Tuscans, also concurred with other western and northern nations of Celtic origin, as well as with the Stoics, in asserting the entire renovation of nature after a long period, or great year, when a similar succession of events would again take place. The cosmogony of an ancient Etrurian, preferred by Suidas, limits the duration of the universe to a period of 12,000 years, 6000 of which passed in the production of the visible world, before the formation of man. The Stoics also maintained, that the world is liable to destruction from the prevalence of moisture, or of drought; the former producing an universal inundation, and the latter an universal conflagration. These, they say, succeed each other in nature, as regularly as winter and summer. When the universal inundation takes place, the whole surface of the earth is covered with water, and all animal life is destroyed; after which nature is renewed, and subsists as before, till the element of fire, prevailing in its turn, dries up all the moisture, converts every substance into its own nature, and at last, by an universal conflagration, reduces the world to its pristine state. At this period all material forms are lost in one chaotic mass, all animated nature is reunited to the Deity, and nature again exists in its original form, as one whole, consisting of God and matter. From this chaotic state, however, it again emerges, by the energy of the efficient principle; and gods and men, and all the forms of regulated nature are renewed, to be dissolved and renewed in endless succession. The doctrine of conflagration is a natural consequence of the general system of Stoicism. For, since, according to this system, the whole process of nature is carried on in a necessary series of causes and effects, when that operative fire which at first, bursting from chaos, gave form to all things, and which has since pervaded and animated all nature, shall have consumed its nutriment, that is, when the vapours,

which are the food of the celestial fires, shall be exhausted, a deficiency of moisture must produce an universal conflagration. This grand revolution in nature is, after the doctrine of the Stoics, thus elegantly described by Ovid, (*Metam. l. i. v. 256*):

"Effe quoque in fatis reminiscitur affore tempus
Quo mare, quo tellus, correptaque regio cœli
Ardeat, et mundi molis operosa laboret:"

or, as Dryden has translated the passage,

"Rememb'ring in the fates a time when fire
Should to the battlements of heaven aspire,
When all his blazing worlds above should burn,
And all th' inferior globe to cinders turn."

Seneca, speaking of the same event, (*Ad Murciam, c. ult.*) says expressly, "Tempus advenit quo sidera fideribus incurrent, et omni flagrant materia uno igne, quicquid nunc ex deposito lucet, ardebit," &c. *i. e.* the time will come when the world will be consumed, that it may be again renewed, when the powers of nature will be turned against herself; when stars will rush upon stars, and the whole material world, which now appears resplendent with beauty and harmony, will be destroyed in one general conflagration. In this grand catastrophe of nature, all animated beings (excepting the universal intelligence), men, heroes, demons, and gods, shall perish together. Seneca, the tragedian, who was of the same school with the philosopher, writes to the same purpose, (*Here. Oâ. iii. 1112.*)

"Cœli regia incidens
Ortas atque obitus trahet,
Atque omnes pariter deos
Perdet mors aliqua, et chaos."

i. e. "The mighty palace of the sky,
In ruin fall'n is doom'd to lie,
And all the gods, its wreck beneath,
Shall sink in chaos and in death."

During the course of this vast conflagration, the Stoics conceived that the world would expand, and in its chaotic state continue to fill a much larger portion of infinite space than it had required, or would again require, in a state of orderly arrangement. After an interval of rest, says Seneca, (*Epist. 9. Qu. Nat. c. ult.*) in which the Deity will be intent upon his own conceptions, the world will be entirely renewed; every animal will be reproduced; and a race of men, free from guilt, and born under happier stars, will repeople the earth. Degeneracy and corruption, will, however, again creep into the world; for it is only while the human race is young, that innocence remains upon the earth. The grand course of things, from the birth to the destruction of the world, which, according to the Stoics, is to be repeated in endless succession, is accomplished within a certain period. This period, or fated round of nature, is probably what the ancients meant by the "Great Year."

From this brief account of the doctrine of the Stoics concerning the final conflagration, it evidently appears, that it differs in several essential particulars from the Christian doctrine on this head. It is the work of fate, performed by natural and mechanical laws, and repeated eternally at certain periods, without any good reason, since with every revolution the same disorders and vices return. Philo justly ridicules this dogma; remarking, that the Stoics make their deities act like children, who raise up piles of sand only for

the pleasure of beating them down. Several of the Stoics themselves were aware of the absurdity of this system, and rejected it; particularly Boethius, Posidonius, Diogenes the Babylonian, and Paretius. This general dissolution the Stoics call *extremis, cyprosis*. The Pythagoreans also maintained the dogma of conflagration. To this purpose Hippafus, of Metapontum, taught that the universe is finite, is always changing, and undergoes a periodical conflagration. Philolaus, who flourished in the time of Plato, maintained that the world is liable to destruction, both by fire and water.

Mention of the conflagration is also several times made in the books of the Sibyls, Sophocles, Hyftapes, Lucan, &c.

Dr. Burnet, after F. Tachard, and others, relates, that the Siamefe believe, that the earth will at last be parched up with heat; the mountains melted down; and the earth's whole surface reduced to a level, and then consumed with fire. And the Bramins of Siam do not only hold, that the world shall be destroyed by fire; but, also, that a new earth shall be made out of the cinders of the old.

The sacred scriptures announce this event in a variety of passages; some of which, however, have been applied by Dr. Hammond, and others, to the destruction of Jerusalem; but others are universally allowed to refer to this awful catastrophe. See 2 Pet. iii. 10—13, referred by Dr. Hammond to the destruction of Jerusalem, and the dissolution of the Jewish state, but generally, and, with just reason, applied to the end of the world. (See Ray's Discourses, p. 311, &c.) 2 Theff. i. 7, 8. Rev. vi. 12, 13, 14. Rev. x. 6. Rev. xxi. 1. Heb. xii. 26, 27. All these passages, and others, which more immediately relate to the time of this event, are applied by Dr. Hammond to the destruction of the city, temple, and polity of the Jews: and, indeed, he leaves only one place in the New Testament, as a proof of the general conflagration of the world; *viz.* 2 Pet. vii. 7. The other passages have been cited from the Old Testament that seem to indicate and foretell the dissolution of the present globe: such are Job. xiv. 12. Pl. cii. 5, 6. Isai. li. 6. Joel, ii. 31. Malachi, iv. 1. Deut. xxxii. 12. But it must be allowed that the prophetic books abound with figurative expressions, the precise object of which cannot be so satisfactorily ascertained. The ancient fathers of the church, and Christian writers, in successive periods of its duration, have frequently referred to this event, and testified their belief of its advent. Some of the first Christians apprehended it to be near at hand; and many of the ancients conceived that it would take place at the end of 6000 years. In this number we may class Justin Martyr, Irenæus, Lactantius, Eusebathius, &c.; but their opinion, with regard to the precise time of this event, is proposed by them not as an undoubted truth, but only as a modest conjecture. It was the general opinion of the ancient Christians, that this world shall not be annihilated or destroyed, but merely renewed and purified. To this purpose we might cite the testimonies of Eusebius, Cyril, Oecumenius, Jerome, and others.

Various are the sentiments of authors on the subject of the conflagration; the cause whence it is to arise, and the effects it is to produce. Divines ordinarily account for it metaphysically; and will have it take its rise from a miracle, as a fire from heaven. Philosophers contend for its being produced from natural causes; and will have it effected according to the laws of mechanics: some think an eruption of a central fire sufficient for the purpose; and add, that this may be occasioned several ways; *viz.* either by having its intensity increased; which, again, may be effected either by being driven into less space by the encroachments of the superfluous cold, or by an increase of the inflammability of the

fuel whereon it is fed: or by having the resistance of imprisoning earth weakened; which may happen, either from the diminution of its matter, by the consumption of its central parts; or by weakening the cohesion of the constituent parts of the mass, by the excess or the defect of moisture.

Others look for the cause of the conflagration in the atmosphere; and suppose, that some of the meteors there engendered in unusual quantities, and exploded with unusual vehemence, from the concurrency of various circumstances, may be made to effect it, without seeking any further.

The astrologers account for it from a conjunction of all the planets in the sign Cancer; as the deluge, say they, was occasioned by their conjunction in Capricorn. This was an opinion adopted by the ancient Chaldeans.

Lastly: others have recourse to a still more effectual and flaming machine; and conclude the world is to undergo its conflagration from the near approach of a comet, in its return from the sun. Those wandering bodies do indeed seem to menace us a little; being able, both by their transverse motion across the earth's way, by the hugeness of their size, and the intense fire wherewith they glow in their recess from the perihelion, to produce the most signal changes and revolutions in the system of things.

Mr. Whiston has shewn, that they are extremely well fitted to produce the phenomena of the deluge; and has gone a good way towards proving, that the comet of 1680, was the very body to which that event was owing; as being then in its approach towards the sun, and its atmosphere crowded with the watery vapours, which it had gathered in those inconceivably cold regions, into which it had fled off in its aphehon.

This same comet, sir Isaac Newton has calculated, when in its perihelion, December the 8th, was heated, by the vicinity of the sun, to a degree two thousand times more hot than red-hot iron: he shews, likewise, that it would scarce be cool again in fifty thousand years.

This same comet, Dr. Halley observed November the 11th, was not above a semidiameter of the earth from the earth's way: so that had the earth, at that time, been in that part of its orbit, something very extraordinary might have been apprehended; but whether in the way of fire, or water, may, perhaps, to some, leave room to doubt. But it is scarcely conceivable, that the comet should bring any vehement degree of heat, out of those regions it comes from, whatever heat it might carry thither. See COMET. See on the subject of this article *Theory of the Earth*.

CONFLANS, in *Geography*, a small town of France, in the department of Mont-blanc, and chief place of a canton in the district of Moutiers, 18 miles N.E. from Moutiers. The place contains 1313, and the canton 5512 inhabitants; the territory includes 182½ kilometres and 10 communes.—Also, a small town of France, in the department of Moselle, and chief place of a canton in the district of Briey, situated at the confluence of the Iron and Orn, 15 miles E. from Metz. This place contains but 347, and the canton 7145 inhabitants, and 31 communes, upon a territorial extent of 240 kilometres.—Also, a town of France, in the department of the Upper Saone, in the district of Lure; 4 leagues N. of Vesoul, and 2½ W. of Luxeuil.—Also, a town of Savoy, near the conflux of the Isere and Doron; 18 miles E. of Chambéry.

CONFLANS, or *Constant*, was, before the revolution, the name of a valley of France, in Rouffillon, surrounded by the Pyrénées, and watered by the river Tet. Villefranche sur le Tet was its capital.

CONFLANS *St. Honorine*, a town of France, in the department of the Seine and Oise; 5 leagues S.W. of Paris.

CONFLICT. See **COMBAT**.

CONFLUENCE, **CONFLUX**, the place where two rivers join, and mix their waters.

CONFLUENT, in *Medicine*, literally *flowing together*, is a term applied to cutaneous eruptions, which, though confining, on their first appearance, of separate and distinct spots, form themselves subsequently into extensive patches, by the spreading of the individual spots, which coalesce with each other. This epithet is most frequently applied to the small pox, which, when confluent, becomes a very formidable and fatal disease, and requires a treatment in its latter stages, different from that which is beneficial in the mild form of the disease, when the pustules are few and distinct. See **SMALL-POX**.

CONFLUENTA, in *Ancient Geography*, a town of Spain, belonging to the Vaccæans, S.E. of Pallentia.

CONFLUENTES. See **COBLENZ**.

CONFOLENS, in *Geography*, a town of France, in the department of Charante, and chief place of a district, situated on the river Vienne, 30 miles N.W. from Limoges, and 36 N.E. from Angoulême. It has a sub-prefect, a court of justice, and a register-office. It is divided into north and south, and has a population of 2025 inhabitants. Its northern canton comprises 7391, and the southern 11,385 inhabitants, distributed in 18 communes, upon a territorial extent of 342½ kilometres. The district reckons 58,503 inhabitants and 70 communes, on a territorial extent of 14,32½ kilometres. Its soil in general is a barren heath, except on the banks of the Vienne, which afford some good corn land and excellent pastures. Corn and cattle are the principal articles of commerce. N. lat. 46° 2'. E. long. 0° 34'.

CONFORMATION, the particular texture and consistence of the parts of any body, and their disposition to make a whole.

We say, light of different colours is reflected from bodies, according to their different conformation; in opposition to the Cartesians, who pretend, that reflected light becomes of different colours, according to the different conformation of the bodies that reflect it. The conformation of the members of an embryo is not perfect enough to allow of distinction.

CONFORMITY, in the *Schools*, is the congruency, or relation of agreement between one thing and another: as between the measure, and the thing measured: the object, and the understanding; the thing, and the conception; the thing, and the division thereof, &c.

CONFORMITY, *Non*. See **NON-CONFORMITY**.

CONFORMITY, *Occasional*. See **OCCASIONAL CONFORMITY**.

CONFRERES, from *con*, and *frere*, *brother*; denote brethren in a religious house, or the fellows of one and the same society. 32 Hen. VIII. c. 24.

CONFRONTATION, the act of bringing two persons, in presence of each other, to discover the truth of some fact, which they relate differently.

The word is chiefly used in criminal matters; where the witnesses are confronted with the accused; the accused with one another, or the witnesses with one another.

CONFUCIUS, or **KONG-FU-TSE**, in *Biography*, the most celebrated ancient philosopher of China, descended from the imperial family of the dynasty of Shang, was born in the reign of the emperor Lu, about four centuries and a half before Christ. He was accordingly a contemporary with Pythagoras, and flourished at a period prior to that in which Socrates rose to celebrity. At fif-

teen years of age, he engaged in the study of the ancient learning of his country; and, before he had arrived at the years of manhood, he had made astonishing proficiency in the doctrines attributed to the legislators Yao and Chun, which the Chinese consider as the source of all their science and morality. The reputation which Confucius acquired, and the uncommon wisdom which he discovered, were the means of advancing him, while he was yet but a youth, to the office of minister of state. The duties of this, and of other posts assigned to him, he performed with honour to himself, and signal benefit to the kingdom. The rank which he held in public life, enabled him to form an accurate judgment of the state of morals among his countrymen.

He devised a plan for a general reformation, which he endeavoured to carry into execution, as well by inculcating a strict and pure morality, as by using the influence of his authority in recommending it. His efforts were crowned with so much success, that the whole nation became, at first, a pattern of order, decorum, and strict justice. This reformation was not, however, permanent; the business of the state was abandoned to men of licentious habits, and in a short time an universal effeminacy and dissoluteness of manners prevailed. Confucius exerted all his powers to stem the torrent of vice; and when he found that his endeavours were fruitless, he resolved to quit his station and country, and seek an asylum in some other kingdom where his efforts in the cause of virtue might be more availing. He, at length, devoted himself to the task of private instruction in philosophy and morality. His great celebrity, and his personal virtues, soon procured him many scholars; and he is said to have had several thousand disciples to whom he taught morals, the art of reasoning, and the principles of policy. From these he selected seventy-two, who were distinguished from the others on account of their superior attainments. These were divided into classes, destined for different purposes. The business of the first class was the study of morals; of the second, that of reasoning and eloquence; of the third, that of the rules of good government; and the immediate province of the fourth was something similar to our public preaching. The exertions of Confucius in the cause of virtue, were too great for the frame of body with which he was endued; his natural strength became impaired, and his mental powers failed. During his last sickness, he declared that his heart was overpowered with grief, on beholding the disorders which prevailed in the empire, and which he had in vain endeavoured to suppress: "The kings," said he, "will not follow my maxims; I am no longer useful on earth; it is, therefore, time that I quit it." This exclamation was followed by a lethargy from which he never recovered. He died in his seventy-third year. B. C. about 479, (Blair.) By his sage counsels, his moral doctrine, and his exemplary conduct, he obtained an immortal name as a reformer of his country. After his death, his name was held in the highest veneration, and his doctrine is still regarded among the Chinese, as the basis of all moral and political wisdom. His natural temper was excellent, and his conduct irreproachable and exemplary. He was particularly praised for his humility, sincerity, temperance, disinterestedness, and contempt of riches.

Confucius seemed designed by heaven to reform, both by his doctrines and example, the corruptions which prevailed, as well in the civil, as in the religious establishments of China. He condemned the idolatry which he found existing among his countrymen, and endeavoured to introduce a purer form of religion. He did not attempt to dive into the impetrate secrets of nature, nor bewilder himself in abstruse researches on the essence of a first cause, the origin of good

and evil, and other subjects which seem beyond the limits of the human mind. He maintained that the Deity was the most pure and perfect principle, and fountain of all things; that he is independent and almighty, and watches over the government of the universe, so that no event can happen but by his command; that our most secret thoughts are open to his view; that he is holy without partiality, and of such boundless goodness and justice, that he cannot possibly permit virtue to go unrewarded, or vice unpunished.

So high is the respect paid to the memory of this great man, even in the present day, that his descendants enjoy, by inheritance, the title and office of mandarins, and are allowed the privilege in common with the princes of the blood, of exemption from the payment of all taxes to the emperor. The works which Confucius composed for the use of his disciples, and the preservation of his philosophy, are looked upon by the Chinese as of the first authority, next to the classical books, styled by way of eminence, "the Five Volumes;" and to these, indeed, he declares himself indebted for the information and wisdom which his own are calculated to convey. Moreri. Hist. Univer. D'Anquetil. Es. field's Hist. of Philosophy.

CONFUSED Notion and Vision. See the substantives.

CONFUSION, in a general sense, is opposed to order; in a perturbation whereof, confusion consists: *e. gr.* when things prior in nature do not precede; or posterior do not follow, &c.

In a logical sense, confusion is opposed to distinctness, or perspicuity; and may happen, either in words, as when misconstrued or misapplied; or in ideas, as when the idea of any thing presents something along with it, which does not properly belong to that thing.

In a physical sense, confusion is a sort of union, or mixture by mere contiguity. Such is that between fluids of contrary natures; as oil and vinegar, &c.

CONFUSION, property by, in Law, denotes the intermixture of the goods of two persons in such a manner, that their respective portions cannot be ascertained. If this be consent, they have a common interest, both by the English and civil law, in proportion to their shares. But, if one wilfully intermixes his money, corn, or hay, with that of another person, without his approbation or knowledge, or casts gold in like manner into another's pot or crucible, the civil law, though it gives the sole property of the whole to him who has not interfered in the mixture, yet allows a satisfaction to the other for what he has so improvidently lost. (Inst. 2. 1. 28.) But our law, to guard against fraud, gives the entire property, without any account, to him, whose original dominion is invaded, and endeavoured to be rendered uncertain, without his own consent. Foph. 38. 2 Bulltr. 325. 1 Hal. P. C. 513. 2 Vern. 516. Bl. Comm. ii. 455.

CONFUSION of tongues, in the History of the World, is a memorable event, which happened in the one hundred and first year, according to the Hebrew chronology, after the flood, B. C. 2247, at the overthrow of Babel; and which was providentially brought about, in order to facilitate the dispersion of mankind, and the population of the earth. Until this period, there had been one common language, which formed a bond of union, that prevented the separation of mankind into distinct nations; and some have supposed, that the tower of Babel was erected as a kind of fortress, by which the people intended to defend themselves against that separation, which Noah had projected.

There has been a considerable difference of opinion, as

to the nature of this confusion, and the manner in which it was effected. Some learned men, prepossessed with the notion that all the different idioms now in the world did at first arise from one original language, to which they may be reduced, and that the variety among them is no more than must naturally have happened in a long course of time by the mere separation of the builders of Babel, have maintained, that there were no new languages formed at the confusion; but that this event was accomplished by creating a misunderstanding and variance among the builders, without any immediate influence on their language. But this opinion, advanced by Le Clerc, &c. seems to be directly contrary to the obvious meaning of the word *שפה*, *shapha*, *lip*, used by the sacred historian; which, in other parts of scripture, signifies *speech*. (See Pl. lxxx. 5. II. xxvii. 11. xxxiii. 19. Ezek. iii. 5.) It has been justly remarked, that unanimity of sentiment, and identity of language, are particularly distinguished from each other in the history; "the people is one, and they have all one language." (Gen. xi. 6.) It has been also suggested, that if disagreement in opinion and counsel were the whole that was intended, it would have had a contrary effect; they would not have desisted from their project, but strenuously have maintained their respective opinions, till the greater number of them had compelled the minority either to fly or to submit. Others have imagined, that this was brought about by a temporary confusion of their speech, or rather of their apprehensions, causing them, whilst they continued together and spoke the same language, to understand the words differently: Scaliger is of this opinion. Others again account for this event, by the privation of all language, and by supposing that mankind were under a necessity of associating together, and of imposing new names on things by common consent. Another opinion ascribes the confusion to such an indistinct remembrance of the original language which they spoke before, as made them speak it very differently; so that by the various inflections, terminations, and pronunciations of divers dialects, they could no more understand one another, than they who understand Latin can understand those who speak French, Italian, or Spanish, though all these languages arise out of it. This opinion is adopted by Causabon, and by bishop Patrick in his Commentary in loc. and is certainly much more probable than either of the former: and Mr. Shuckford maintains, that the confusion arose from small beginnings, by the invention of new words in either of the three families of Shem, Ham, and Japhet, which might contribute to separate them from one another; and that in each family new differences of speech might gradually arise, so that each of these families went on to divide and subdivide among themselves. Others, again, as Mr. Jos. Mede and Dr. Wotton, &c. not satisfied with either of the foregoing methods of accounting for the diversity of languages among mankind, have recourse to an extraordinary interposition of divine power, by which new languages were framed and communicated to different families by a supernatural infusion or inspiration; which languages have been the roots and originals from which the several dialects that are, or have been, or will be spoken, as long as this earth shall last, have arisen, and to which they may with ease be reduced. This opinion is adopted and vindicated by Dr. Hartley, in his "Observations on Man," p. 179, who says, that it seems impossible to explain how the human languages should arise from one stock. Upon the whole, we may observe, that there evidently seems to have been something miraculous in the transaction; and if it be supposed that nothing more was meant than a confusion of designs, counsels, and opinions; so that they could not agree

agree together in the execution of their scheme (which, as we have shewn, is not very probable); this would be sufficient to answer the purpose of Divine Providence, which was to prevent the children of Noah from preserving their union in one body, and to spread them over the face of the earth, that it might be peopled and cultivated. If the confusion of tongues was an actual change of languages, it was probably accomplished by degrees; nor does it appear to be so fundamental and radical an alteration as some have imagined. In proof of this, we may allege the free intercourse which subsisted in early times between persons of different ages and countries; the uniformity of the Eastern languages, which plainly shews that they have one common radix; and the manifest derivation of the Greek and Latin from the same source.

As to the number of languages thus introduced, many opinions have been adopted. If there were no more than three were nations or heads of nations, then the number would be seven for Japhet, four for Ham, and five for Shem; but if there were as many as there were families, which is the more probable opinion, their number cannot be certainly assigned. However, the Hebrews fancy they were seventy, because the descendants from the sons of Noah, enumerated Genesis x., were just so many. Allowing then the languages of the chief families to have been fundamentally different from each other, the sub-languages and dialects within each branch would probably have had a mutual affinity, greater or less, as they settled nearer or farther from each other. But whichever of these hypotheses is adopted, the primary object of the confusion at Babel was the separation and dispersion of mankind. Cleric. Com. in Gen. x. i. Scaliger Exerc. in Cardan. § i. Casaubon. Distrib. de Ling. Heb. Mede's Works, vol. i. p. 276. Wotton's Disc. and Brett's Ess. on the Confusion of Languages. Univers. Hist. vol. i. part i. chap. 2. § 5. Shuckf. Conn. vol. i. p. 146.

The ingenious and learned Dr. Bryant has, in the third volume of his "Analysis of Ancient Mythology," advanced a new and singular hypothesis, both with respect to the confusion of tongues and the dispersion. He supposes that the confusion of language was local and partial, and limited to Babel only. By כַּל-הָאָרֶץ Gen. xi. 1 and 8, which our translators render the *whole earth*, he understands *every region*: and by the same words in ver. 9, the *whole region*, or province. This confusion was occasioned, as he supposes, by a labial failure; so that the people could not articulate. Thus their speech was confounded, but not altered; for as soon as they separated, they recovered their true tenor of pronunciation, and the language of the earth continued for some ages nearly the same. The interviews between the Hebrews and other nations, recorded in Scripture, were conducted without an interpreter; and he farther observes, that the various languages which subsist at this day retain sufficient relation to shew, that they were once dialects from the same matrix, and that their variety was the effect of time. See DISPERSION.

CONFUTATION, in *Rhetoric*, &c. a part of an oration, wherein the orator seconds his own arguments, and strengthens his cause, by refelling and destroying the opposite arguments of the antagonist. This is done by denying what is apparently false, by detecting some flaw in the reasoning of the adverse party, by granting their argument, and shewing its invalidity, or retorting it upon the adversary.

Confutation makes a branch of what we call *confirmation*.

The confirmation and confutation are sometimes called *confirmation*.

Rhetoricians generally place confutation after confirmation, which seems agreeable to the natural method of thinking on any subject. For persons first endeavour to find out such arguments as are proper to maintain that side of a question which they espouse, before they consider what objections may be offered against it: although in speaking it may be necessary to vary the order, according to the nature of the discourse. The method prescribed by Quintilian (Inst. Orat. l. v. c. 13.) is this, that, "if we bring a charge, we should first prove it, and then answer objections; but if we stand upon the defence, we ought to begin with confutation." The forms of reasoning are the same here as those that occur under *confirmation*. But it is of importance to know the different modes of confutation practised by orators, which is often the more difficult task; because he, who is to prove a thing, comes usually prepared; but he, who is to confute it, is frequently left to a sudden answer. Hence Quintilian says, that, in judicial cases, "it is as much easier to accuse than to defend; as it is to make a wound than to heal it." In all disputes it is of the greatest consequence to observe, where the stress of the controversy lies; and in confutation, what the adversary has advanced ought carefully to be considered, and in what manner he has expressed himself. Those things, which relate to the merits of the cause, may be confuted either by contradicting them, or by shewing some mistake in the reasoning, or their invalidity when granted. There are various ways in which things may be contradicted; what is apparently false may be expressly denied; and things which the adversary cannot prove may be likewise denied. A thing may be also contradicted by shewing that the adversary himself maintained the contrary. When you can fix contradictions on an adversary, you effectually silence him; for this is stabbing him with his own weapon. Sometimes a thing is not in express terms denied, but represented to be utterly incredible; and this method exposes the adversary more than a bare denial. There is, likewise, an ironical way of contradicting a thing, by retorting that and other things of the like nature upon the adverse party. A second mode of confutation is by observing some flaw in the reasoning of the adverse party. The last method of confutation is, when the orator does in some sense grant the adversary his argument, and at the same time shews its invalidity. This may be done in a variety of ways, according to the different nature of the subject. Sometimes he allows that what was said may be true, but pleads, that what he contends for is necessary. At other times the orator pleads, that although the contrary opinion may seem to be attended with advantage, yet that his own is more just and honourable. Another way of confutation is by retorting upon the adversary his own argument. The orator takes this advantage, when an argument proves too much, that is, more than the person designed it for, who made use of it. See INVERSION. Sometimes orators in confutation raise such objections themselves to what they have said, as they imagine may be made by others; which they afterwards answer the better to induce their hearers to think, that nothing considerable can be offered against what they have advanced, but what will admit of an easy reply. See PROLEPSIS. See the several modes of confutation above recited illustrated by apposite citations from Cicero's Orations in Ward's Oratory, vol. i. lect. 17.

As to the order and disposition of the arguments, proper to be used in confutation; whether to follow the adverse party, or alter his method, and range them in a different manner

manner, as likewise whether to attack the weak-st or strong-st arguments first; these things must be left to the discretion of the speakers.

CONG, in *Geography*, a village of the county of Mayo, Ireland, situated in the neck of land between the Loughs, Mask, and Corrib. Large caverns and subterraneous waters are frequent in the neighbourhood; especially at the back of the village, a very broad river rushes at once from beneath a gently sloping bank, and after a rapid course of about a mile loses itself in Lough Corrib. It is supposed to be the outlet of a subterraneous channel, through which the superfluous waters of Loughs Mask and Carrah are discharged into Corrib. Cong is about 108 miles west from Dublin, and 20 south from Castlebar.

CONG, a town of China of the third rank, in the province of Honan; 15 miles south of Hoi-king.—Also, a town of China of the third rank, in the province of Szechuen; 25 miles south of Sou-tcheou.

CONGA, a town of Persia, in the province of Irak-Agemi; 100 miles N. W. of Ispahan.

CONGAREE, a considerable river of America, in the state of S. Carolina, formed by the confluence of Saluda and Broad rivers. The union of the waters of Congaree and Wateree forms the Santee.

CONGAUTATA, in *Ancient Geography*, a station on the line of Severus's wall in Britain, mentioned in the Notitia Imperii, and supposed to be at Stanwix.

CONGE, APOPHYGE, Gr. *Στοπος*, Lat. in *Architecture*. The extremities of the shaft of a column when they are worked circularly to unite gradually with the fluted of the base and capital are thus named.

CONGE, in the *French Law*, a licence, or permission, granted by a superior to an inferior, which gives him a dispensation from some duty to which he was before obliged. The word is French: Menage derives it from the Latin *committus*, used for *commensus*, and *commencare*, often seen among ancient writers: the Italians say, *congedo*.

A monk cannot go out of his convent, without the conge of his superiors.

CONGE *d'accorder*, i. e. *leave to accord*, or *agree*, is used in the statute of hies, anno 18 Edw. I. to the following purpose. "When the original is delivered, in presence of the parties before justices, a pleader shall say this: sir, justice, *conge d'accorder*; and the justice shall say to him, What saith sir R. and shall name one of the parties, &c."

CONGE *d'elire*, is the king's permission royal to a dean and chapter, in time of a vacancy, to choose a bishop. See BISHOP, CANON, and COLLATION.

Gwyn observes, that the king of England, as sovereign patron of all bishoprics and other benefices, had anciently the free appointment of all ecclesiastical dignities; investing, first, *per baculum & annulum*; and afterwards by letters patent: but that, in process of time, he made the election over to others, under certain forms and conditions; as, that they should at every vacancy, before they chose, demand of the king *conge d'elire*, i. e. leave to proceed to election; and after election to crave his royal assent, &c. He adds, that king John was the first who granted this; which was afterwards confirmed by stat. Westm. 3 Edw. I. cap. 1. and again in the Articuli Cleri, 25 Edw. III. cap. 1.

CONGE, in *Military Language*, leave of absence granted to an officer or soldier from his corps, from the army or altogether from the service. The old service of France admitted of two kinds; namely, the *congé limité*, a specific or limited leave, and the *congé absolu*, or an absolute discharge. In the latter case there was delivered to the soldier a *car-*

tourte, with all the signatures on it necessary for the good order and regularity of the service, and for the tranquility of the person, who obtained it. The *congé absolu* was always suspended in time of war.

CONGEABLE, from the French *congé* (i. e. *leave, licence, or permission*), signifies as much as lawful, or lawfully done, or done with leave or permission; as, *then entry of the diffidite* is congeable.

CONGELATION (from the Latin *congelare*), means the transition of a liquid into a solid state, in consequence of the abstraction of heat; thus metals, butter, oils, water, &c. are said to *congeal*, when, from a fluid state, they pass into that of a solid.

Congelation and freezing mean, in fact, the same effect; yet the term congelation is indiscriminately applied to all the above-mentioned transitions; whereas the word freezing is more commonly used for denoting the congelation of water, of vinegar, of brandy, of mercury, and in short of all those substances which, in order to become solid, must be cooled below 32° of Fahrenheit's thermometer. We shall, however, in this work, divide the subject of congelation under the two above-mentioned denominations; stating, under the present article, whatever relates to natural congelation, and under the article FREEZING, whatever relates to the artificial methods of freezing.

Another important process, much connected with congelation, has been improperly separated from it. And this is *crystallization*, or the arrangement of certain substances into regular figures, in their transitions from the fluid into the solid state; but water and several other bodies likewise crystallize in congealing, which shews that the two processes can hardly be separated; and this is rendered still more evident by a due consideration of other phenomena that accompany both processes. Allowing therefore that crystallization and congelation are essentially of the same class, a slight discrimination may be formed by applying the term crystallization to the formation of those regular forms or crystals, which are of a compound nature, and which, when once formed, generally require a much greater degree of heat for their liquefaction, than that in which they were formed.

By far the greater number of liquids we are acquainted with, have been found capable of congelation in a proper temperature; and on the other hand most of those solids which are such in the usual temperature of the atmosphere may be rendered fluid by the application of certain appropriate degrees of heat; hence we are led by analogy to suppose, that every fluid might be congealed, if it were possible to cool it sufficiently; or that fluidity is the effect or consequence of heat. Every particular kind of substance requires a different degree of temperature for its congelation; hence it appears why certain substances remain always fluid, whilst others remain always solid, in the ordinary temperature of the atmosphere, and why certain other substances are sometimes fluid, and at other times solid, according to the vicissitudes of the weather, the difference of seasons, and the variety of climates.

Heat, or sensible caloric, continually tends to pass from those bodies which have more of it than their proper share, to those contiguous bodies which have less of it than their proper share; hence, when a body is placed amongst other bodies of a lower temperature, its heat gradually passes to those other bodies, until the whole acquires the same temperature; and this transition proceeds regularly, excepting, however, when the body is in the act of assuming the solid state; for at that moment a sudden extrication of heat is observable. Place a thermometer in a glass full of water,

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and place the glass in a freezing mixture of broken ice, and common salt, the thermometer will be found to descend gradually as low as 30, or 28 degrees of Fahrenheit's thermometer, and sometimes even much lower, whilst the water remains fluid; but, at last, the water begins to freeze, and at that very moment the thermometer rises suddenly to 32°, and it remains at that point until the whole of the water is congealed. If then the application of the freezing mixture be continued, the thermometer will sink gradually several degrees below 32°, according to the activity of the freezing mixture. We may, Dr. Black observes, easily satisfy ourselves, that the water, while congealing, is continually imparting heat to the surrounding air; for, if we suspend a delicate thermometer immediately above the water, we shall find the instrument affected by an ascending stream of air, less cold than the air around.

Not only pure water, but all aqueous fluids, may be cooled down 7, or 8, or 10 degrees without freezing; but if in that state they be affected with a tremulous motion, or if they be touched with a slender piece of ice, they will instantly shoot into beautiful spicules, the thermometer in it rising at the same time. This striking phenomenon of the sudden rising of the thermometer at the moment of congealation, which has also been remarked in wax, spermaceti, and other substances, has not yet been fully or satisfactorily explained. It is true that ice has not so great a capacity for containing heat as water has; (see the capacities of bodies under the article CALORIC and HEAT); but why should water so reluctantly part with that superfluous quantity of heat as to suffer itself sometimes to be cooled several degrees below 32, before it will assume the solid form?

Since water, when it has once begun to congeal, remains at the apparent temperature of 32° until the whole of it is congealed; and since water cannot remain congealed in a temperature higher than 32°; therefore the congealed point of water has been fixed at 32°, of Fah.

The congealing points of several other substances have also been ascertained with considerable accuracy. In some, however, it is not the congealing, but the melting, point that has been ascertained. These two points, if they be not quite the same, may naturally be supposed not to differ more than about a degree or two; hence from the latter the former may be easily deduced. In the following table, however, we shall set down the one or the other of those points, according as either of them has been more accurately determined.

Table of the congealing, or melting points of different substances, expressed in degrees of Fahrenheit's scale; the high degrees of which have been estimated by the equivalent degrees of Wedgwood's thermometer;

Platina melts	-	-	-	23177° F.
Manganese melts	-	-	-	28877.
Iron melts	-	-	-	21637.
Nickel melts	-	-	-	20577.
Pig iron begins to melt	}	-	-	17977.
Cobalt melts		-	-	
Fine gold melts	-	-	-	5237.
Settling heat of flint glass	-	-	-	4847.
Fine silver melts	}	according to Mr. Wedgwood	-	4717.
		according to Sir James Hall	-	3937.
Swedish copper melts	-	-	-	4587.
Brass melts	-	-	-	3807.
Zinc melts	-	-	-	700.
Lead melts	}	according to Newton	-	540.
		according to Seconat	-	535.
		according to Irwin	-	594.
		according to Parker	-	612.

Lead fixes, according to Crichton of Glasgow	612° F.	
Bismuth melts	460.	
A mixture of one part of tin and four of lead, melts	according to Irwin	470.
	-	476.
Tin melts	according to Irwin	408.
	according to Crichton of Glasgow, it congeals at	442.
	-	413.

The last mentioned gentleman says, "it melted in the thermometer sunk gradually till it arrived at 442°; then it instantly sunk to 439°; and as instantly rose to 442°." At this temperature the mercury remained perfectly stationary for five minutes, at which time the metal became solid to the centre of the crucible."

A mixture of three parts of tin and two of lead	}	melts	-	334.
A mixture of two parts of tin, and one of bismuth melts		-	-	
A mixture of tin and bismuth, in equal parts, melts	-	-	-	283.
Sulphur melts	-	-	-	234.
A mixture of five parts of bismuth, three of tin, and two of lead, melts	-	-	-	212.
A mixture of three parts of tin, five of lead, and eight of bismuth, melts	-	-	-	219.
Serum of blood begins to coagulate at	-	-	-	156.
Albumen, or the white of an egg, coagulates at	-	-	-	156.
Bees wax melts	-	-	-	142.
Tallow melts	-	-	-	127.
Spermaceti melts	-	-	-	112.
Ice, or congealed water, begins to melt	-	-	-	32.

The increase of the bulk of water previous to, as also following, its point of congealation is a remarkable property, which has been more or less observed with all aqueous fluids, viz. they are contracted by cold, until a certain limit, which generally is about 7 or 8 degrees higher than their congealing point; they then expand again as they are cooled farther, and if they are not agitated, they will remain liquid at a temperature lower than their congealing point. The greatest density of water, Count Rumford says, is somewhat lower than 40°. Professor Hope of Edinburgh places it between 39°.5 and 40°. Mr. Dalton says, that the greatest density of water is at the temperature of 42°.5. And that the expansion of water is the same at the distance of the same number of degrees above and below 42°.5. Thus the expansion is the same at 32° and 53°; the same at 10° and 75°, &c. The increase of bulk in freezing water is not owing to the formation of air bubbles, for water, which has been deprived of air, will also expand in freezing. The bulk of ice, at a mean, is to that of the water which it produces, as 9 to 8. This enlargement of bulk is attributed to a crystallization; the particles of water in freezing tend to arrange themselves so as to form angles of about 60 and 120 degrees; and this tendency is exerted with a prodigious force. Mr. Leslie says, "water necessarily discharges its air previous to the act of congealation; a circumstance which sometimes retards that species of crystallization. Hence it is, that water freezes sooner which has been boiled. When exposed to cold, crude water will present a cake of ice crowded with large bubbles entangled in the mass; but boiled water will contain a solid lump, almost pellucid, with only some minute specks or strag floating from the centre." Dr. Black says, that boiled water begins to freeze as soon as the air has cooled it to 32°. Iron likewise occupies less room when fluid than when solid. And the same thing has been asserted of two or three other metallic substances.

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Vinegar congeals at about	28° F.
Human blood congeals at	25.
Strong wines congeal at about	20.
A mixture of one part of alcohol and three of water congeals at	7.
A mixture of alcohol and water, in equal parts, congeals at	minus 7.
A mixture of two parts of alcohol and one of water, congeals at	minus 11.
Mercury congeals at	minus 39.

Mercury exposed to cold, and at about the point of congelation, contracts its bulk irregularly. This substance may be cooled some degrees below its freezing point, before it assumes the solid form; but as soon as it begins to harden, the thermometer rises to its freezing point, which, from a variety of experiments made by Mr. Hutchins at Hudson's Bay, appeared upon his thermometer to be -40° . "But (Mr. Cavendish observes in the Phil. Transf. vol. lxxiii. p. 321.) as it appeared from the examination of his thermometer, after it came home, that -40° thereon answers to $-38\frac{3}{4}$ on a thermometer adjusted in the manner recommended by the committee of the Royal Society; it follows, that all the experiments agree in shewing that the true point at which quicksilver freezes, is $-38\frac{3}{4}$, or in whole numbers 39° below nothing."

In becoming solid, mercury sometimes shoots into crystals or longitudinal filaments like pins. The first observations concerning the natural congelation of mercury were made by Mr. Gmelin about the year 1735, at Yeneseick in lat. $58\frac{1}{2}^{\circ}$ north, at Yakutsk in lat. 62° north, at Rivengo, lat. $57\frac{1}{2}^{\circ}$ north, and elsewhere. (See the Peterburg Commentaries for the years 1756 and 1765). Professor J. A. Baux, of Peterburg, in the year 1759, first accomplished the congelation of mercury by art, viz. by means of snow and aqua fortis. But with respect to the artificial methods of congelating mercury, and their history, see the article FREEZING.

Nitric acid is said to congeal at - - - minus 66.

With respect to the congelation of the sulphuric, or vitriolic acid, the greatest number of experiments seems to have been made by Mr. Keir, and from those experiments he infers: "1. That the vitriolic acid has a point of easiest freezing, and that this is when its specific gravity is to that of water as 1780 to 1000. 2. That the greater or less disposition to congelation does not depend on any other circumstance than the strength of the acid. 3. That the freezing and thawing degree of the most congelable acid is about 45° of Fahrenheit's scale. It is, however, to be observed, that this degree is inferred from the temperature indicated by the thermometers immersed in the freezing and thawing acids; but the congelation of the fluid acid could never be accomplished without exposing it to a greater degree of cold, either by exposing it to the air in frosty weather, or to the cold of melting snow. 4. Like water, this acid possesses the property of retaining its fluidity when cooled several degrees below the freezing point; and of rising suddenly to it when its congelation is promoted by agitation, or by contact even with a warmer thermometer. 5. That, like water and other congelable fluids, the vitriolic acid generates cold by its liquefaction, and heat during its congelation, though the quantity of this heat and cold remains to be determined by future experiments. 6. That the acid, by congelation, when the circumstances for distinct crystallization are favourable, assumes a regular crystalline form, a considerable solidity and hardness, and a density much greater than it possessed in its fluid state."

The heat of the earth, at least on the surface of it, is de-

rived entirely from the sun; for the heat arising from combustion, as about volcanos, or from decomposition of bodies, is trifling and partial. The direct rays of the sun on the same spot of the surface of the earth heat it more or less, according to the time of the year, clearness of the atmosphere, state of the winds, colour and quality of the spot. In Great Britain, during the hottest time of the summer season, the direct rays of the sun seldom raise the mercury in the thermometer so high as 110° . But in other climates, especially within the tropics, the mercury is raised considerably higher by the like exposure. Yet we must not believe the idle stories of the sun's heat melting lead, or setting fire to gun-powder, without the assistance of lenses, speculums, or other artifice.

It is not on account of the sun's being nearer or farther from the earth, that we receive much more heat in the summer than in the winter time; since the difference of those distances is too small to be sensibly felt; but we receive more heat in the summer than in the winter season. 1. Because the sun comes nearer to our zenith in the summer than in the winter time, in which situation its rays pass through a shorter portion of the atmosphere, and of course are less intercepted by it. 2. Because, when the sun is nearer to the zenith, a greater quantity of its rays falls upon a given horizontal part of the surface of the earth, than when that luminary stands lower, and its rays fall more obliquely upon the same spot. 3. Lastly, because the sun remains longer above the horizon during a summer day than a winter one.

The hottest part of the day is not at noon, nor that of the year when the sun passes nearest the zenith of a given country; but the hottest part of the day, when no accidental circumstance intervenes, is some time in the afternoon, and nearer to noon in the winter than in summer. In this country and in summer, the hottest part of the day generally is either precisely at, or a little before, two o'clock. The hottest time of the year in this country generally takes place in July, viz. after the solstice. The reason of this, is that though the rays of the sun give more heat when the sun stands higher, and of course at two o'clock they must give less than at noon; yet the earth, and the air contiguous to it, are hotter at two o'clock, because, besides the heat which they are actually receiving from the sun, they retain a considerable portion of the heat acquired before that time; so that as long as they acquire at any particular time, a greater quantity of heat than they lose of that which they had previously acquired, their temperature must continue to increase. The same thing must be understood with respect to the communication of cold, which, for similar reasons, is greatest some time after midnight, and some time after the shortest days of the year. The earth acquires heat in the day time, and loses it during the night. In the summer season the loss of heat during the night is less than the acquisition of it during the day; therefore that excess of heat is gradually communicated from the surface to the more internal parts of the earth. But when the above-mentioned summer heat has penetrated a certain way, the winter cold begins to counteract it; and when that cold has penetrated a certain way, the next summer heat begins again to counteract it, and so on; hence, below a certain depth there is no alteration of temperature at any time of the year; unless some local combustion or other source of heat should interfere, which, however, seldom occurs. This fixed degree of temperature at a certain depth below the surface of the earth, varies in different countries, and nearly coincides with the mean temperature of the particular country. Thus in London the mean temperature is 50° ; and if a bucket of water be drawn from a pretty deep well, and a thermometer

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be instantly placed in it, the temperature of that water, (which is the same as that of the ground furrounding the bottom of the well) will also be found to be 50°. In products of time the mean temperature of a country is liable to some alteration arising from cultivation, clearing of grounds, draining of marshy grounds, &c. See CLIMATE.

With respect to the temperature at different altitudes, it has been found that a thermometer placed close to the ground is sometimes affected by heat or cold, sooner, or in a greater degree, than a thermometer placed 20, or 30, or 60 feet, higher up; and that at other times the latter is affected sooner, or in a greater degree, than the former. In the night time, especially when the air is still, and the sky quite free from clouds, a thermometer close to the ground generally indicates a greater degree of cold than in a higher situation. The true cause of this phenomenon is not fully understood; though it is attributed to evaporation, or according to Mr. Six, to the coolness which the dews or vapours may acquire in their descent.

At great heights above the surface of the earth, either in the free air, or on the summit of high mountains, the cold is much greater, and it increases more suddenly; it, because they are much more exposed, and 2dly, because they are more remote from the body of the earth, which, as has been observed above, tends to equalize the temperature, by retaining in the winter time a considerable degree of the heat acquired in the course of the summer. The winds to which mountains are exposed, especially those which, after having blown over the plains below, rise along their sides, have a peculiar refrigerating power, arising from the expansion of the ascending air, which becomes capable of absorbing more heat in proportion as it is more rarefied. See Dr. Darwin's Paper, Phil. Transf. for 1788.

Thus we have briefly stated the natural sources, and the principal causes which check or promote the heat and the cold, that are usually experienced in the world, at different times of the day, of the year, and in different countries; whence alone one may pretty well conceive where and when natural congelation may be expected to take place. Yet it is necessary to subjoin some farther observations, that have been made with respect to natural congelation at different times and different places.

The greater obliquity with which the sun's rays fall upon the northern and southern parts of the earth, than they do upon such parts as are near the equator, undoubtedly produces the variety of the mean temperatures that are observed in different latitudes; the higher latitudes being generally colder than the lower, and *vice versa*. But this gradation is partly counteracted by a variety of local circumstances; and such are the vicinity of large tracts of land or great extent of sea, the face of the country being flat or hilly, the disposition of the hills and mountains, the prevalence of rain and of certain winds, the state of cultivation, &c. The influence of winds in certain latitudes is so very great that a frost or thaw is brought on within a remarkably short time by a change of the wind. The action of winds on the temperature of a country principally depends upon three circumstances, *viz.* on their bringing a quick succession of new air in contact with the bodies that are exposed to it, on their having passed over the surface of hotter or colder tracts of water or land, and upon their increasing the evaporation. Saussure found that when the wind moves at the rate of forty feet per second, it triples that quantity of evaporation that would take place in calm air; hence it follows that frequently unusual heats or colds come on at unexpected times, and that the higher strata of the atmosphere are often warmer than the lower; for the heat

of the atmosphere is derived not from the immediate action of the sun's rays which pass through it, but from the warmer and more solid bodies with which it has been, or is, in actual contact. In consequence of these various circumstances, it has been observed that the north Pacific Ocean, above latitude 40°, is much colder than the north Atlantic, between the same parallels of latitude. The interior parts of Siberia, east of longitude 100°, are much colder than the parts equally distant from the meridian on the western side. The coast and interior parts of the western regions of America are much colder above the latitude of 40°, than the corresponding tracts of the continent of Europe. Large seas, which are agitated by winds and currents, are thereby so little affected by cold winters or hot summers, as to preserve a temperature nearly uniform in every season, like the internal parts of the earth.

With respect to the mean temperature of places at different altitudes above the level of the sea, but in the same country, or nearly about the same spot with respect to latitude, the heat diminishes nearly one degree of Fahrenheit for every 200 feet of elevation, according to Dr. Black. Other writers find reasons to assert, that the diminution of one degree takes place at every 299 feet of elevation.

From the statement of all the above, particulars the reader may form some idea of the time and place when natural congelation may be expected, and he will at the same time be able to perceive that close to the surface of the earth, no great regularity can be expected. On the continent of Europe congelation formerly took place at a lower latitude than it does at present, when natural congelation is seldom observed lower than the latitude of 40°. In America congelation has been observed at a much lower degree; and it is remarkable that great degrees of heat, as well as great degrees of cold, are alternately experienced on the same spots of that continent. In the more northern parts of the world the degrees of cold are very extraordinary. At Torneao, Reaumur's spirit thermometer fell to minus 34°. In Siberia the spirit thermometer has been known to descend as low as minus 121°. Even at the Glasgow observatory in the year 1780, the mercury of the thermometer exposed to the ambient air was found to stand at minus 14°.

The altitude on the sides of mountains, at which constant congelation takes place, seems to be less fluctuating, though not accurately ascertained. This altitude varies with the latitude; but even in the torrid zone perpetual congelation has been observed (according to Bouguer and others) at the altitude of about 15600 feet. This altitude, at which the congelation is constant, or where water ceases to be a fluid, and beyond which visible vapour does not seem to ascend, is called the *upper line of congelation*. The *lower line of congelation* is where it freezes at night only. The upper line of congelation, within the tropics, has been observed at the altitude of 15600. Near the tropics, on the sides of the temperate zones, it lies at the height of about 13428 feet. On the island of Teneriffe, in lat. 28° N., it lies at the altitude of about 10000 feet. In Auvergne, lat. 45° N. the line of congelation is at the altitude of 6740 feet. In latitude between 51° and 54° N. it seems to be at the altitude of about 5800. In latitude 80° north, lord Mulgrave found the line of congelation at the altitude of about 1200 feet above the level of the sea; whence, if the progression continues uniformly, as general Roy observes, we may conclude that the surface of the earth, at the pole itself, is for ever covered with congelation. Mr. Kirwan, however, places the upper line of congelation considerably higher. See his paper on the variations of the atmosphere, in the 8th vol. of the Transf. of the Royal

Royal Irish Academy. He reckons the altitude of the line of congelation from 0° to 10° of north latitude, at about 27700 feet; from 10° to 15° at about 26,00 feet; from 15° to 20°, at about 25200 feet; from 20° to 25°, at about 24000 feet; from 25° to 30°, at about 23000 feet; from 30° to 35°, at about 20000 feet; from 35° to 40°, at about 17000 feet; from 40° to 45°, at about 15000 feet; from 45° to 50, at about 12500 feet; and for every one of the other degrees of latitude, at the altitudes which are annexed to them in the following table. These results, however, he deduced by computation from a few ascertained particulars.

Degrees of N. lat.	Altitude of the line of congelation.	D egrees of N. lat.	Altitude of the line of congelation.
51°	10124	71°	4354
52	8965	72	4295
53	7806	73	4239
54	6647	74	4177
55	5617	75	4119
56	5533	76	4067
57	5439	77	4015
58	5345	78	3963
59	5251	79	3911
60	5148	80	3861
61	5068	81	3815
62	4999	82	3769
63	4910	83	3723
64	4831	84	3677
65	4752	85	3631
66	4684	86	3592
67	4616	87	3553
68	4548	88	3514
69	4480	89	3475
70	4413	90	3432

CONGENERES *musculi*, in *Anatomy*, are such muscles in an animal body, as serve together to produce the same motion; and they are so called because they assist one another in their action.

CONGER, or **CONGER EEL**, in *Ichthyology*, the largest of the *Muraena* tribe. This voracious fish grows to the length of five or six feet, and the thickness of a man's thigh. The colour of the upper part is dark grey, sometimes inclining to olive, and the belly pure white; but it is principally distinguished from the other species of the *muraena* genus by having the lower jaw rather shorter than the upper; nose with two tentacula, and the lateral line whitish, with a row of spots. See *MURENA*.

CONGERIES, a Latin word, sometimes used in our language for a collection or heap of several particles, or bodies, united into one mass or aggregate.

CONGERIES, in *Rhetoric*. See *SYNATHROISMUS*.

CONGESTION, in *Medicine*, has been used to denote an enlargement of any part of the body, especially when accompanied with hardness, or alteration of structure, which, in the opinion of the humoral pathologists, was produced by a collection of morbid humours, deposited in the part. The term is still employed, chiefly to express the morbid increase of distention in the blood-vessels in inflamed parts, or morbid effusions of blood or lymph in the viscera. Thus, a *congestion* of blood in the vessels of the brain is said to have produced apoplexy, when, on dissection, vessels which are usually invisible, are observed to be filled with red blood; and congestion is said to exist in the lungs, when the circulation of the blood through the minute ramifications of the

blood-vessels is impeded, or when lymph is poured out into the cells of the bronchæ, as in the catarrhus semis, and p^{ne}pneumonia.

CONGHEVE LAKE, in *Geography*, a Lake of Thibet, which intervenes between the Maagarvar lake, and the head of the river Sampo.

CONGLIARUM, **CONGIARI**, among *Malaïis*, a gift or d native, represented on a medal.

The word comes from the Latin *congius*; because the first presents made to the people of Rome consisted in wine and oil, which were measured out to them in congi. The congiary was properly a present made by the emperors to the people of Rome. Those made to the soldiers were not called *congiaries*, but *donatives*.

The legend on medals representing congiaries, is *congiarium*, or *liberalitas*.

Tiberius gave a congiary of three hundred pieces of money to each citizen: Caligula twice gave three hundred sesterces a head. Nero, whose congiaries are the first that we find represented on medals, gave four hundred. The congiarium of Nerva had on its reverse five figures.

CONGIO, or **CONGIO**, **CAMILLO**, in *Biography*, was a designer and engraver of considerable talents. He was born at Rome about 1604. Little is known of his life, except that he followed his profession at the place of his nativity, and at Florence. About the year 1650, he engraved several of the plates for the Galleria Justiniana. Most of the twenty plates for Tasso's Jerusalem, from the designs of B. Caselli, are by Congio, as likewise several of the engravings in the fine work entitled *Odes Barberine*. Besides the above, we have many prints by him executed in a bold and firm manner, from the designs or pictures of Tempella Larifianco, Pomerancio, and other masters, and some from his own drawings. His plates are generally marked with two C's, the top of one joined to the bottom of the other; or in this manner: C. C. F. the F. standing for fecit. Strutt. Huber, Manuel des Arts.

CONGIATELLA, in *Antiquity*, half a congius.

CONGIUM, in *Ancient Geography*, a town of Spain, placed by Ptolemy in the Tarragonensis territory; the country of the Vaccæans, supposed to be the present Cabçon.

CONGIUS, an ancient Roman measure of capacity, or for things liquid, = $\frac{1}{4}$ of a cubic Roman foot, = 8 sextaries, = 197.137 cubic English inches, = .1141 cubic English feet.

From the original standard of Vespasian extant at Rome, Graves deduced the value of the Roman pound to be 5256 Troy grains. See *DENARIUS*. But Mr. Raper, in an excellent paper on this subject, has suggested several objections against the accuracy of this conclusion. Phil. Trans. vol. lxi. part ii. p. 456.

The congius has also been used in England, as appears by a charter of king Edmund in 946.

CONGLETON, in *Geography*, a small corporate town in Cheshire, England, is situated near the upper part of the river Dane, on the borders of Staffordshire, and governed by a mayor and six aldermen. It possesses two churches, both subject to the mother church of Athbury, a village two miles distant. The town was formerly celebrated for the manufacture of tagged leather laces, called Congleton points; but the chief employment of the poor is now derived from a very capital silk mill erected on the river; and from a ribbon manufactory. In the church-yard of Athbury are two ancient stone monuments, ornamented with the insignia of Knighthood; but the families whose memory they were intended to record are now unknown. Congleton is 163 miles N.W. from London; has a market on Saturdays.

In the return under the late act the houses were estimated at 855; the inhabitants at 3861, of whom 1713 were males and 2148 females.

CONGLOBATE glands, in *Anatomy*, those glands whose substance is not divided, but firm, entire, and continued; and their surface smooth and uniform.

They are thus called, in opposition to *conglomerate glands*. Conglobate glands have each of them an artery which brings them blood, a vein which carries it back again, after the proper juice has been filtrated, and several excretory ducts.

Some of them have a cavity in the middle, with lymphatic vessels, which discharge themselves into a common reservoir, or canal.

CONGLOBATE flowers, are those with globular heads.

CONGLOMERATE glands, are those which are composed of several little ones; or they are several glandulous bodies joined together under the same common membrane. See **GLAND**.

Such are the salival glands, lachrymal glands, the pancreas, &c. which see under their proper articles.

The conglomerate glands, besides their arteries, veins, and nerves, are also furnished with an excretory vessel, ramified throughout their own substance; by means whereof they discharge the liquors they have filtrated into reservoirs.

CONGLOMERATE flowers, are those which are irregularly crowded together.

CONGLOMERATION, in *Minerology*, is the term used to express confused mixtures or concretions of different mineral substances. Kirwan's *Geol. Essays*, p. 303 and 306.

CONGLUTINATION, the act of gluing, or fastening two bodies together, by the intervention of some third, whose parts are unctuous and tenacious, in the nature of a glue, *gluten*; from whence the word is formed.

In the animal economy, the parts of the body are said to be conglutinated by means of their natural moilures; by the help of bandages, as in several cases of surgery; or by the supply of viscid particles. In which last acceptation, conglutination differs little from accretion, or nutrition.

CONG-MOU-ING, in *Geography*, a town of China, in the province of Setchuen; 42 miles N.W. of Hoi-li.

CONGO, or **KONGO**, a name given to the country of Africa, otherwise called *Lower-Guinea*, which see. It is commonly divided into Loango, Angola, Benguela, and Congo Proper.

Congo, or **Kongo**, *Proper*, a kingdom of Africa, bounded on the north by the famous river Zair or the river of Congo, which divides it from that of Loango, on that side; on the south by that of Dando, which separates it from the kingdom of Angola; on the east by the kingdoms of Fungoo and Metamba; and the burnt mountains of the sun, those of crystal or salt-petre and silver, and by the rivers Verbeia and Chilenda; and on the west by the Ethiopic sea, called the sea of Congo. Its extent from N. to S. and from E. to W. has not been accurately ascertained; but according to the relation of John Anthony Cavazzi de Monte Cuculo, a Capuchin missionary, the dominions of the kings of Congo were much extended towards the east and the south, before the introduction of the Christian religion; but since this event, many of the remote provinces in these directions have been dismembered, so that Congo was reduced from above 600 leagues in circuit to less than one-half of that extent. Being situated under the torrid zone, it is subject to the excessive heats peculiar to that climate; however, they are considerably mitigated by winds and breezes, rains and constant dews; as well as by the more equal length of days and nights. Their summer and winter, which compose their year, are divided into six sea-

sons, which they call *massanza*, *neasu*, *ecundi*, *quitombo*, *quifiso*, and *quimbangala*. The first commences with the month of October; which is the beginning of their spring, when the rains begin to fall; and they continue during the two, and sometimes the three, next months. The floods that are thus occasioned are commonly followed by a famine. Their second season begins about the end of January, which is followed by harvest and new sowing; their lands commonly yielding them two harvests. The third and fourth seasons are frequently blended towards the beginning of March, when the more gentle rains begin to fall and continue till the month of May; at which time the air is clear and dry, but occasional clouds burst forth into tremendous lightning and thunder without rain; these two seasons last till about the beginning or sometimes till the end of September. The two last seasons constitute their winter, which consists not in frost or snow, for these are unknown in this climate, but in dry blasting winds, that strip the earth and trees of their verdure, till the next *massanza*, or spring, restores their vernal bloom. The Congoes divide the year into twelve lunar months, commencing like that of the Jews, in September. Their week consists of four days; three of which are appointed for labour, and the fourth for rest or religious exercises. The general indolence of the inhabitants prevents their deriving any substantial benefit from the fertility of their soil, which duly cultivated would yield a double, and sometimes a triple, crop yearly. But the negroes, averse from labour, spend their time in dancing, leaping, hunting, and shooting, or in smocking and more listless indolence; whilst they commit to their slaves, or their wives, the operations of digging, sowing, reaping, cutting woods, grinding corn, and fetching water. Their ground produces variety of grain, but no corn or rice besides that which is cultivated by the Portuguese. Of their maize, of which they have regularly two crops, they make their bread. They have three other sorts of grain, which they apply to the same purpose. They also cultivate a variety of pulse, as beans and pease of different sorts, which serves them for part of their food. Their fruit-trees have been chiefly trees planted there by the Portuguese; and of palm-trees, which are exotic and brought from America, they have no less than eight sorts, which are all excellent in their kind. If we may credit the accounts that are given of the productions of the country, which sometimes border on the fabulous, they have a tree called *Aliconda*, so large that ten men cannot fathom it, yielding a fruit which resembles a gourd, and which serves for vessels of various uses; the bark of which furnishes them with a coarse thread, which they form into ropes and into a cloth, with which the natives cover their middle from the girdle to the knees; and the small leaves of which supply them with food in a time of scarcity, while the large ones are used for covering their houses, or by burning for the manufacture of good soap. Of the bark of the insana tree, and also of the *mulemba*, resembling in many respects our laurel, they form a kind of stuff or cloth, which is fine and used for cloaks and girdles by persons of the highest rank. The oil of their palm-trees is used instead of butter; with the moss that grows about the trunk, the rich commonly stuff their pillows; and the *Gia-gas* apply it to their wounds with good effect: with the leaves the Moors cover their houses, and they draw from these trees, by incision, a pleasant liquor like wine, which however turns sour in five or six days. From the Congo palm-tree, so called, because it thrives better in that country than any of the other sorts, they obtain a liquor, which is reckoned as valuable as the wine that is brought from Europe, though it is rather a kind of milk, sweet and agree-

ably tart, which will become four in three or four days, and is so strong and heady, that a pint of it will produce intoxication. The fruit of this tree, not unlike a peeled chestnut in colour, taste, and substance, is the common food of the poorer class. With the oil that is drawn from it the natives dress their vicinals: but the Europeans only burn it in their lamps. Of their shrubs we shall only mention that which they call capano, or "the fig of hell," from the nut of which they extract an oil for the lamp, and which they also use in the composition of their ointments and plasters. The leaves burnt to ashes, afford a good lye, with which the natives wash their bodies. The Portuguese have cultivated to plant several other fruits, as oranges, lemons, citrons, granates, cedars, and others, which thrive as well as in their native soil. Vines have also been brought thither from Candia; and they yield excellent grapes twice a year. They have also plants of the aromatic kind, which yield substitutes for cinnamon and pepper. Their manioc, of which they make bread, is the same which is used in Asia and America; their potatoes and other roots of a like kind yield a grateful nourishment. Wheat is the only grain which the ground will not produce, as it shoots up into straw and ear, the former being high enough to hide a man on horse-back and the latter being unfiled. Their grass grows to a great height, and affords sheltering places for a variety of wild and voracious beasts, and venomous insects; so that it is dangerous to travel through the country on this account. Their lilies, tulips, tuberoses, hyacinths, &c. grow wild, and are singularly beautiful.

The principal rivers of this country are the Zair, into which fall the Bancaro, Vambra, Congouo, and Barbelo or Vervel, the Dando, which see respectively. Between the Zair and Dando, are the Ichunça, Doce, Ambriz, Leze, Ouzi, and Lutana, with several others of less note.

Congo is divided into six large provinces, under the titles of duchies, counties, and marquises, and these again are subdivided into lesser signories or lordships. The situation of these provinces is as follows; along the sea coast lie the county of Sogno, and the great duchy of Bamba; on the north, the duchy of Sandi, the marquise of Pango; on the west, the duchy of Batta; and within land, the marquise of Pemba. See each respectively. The capital of the whole kingdom is Banza, or St. Salvadore, which see. Independent of the six districts above enumerated, Congo has several other lesser provinces, most of which are covered with forests or mountains, and inhabited by a race of men in a barbarous and savage state: their names, as we learn from Cavazzi, are Zuionz, Zujamazondo, Ndamba, Nfusso, Nkellajua, Alombo, Niolo, Nzanga, Marlinga, and Mor-tonda; the three last of which border upon the country of Ajacoo, a nation more barbarous than any of the rest.

The kingdom of Congo, like most other parts of Africa, breeds a prodigious variety of living creatures, both wild and tame, and particularly those of the former sort; such as elephants and lions, of a monstrous size, leopards, tigers, wolves, and other voracious animals. The zebra of this country is a beautiful animal, which the natives hunt, on account of its flesh, which they esteem a dainty food, and for its hide which they send to Europe as a valuable commodity. In this country they have also a great abundance of buffaloes and wild asses. The "Dante" seems peculiar to this country; in shape and colour it resembles an ox, but is not so large; its horns are like those of a he-goat, but very smooth and shining, and of a blackish hue, of which the natives make a variety of pretty bangles; the skin is commonly bought by the Portuguese, and sent into Germany, to be tanned and made into targets, called

"Dantes;" and of the raw hide dried, the natives make their shields, which are impenetrable to arrows and darts, and so large as to cover the whole body. Camelons swarm in Congo; and it has several sorts of wild rats, as the ningi, nssoli, and maimoni; whose furs excel those of the finest tigers, in the beauty, variety, and regularity of their streaks and spots. The forests also swarm with wild dogs, which are extremely fierce and voracious. It has also one singular quadrupel, which abides constantly in the trees, and which is said to die immediately upon letting its feet on the ground; it is called "entingia," and is very small; its skin is so beautifully spotted, that none but the kings of Congo, the princes of the blood, and such nobles as obtain the privilege from him, have the liberty of wearing it. And even the kings of Lovango, Cucongo, and Gay, receive this extraordinary fur, as a valuable present.

The tame animals of Congo, such as oxen, sheep, hogs, horses, mules, and asses, which might be rendered useful and profitable, are much neglected. The Portuguese, however, have directed their attention to the cows, sheep, and goats, chiefly on account of their milk, though they have not learned to make butter or cheese. The land and sea fowls of this country are very numerous; its ostriches are very large and beautiful; the feathers of which, mixed with those of peacocks, no less numerous and beautiful, are used, instead of ensigns and standards, and made into umbrellas. Turkeys, geese, hens, and ducks, both wild and tame, and also pheasants, pigeons, doves, woodcocks, and other smaller birds, abound in this country. Of parrots there is a great variety, distinguished both by their size and colour; the most esteemed of these are such as they denominate, by way of excellence, the birds of music, which are kept by persons of rank in cages and aviaries, for the sake of their surprising melody. Here are other birds which the superstitious natives regard with horror; the sight or cry of which throws them into a general panic, and occasions them to disperse with the utmost precipitance and confusion. The most dreaded of the ominous kind are crows, ravens, bats, owls, and especially the great owl, which they call, in their language, "kariam pempa," the name they give to the devil. Birds of prey, such as eagles, vultures, falcons of various sorts, sparrow-hawks, and others of a similar kind, are found in great numbers. Herons, bitterns, and some others of the like voracious kind, commonly abound in their marshes, lakes, and other waters. Among these they have a bird, in shape and size like a crane, and one in particular, called by the Portuguese the pelican, of a large size and whitish colour; and also another called the fisher, which darts from a surprising height in the air on the fish which he perceives in the sea or in rivers. Of fish, the sea adjoining to this country, and its rivers, afford great plenty and variety. The inhabitants are likewise infested with a great variety of serpents, very long and thick, rattle-snakes, vipers, and other venomous reptiles, scorpions, and other venomous insects, both flying and reptile, of various kinds, are found in this country. This country is said to possess mines of silver and gold, as well as of iron and copper; but the people are too indolent to work them, or to derive any great advantage from them.

When the Portuguese first discovered this country, in the reign of John II., in the year 1484, they found it for the most part covered with towns and villages, swarming with inhabitants; the cities being well filled with people, and particularly the metropolis, which contained above 50,000 persons. We may form some judgment of the population of the country by this circumstance, *viz.* that the army of the king of Congo, in the year 1665, consisted of no less than

than 900,000 fighting men; and, besides, the number of converts to Christianity, which a small number of Capuchin friars made among the more civilized part, within the space of a few years, is affirmed to have amounted to 60,000. The surprising fecundity of their women, the hardiness with which they bring up their children, and the robust healthy constitution of their men, if we may credit Cavazzi, and the missionaries, are such that their villages and hamlets swarm with men, women, and children, that a father will exchange one or two of the latter for some commodity he wants, or even some trifling bauble which he fancies; inasmuch that the number of slaves they sell abroad, both seldom, communibus annis, fall short of 15 or 16 thousand. Notwithstanding the indolence and consequent poverty of the Congoese, they entertain the most extravagant conceit both of themselves and of their country; so that it is one of the articles of their belief, that the rest of the world was the work of angels, but that their kingdom of Congo, in its full and ancient extent, was the immediate production of the Supreme Architect himself, and must of course enjoy singular advantages and prerogatives above all others; and that their monarchs must be the most opulent, wise, and powerful, and their subjects the noblest, richest, most ingenious, and happiest in the universe. They imagine also, that the natives who traffic with them are forced to undertake that servile employment by their poverty and the sterility of their respective countries, rather than induced to it by their luxury and avarice; whilst they themselves, with the utmost ease and content, can indulge their natural indolence, though attended with hunger and misery, rather than disgrace the nobleness of their blood by any kind of industry; which, however laudable and beneficial, is regarded by them as a lesser degree of slavery. However, since the settlement of the Portuguese, they have been roused by their example from this kind of fantastic pride and shameful sloth into occasional and partial exertion; in weaving nets, and other coarse stuffs, sawing of boards, several branches of carpentry, and other manufactures and trades. But though they think it beneath their dignity to apply to any useful work, they deem it no disgrace to beg and steal.

The complexion of the genuine natives, that both of the men and women, is black, but some of them are of a deeper dye than others. Since their intermarriages with the Portuguese, they have varied from their native hue; some to a dark brown, some to an olive, and others to a blackish red. Their hair is black and curled, and in some cases of a dark sandy; their eyes are generally of a fine lively black, but some are of a dark sea-colour; they have neither flat noses nor thick lips, like the Nubians and other negroes; their stature is mostly of the middle size; and, excepting their black complexion, they much resemble the Portuguese, though some of them are more fat and fleshy. In their disposition, they are generally mistrustful, jealous, envious, and treacherous, and much inclined to revenge. They are so far devoid of natural affection, that a father will sell his son or daughter, and perhaps both, for a piece of cloth, a collar or girdle of coral or beads, and often for a bottle of wine or brandy. A husband may have as many wives, or if a Christian, as many concubines, as he pleases, and repudiate, or even sell them, though with child, at his pleasure. The religion of the country, before the Portuguese introduced their Christianity into it, was, and still is, among the unconverted, a monstrous compound of idolatry and superstition, and of the most absurd and detestable rites and customs, invented by their "gansas," or priests, for the purpose of keeping the people in a state of the most abject subjection, and

cruel tyranny and wretchedness. They do, indeed, acknowledge one supreme being, called "Nzambiamponga," believed to be all-powerful, and to whom they ascribe the creation of their country; but they suppose that he has committed the care and government of all subsidiary things to a great variety of subordinate or inferior deities, appointed to preside over the air, sea, and earth; lakes and rivers, winds and storms, rain, lightning, drought, heat and cold, men, beasts, fowls, and fishes, trees, fruit, and other productions of nature, fertile and barren, healthy and sickly, &c. Hence proceeds that immense multitude of false deities, idols and altars, and that prodigious variety of gansas or priests, and superstitious rites, still found in those parts of the kingdom, where Christianity has not been introduced. These imaginary deities are represented under various forms, at the pleasure of the worshipper, either of living creatures, as serpents, crocodiles, lions, tigers, he-goats, &c. or of trees and plants of different kinds, or of statues and images, skilfully carved or painted, some of which they worship in their houses, and others in temples of mean construction. Their worship consists in genuflexions, prostrations, fumigations, and other such superstitious rites; and also, agreeably to the injunctions of the gansas, in offerings of their most valuable effects, for food, apparel, &c. from which the principal revenue of the gansas is derived, who contrive to sell the favour of these deities at the most exorbitant price. Such is the superstition of the people, and the unbounded influence of these gansas, that they will not attempt to build a house or hut without consulting some gansa, and putting the edifice under the protection of a deity; nor can the owner take possession of it without employing the gansa to make the necessary sacrifices and fumigations, and performing other ceremonies, in order to secure that protection. Even the gansas, who are the most barbarous people of this kingdom, never venture to begin their harvest till they have offered various, and even human victims to their gods, and gorged their gansas themselves with human flesh. Excepting their new moons, they have no set festivals or seasons of worship, besides those which the president of the gansas appoints, after a victory, a good harvest, &c. to whom it belongs, to appoint the attendant sacrifices and rites, to receive the offerings of the people, and to prescribe the various ceremonies which accompany them. The highest power and dignity, pertaining to the priestly tribe, are those which are vested in the "shalome" or "chalombe," whom the people reverence as a kind of deity, and to whose rank and office various privileges belong. The influence of the gansas is so extensive and so powerful, that the kings of Congo, though desirous of extirpating idolatry from their dominions, have been unable to effect it. With regard to the establishment of Christianity in the kingdom of Congo, the first preachers commissioned by the court of Portugal for this purpose, were priests and monks of the church of Rome; so that the Romish religion became the established religion of all the conquered provinces of the kingdom. But Christianity, even under that form of it, has been so much neglected, that in the greater part of these extensive dominions, nothing now remains but the mere name of Christian. It is said, indeed, that the catholics in the duchy of Sogno, are better Christians than others, as they pay a peculiar regard to the external forms of the popish worship. The princes of this province, as well as those of Lamba and Pemba, have always distinguished themselves by their zeal for the Christian religion, under that external mode of it in which they have been instructed; and they have been careful to preserve their respective governments from being corrupted by the heathenish gansas or priests;

priests; and if any such are ever found within their dominions, they are treated with a severity, which prevents their attempting to repeat their visits.

The government of Congo is monarchical and despotic. The kings are the sole proprietors of all the lands within their dominions; which they parcel out to individuals on condition of a certain tribute and of the performance of particular services. The tribute is ordered to be brought in once in three years at the furthest; and the rigorous demand of it is the cause of many cruel extortions, which often terminate in a revolt, or open rebellion. The crown is partly hereditary, and partly elective, so that no candidate can be chosen, unless he be of the royal blood; and since the introduction of Christianity, a Christian of the church of Rome. The whole process of his coronation and his mode of living after his advancement to the throne are attended with various circumstances of splendour and magnificence. Whenever he goes abroad, which is seldom the case, he is attended by a numerous guard, consisting of Ansiki (See ANSIKO), and some others of neighbouring nations in whom he reposes the greatest confidence, musicians, knights of the holy cross, (an order instituted by the first Christian king of Congo) and a number of officers, richly accoutred. The respect that is paid him approaches to idolatry. His court is numerous and brilliant; and the royal palace is spacious, grand, and commodious. His seraglio, in which he keeps a great number of concubines, though he is allowed only one wife, is a kind of prison; as the women that enter it are confined during the remainder of their lives. His lawful wife presides in the seraglio over all the other women; who ingulf themselves in the most licentious gratifications. The royal revenue consists chiefly in the tribute that is paid him by several vassal princes; free-will-offerings, in acknowledgment of the lands which are held under him; the property of all the zimbis, or cockle-shells, that constitute the current coin of this and other neighbouring kingdoms; mines of silver and gold, which, however, are much neglected; and the renewal of siefs and investiture, fines and confiscations. He has also the prerogative of levying taxes upon his subjects whenever he pleases. His standing forces are neither numerous, nor well-disciplined, and very badly armed and clothed. Their mode of fighting is tumultuous and ferocious, nor do they give any quarter. Those that are taken alive are hurried to the sea-side, or to some inland market, where they are sold for slaves to the Europeans. The funeral obsequies of the monarchs of Congo before they were converted to Christianity, consisted of various kinds of sacrifices and superstitious ceremonies, accompanied with music, howling, dancing, and feasting, which lasted a whole week, and were resumed once a year, on the anniversary of the king's demise. It was also the custom to bury alive a certain number, nor exceeding twelve, of his favourite concubines, or young ladies belonging to his court; but Christianity has abolished this inhuman custom, though it has not suppressed the drunken revels that take place on this occasion.

It is considered as a great crime and liable to punishment on conviction to shed tears even for the king. But certain persons are kept in pay to go to all the public places of the city or town, to remind the subjects of his death by the mournful sound of their ivory cornets. The princes and nobles are interred in waincoated vaults hung with black; and two of their old domestics destined alternately to guard the entrance, and to pray for the deceased. Other prayers are to be offered on the anniversary of their decease, and on All-souls day, at which times their graves are opened, and the hangings exchanged for new ones. The giagas dance

about the graves of the deceased in a frantic manner, and bring them victuals, drink, and other conveniences. The dances that are performed at the funeral of their great men last eight whole days, without intermission: and upon these occasions, they never fail sacrificing a number of human victims, the flesh of which they devour with peculiar relish. Mourners of the common class shave their whole heads, and anoint themselves with oil, upon which they rub such a quantity of earth and dust, and dried leaves, as to give them a shocking appearance. Those of higher ranks have only the upper part of their heads and bind it with a list of cloth, linen, or leather, and confine themselves to the house for eight whole days. The Congoese conceive concerning dying persons that they are just passing from a wretched life into a state of tranquillity and happiness; and therefore they think they cannot act a kinder part than to accelerate their deliverance. Among the vulgar this notion leads to the barbarous practice of stopping the mouth and nose of a dying person, and thumping upon the breast with violence, that he may the sooner pass into a state of felicity.

The Congoese have no written laws; but custom and tradition serve them instead of a code and commentaries, unless favour or bribery interpose. Every province has a chief justice for civil and criminal affairs from whom an appeal may be made to the king; and under him are inferior officers in every town and community. Three offences, *viz.* treason, murder, and sorcery, are deemed capital; and the two first are punished with decollation, and the latter by being burned alive. The punishments of lesser offences are the bastonade, hanging, fines, and imprisonment.

The traffic of the Congoese with the Europeans consists chiefly in slaves, and St. Salvadore is the principal mart of the country. The traders who reside in this place bring thither the products of Brasil, such as grain, fruit, plants, and other provisions, and the manufactures of Europe, which are usually Turkey carpets, English cloth, and other stuffs; copper and brass vessels, blue earthen ware, rings, and ornaments of gold, silver, and base metals, coral, glass beads, bugles, and other trinkets; tobacco, wine, brandy, and other spirituous liquors; light stuffs made of cotton, linen, and woollen, for cloathing; and a great variety of tools and utensils. In return they carry off a number of slaves, amounting annually to 15 or 16,000. Slaves indeed are employed at home in all their laborious occupations, and are reckoned the most valuable commodities, which a man possesses or is able to bequeath to his children or relations. Among the Congoese every kind of manufacture is in a very imperfect state. The roads through different parts indicate the inattention and indolence both of the government and the people, as they are either extremely bad in themselves or infested with banditti, and a variety of pernicious animals.

The houses of the Congoese are low, ill-built huts, thatched with straw or fern, without windows and with doors so low, that the shortest man is obliged to stoop when he enters them. They are so slightly built, as to be liable to be blown away by a gust of wind. Those, however, belonging to the Portuguese are built of brick and mortar, and generally well-furnished and adorned. The furniture of the Congoese houses consists chiefly of some few contrived instruments for agriculture, a hatchet to fell timber, a cutlass for travelling or for war, some few calabashes for containing their provisions, a pot, kettle, and ladle, a few earthen platters, and a hand-mill for grinding their corn. Their bed bedding is a large coarse sackcloth, filled with straw or leaves, with a slight covering, and perhaps a log of wood instead of a pillow. But the Portuguese have introduced

roduced among the superior classes, and particularly in the palaces of the princes and viceroys, various articles of luxury.

Polygamy was universally allowed in Congo before the introduction of Christianity; and since that period, the missionaries have in vain endeavoured to persuade the inhabitants to be contented, each of them, with one wife. Previous to marriage the person is allowed three years trial; and when this term is expired, the priest performs the ceremony, and the stipulated dowry is paid. This ceremony is preceded by a sumptuous banquet, and dancing and drinking are continued till the next morning, when the parties retire.

The musical instruments, new used by the Congoese, are such as the Portuguese have introduced; such as the trumpet, cornet, French-horn, and fife; but the common people are contented with their flutes and tabors at their weddings and other rejoicings. They have also stringed instruments, which by their rude construction seem to be natives of the country; such are their "nambi," resembling the Spanish guitar, and the "mambimba," consisting of fifteen or sixteen small calabashes, of different sizes, fastened to a flat board by strings that pass across their mouths, and which, being touched by small pieces of wood, like the sticks of our dulcimers, yield an agreeable variety of sounds. Their drums are made of a long hollow trunk of a tree, with a single skin stretched over one end of it, the other being left open; they are beat either with the fists, or by sticks of heavy wood, and are used at their festivals as well as in the army; they are called "ngambo" or "ingombo," and give but a dull heavy sound, which is raised either by that of the fife, or the "longa," which consists of two or more small bells. The dancing of the Congoese consists in a promiscuous round of men and women, all striving who shall shew the greatest agility and variety of gambols, contortions, and indecent postures.

The history of the foundation of the monarchy of Congo is uncertain and fabulous. It is ascribed to the son of a neighbouring prince, whose small territory was situate on the banks of the Zair, in the province of Corimba. The name of the young prince was Luqueni, who subdued the whole province of "Npemaassii," since called Congo, and extended his conquests from the mouth of the Zair to the city of St. Salvador. His successors, it is said, have maintained themselves on the throne ever since his time. This country was discovered by the Portuguese in the reign of king John II., who employed Diego Cam, a person of enterprise and a famous navigator, in an expedition for making discoveries on the coasts of Ethiopia. Cam, on his arrival near these coasts in the year 1484, fell insensibly upon the rapid stream of the river Zair, as he was endeavouring to double the cape Catalina; and having cast anchor at its mouth, he explored the country situated on its banks, and was well received by the inhabitants, who conducted four or five of his officers to St. Salvador. Before their return, he determined to set sail for Portugal, and took with him four of the natives. King John was so pleased with the account which he received of the country, that he ordered Cam to return with his companions as speedily as possible, and furnished him with valuable presents for the king and his court. He charged him, moreover, to exhort the monarch of Congo, in his name, to become a convert to the worship of the only true God, and to permit the Christian religion to be propagated through his dominions. Cam, in the year 1485, arrived at Congo, and was very favourably received. No time was lost in establishing an alliance between the two crowns of Portugal and Congo, which has continued to

subsist, though often suspended by intervening wars. This alliance was followed by the conversion of the king to the Christian faith. For a further account of the hereditary sovereigns of Congo, too minute in detail to be introduced into our work, and too uninteresting at this remote period for abridgment, we refer to the "Modern Universal History," vol. xvii.

Congo money, or Guinea money, a name given to a peculiar species of *concha venetis*, or porcelain shell, which passes by way of money among the natives of those places. It is distinguished from the other porcelains by having a dentated mouth, and six gibbous protuberances on its surface.

Congo Tea, in Commerce. See Tea.

CONGORLAN, a town of Persia, in the province of Irak; 75 miles N.N.E. of Amadan.

CONGOU, in Geography, a town of Persia, situated on the eastern side of the Persian Gulf. N. lat. 25°. E. long. 52°.

CONGRATULATION, denotes the immediate expression of our joy, on account of any favourable event that has occurred in any of our connections.

CONGREGATION, an assembly of several ecclesiastics, united so as to constitute a body.

The term is principally used for assemblies of cardinals, appointed by the pope, and distributed into several chambers, for the discharge of certain functions and jurisdictions, after the manner of our offices and courts. The decisions of these societies are generally sanctioned by the approbation of the Roman pontif, who has not a right, without alleging the most weighty and evident reasons, to reverse what they pronounce to be just and expedient. This form of ecclesiastical government is, without doubt, a check to the authority of the pope; and hence it is, that many things are transacted at Rome in a manner that is in direct opposition to the sentiments of its spiritual ruler. This may serve to correct a mistaken notion concerning the nature and limits of the papal hierarchy maintained by those, who pretend, that all the iniquitous proceedings of the court of Rome, the calamities it has occasioned, the contentions, rebellions, and tumults it has excited, are to be wholly laid to the charge of the Roman pontif. Hence also arises that important distinction that has been frequently employed by the French and other nations in their debates with the Roman pontif, that is, the distinction between "the pope of Rome," and "the court of Rome." The one is often loaded with the bitterest reproaches and the heaviest accusations, while the other is spared, and in some measure excused. Nor is this distinction by any means groundless; since the cardinals and congregations, whose rights and privileges are held sacred, undertake and execute many projects without the knowledge, and sometimes against the will and consent, of the Roman pontif.

The principal congregations of cardinals are these: 1. "The congregation of the Pope," instituted first by Sixtus V., to prepare the matters that were to be brought before the consistory, at which the pope is always present. Hence this is called the "consistorial congregation," and in it are treated all affairs relative to the creation of bishops and cathedral churches, the reunion or suppression of episcopal sees, the alienation of church goods, and the taxes and annates that are imposed upon all benefices in the pope's gift. The cardinal-dean presides in this assembly. 2. "The congregation of the Inquisition," or, as it is otherwise called, "of the holy office," instituted by Paul III., or, as others say, by Pius IV., and reformed by Pius VI., which takes cognizance of heresies, apostacy, magic, and profane writings.

ings, assembling thrice in the week, and every Thursday in presence of the pope, who presides in it. This congregation consists of at least 12 cardinals, with several other prelates and divines of different orders, who were called confulators of the holy office. The office of grand inquisitor, which encroached upon the prerogatives of the pontif, has been long suppressed, or rather distributed among the cardinals who belong to this congregation, and whose decisions come under the supreme cognizance of his holiness. See *INQUISITION*. 3. "The congregation for the propagation of the Roman Catholic faith," founded under the pontificate of Gregory XV., and composed, (says the translator of Moheim's *Ecl. Hist.*), of 18 cardinals, one of the secretaries of state, a protonotary, a secretary of the inquisition, and other inferior members. (See *COLLEGE de propaganda fide*).

In this congregation are carried on the deliberations which relate to the extirpation of heresy, the appointment of missionaries, &c.; this congregation has built a most beautiful and magnificent palace in one of the most agreeable situations that could be chosen at Rome, where profelytes to popery from foreign countries are lodged and maintained gratis in a manner suitable to their rank and condition, and instructed in those branches of knowledge to which their genius inclines. The prelates, vicars, and curates, who are obliged, without any fault on their own part, to abandon the places of their residence, are entertained charitably in this noble edifice, in a manner corresponding to their rank in the church. 4. "The congregation designed to explain the decisions of the council of Trent." 5. "The congregation of the Index," whose principal business is to examine MSS. and books that are designed for publication, to decide whether the people may be permitted to read them, to correct those books whose errors are not numerous, and which contain useful and salutary truths, to condemn those whose principles are heretical and pernicious, and to grant the peculiar privilege of perusing heretical books to certain persons. This congregation, which is sometimes held in the presence of the pope, but generally in the palace of the cardinal-president, has a more extensive jurisdiction than that of the inquisition, as it not only takes cognizance of those books that contain doctrines contrary to the Roman Catholic faith, but of those also that concern the duties of morality, the discipline of the church, and the interests of society. Its name is derived from the alphabetical tables, or indexes, of heretical books and authors, which have been composed by its appointment. 6. "The congregation for maintaining the rights and immunities of the clergy, and of the knights of Malta." This congregation was formed by Urban VIII., to decide the disputes and remove the difficulties and inconveniences that arose from the trials of ecclesiastics before princes, or other lay judges. 7. "The congregation relating to the Bishops and regular Clergy," instituted by Sixtus V., to decide the debates which arise between the bishops and their diocessans, and to compose the differences that happened so frequently among the Monastic orders. 8. "The congregation," appointed by Gregory XIV., for examining into the capacity and learning of the bishops. 9. "Another," for inquiring into their lives and morals. 10. "A third," for obliging them to reside in their dioceses, or to dispense with that obligation. 11. "The congregation for suppressing monasteries," i. e. such whose revenues are exhausted, and which thereby become a charge upon the public. 12. "The congregation of the Apostolic Visitation," which names the visitors who perform the duties and visitations of the churches and convents within the district of Rome, to which the pope is obliged, as archbishop of that city. 13. "The congregation of Relics,"

designed to examine the marks, and to augment the number of these instruments of superstition. 14. "The congregation of Indulgences," designed to examine the case of those who have recourse to this method of quieting the conscience. 15. "The congregation of Rites," appointed by Sixtus V., to regulate and invent the religious ceremonies that are to be observed in the worship of each new saint that is added to the kalendar. Such are the congregations of cardinals, set apart for administering the spiritual affairs of the church; and they are undoubtedly, in some respects, a check upon the power of the pontif, enormous as it may be. There are six more, which relate to the temporal government of the papal territories. In these congregations, where the pope is never present, all things are transacted which relate to the execution of public justice in civil or criminal matters, the levying of taxes, the providing of good governors for the cities and provinces, the relief of those who are unjustly oppressed by subordinate magistrates, the coinage, the care of the rivers, aqueducts, bridges, roads, churches, and public edifices.

CONGREGATION is also used for a company or society of religious cantoned out of this or that order; and making, as it were, an inferior order, or a subdivision of the order itself. Such are the congregations of the Oratory, and those of Cluny, &c. among the Benedictines.

The word is also used for assemblies of pious persons, in manner of fraternities; frequent among the Jesuits in honour of the Virgin, &c.

CONGREGATION of *Aids*, or *de Auxiliis*, was established in consequence of a dispute between the Dominicans and Jesuits. The former had long cherished a deep rooted and invincible hatred against the latter; and having a favourable opportunity of venting their indignation, exhorted their furious zeal against the doctrine of Molina, notwithstanding the pacific orders of the papal edict, issued by Clement VIII., in the year 1594. They incessantly wearied the Spanish monarch, Philip II., and the Roman pontif, Clement VIII., with their importunate clamours, till at length the latter found himself under a necessity of assembling at Rome a sort of council for the decision of this controversy. Thus commenced, about the year 1598, those famous deliberations concerning the contest of the Jesuits and Dominicans, which were held in the congregation of aids. This congregation was so denominated on account of the principal point in debate, which was the efficacy of the aids and succours of divine grace; and its consultations were directed by Lewis Madruzi, bishop of Trent, and one of the college of cardinals, who sat as president in this assembly, which was composed besides of three bishops and seven divines, chosen out of so many different orders. The history and transactions of this congregation are related and illustrated by several writers of different complexions, by Jesuits, Dominicans, and Jansenists. After all it is still a matter of doubt, which party was most favoured by the court of Rome on this occasion, the Jesuits or the Dominicans, and which of these two parties defended their cause with the greatest dexterity and success.

CONGREGATION of the *Immaculate Conception*. See *IMMACULATE*.

CONGREGATION of the *Lateran*. See *LATERAN*.

CONGREGATION of the *Lord*, in *Ecclesiastical History*, an association of reformers in Scotland, formed in the year 1557 by the earl of Argyle, his son Lord Lorne, the earl of Morton and Glencarne, Erskine of Dun, and others, who, observing the danger to which they were exposed, and desirous of propagating their principles, entered privately into a bond or association; and assumed this appellation

Iation; in contradistinction to the established church, which they denominated the congregation of Satan. Supported by the authority, which, they thought, belonged to them under the denomination they assumed, they ordained that prayer in the vulgar tongue should be used in all the parish-churches of the kingdom; and that preaching, and the interpretation of the Scriptures, should be practised in private houses, till God should move the prince to grant public preaching by faithful and true ministers. This congregation, encouraged by some favourable appearances which occurred, proceeded with alacrity in openly soliciting subscriptions to their league; and the death of Mary of England, with the accession of Elizabeth, which happened about this time, contributed to increase their hopes of ultimate success in their undertaking. They ventured to present a petition to the regent, craving a reformation in the church, and of the wicked, scandalous, and detestable lives of the prelates and ecclesiastics. They also framed a petition, which they intended to present to parliament, in which, after premising that they should not communicate with the damnable idolatry, and intolerable abuses of the papistical church, they desired that the laws against heretics should be executed by the civil magistrate alone, and that the Scripture should be the sole rule in judging of heresy. They even petitioned the convocation, and insisted, that prayers should be said in the vulgar tongue, and that bishops should be chosen with the consent of the gentry of the diocese, and priests with the consent of the parishioners. The regent prudently temporized between these parties; but after some time, she proceeded with greater rigour against the reformers, and the dispute terminated in a civil war. At length the covenant was subscribed by the reformers, who committed themselves to the guidance of John Knox. The consequence was, that the Catholic religion was suppressed, and the presbyterian discipline established. See REFORMATION.

CONGREGATION of *Mission*. See MISSION.

CONGREGATION of *Penitence*. See PENITENCE.

CONGREGATION of *Holy Sacrament*. See SACRAMENT.

CONGREGATION of *Holy Trinity*. See TRINITY.

CONGREGATION, in *Physics*, is used by Dr. Grew for the least and lowest degree of mixture; or that wherein the parts of the mixt do not conflux with, or adhere to, each other, but only touch in one point. That author declares himself of opinion, that the particles of all fluids only touch in this manner; or that their cohesion only amounts to a congregation. See FLUID.

CONGREGATION also denotes an assembly of persons in social and public worship.

CONGREGATIONALISTS. See INDEPENDENTS.

CONGRESS, CONGRESSUS, is used for an assembly of commissioners, deputies, envoys, &c. from several courts or provinces, meeting to settle terms for a general pacification or to concert measures for their common good.

The congress at the Hague, while held during the course of the war, terminated in 1697, by the treaty of Ryfwick, was composed of the envoys of all the princes in the confederacy against France.

CONGRESS, in *Modern History*, denotes that body, in which, by the constitution of the United States of America, all legislative powers are vested. It consists of a senate and house of representatives. The house of representatives is composed of members chosen every second year by the people of the several states; and the electors in each state shall have the qualifications requisite for electors of the

most numerous branch of the state legislature. No person shall be a representative under the age of 25 years, who has not been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of the state in which he shall be chosen. The number of representatives, apportioned among the several states, which may be included within this union, according to their respective numbers, to be ascertained by actual enumeration within three years after the first meeting of congress, and within every subsequent term of ten years, shall not exceed one for every thirty thousand; but each state shall have at least one representative. In case of vacancy in the representation of any state, writs shall be issued by the executive authority for filling such vacancies. The house of representatives chuse their speaker, and other officers, and have the sole power of impeachment.

The senate of the United States is composed of two senators from each state, chosen by its legislature for six years; and each senator has one vote. The senators are divided into three classes; the seats of those of the first class being vacated at the expiration of the second year; of the second class at the expiration of the fourth year; and of the third class at the expiration of the sixth year; so that one-third may be chosen every second year.

No person shall be a senator, under the age of 30 years; after being nine years a citizen of the United States, and who is not, when elected, an inhabitant of the state for which he is chosen. The vice-president of the United States is president of the Senate, but has no vote, unless the votes be equally divided. The senate chuses its other officers, and also a president pro tempore, in the absence of the vice-president, or when he shall exercise the office of president of the United States. The senate has the sole power to try all impeachments; and no person shall be convicted without the concurrence of two-thirds of the members present.

The congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall, by law, appoint a different day. Each house has its peculiar powers; but neither house, during the session of congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting. The senators and representatives shall receive a compensation for their services, ascertainable by law, and payable out of the treasury of the United States. They are, in all cases, except treason, felony, and breach of the peace, privileged from arrest during their attendance at the session of their respective houses, and in going to, and returning from, them; and for any speech or debate in either house, they are not to be questioned in any other place. No senator or representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments of which shall have been increased, during such time; and no person holding any office under the United States shall be a member of either house, during his continuance in office.

All bills for raising revenue shall originate in the house of representatives; but the senate may propose or concur with amendments, as on other bills. Every bill, which shall have passed the house of representatives, and the senate, shall, before it become a law, be presented to the president of the United States; if he approve, he shall sign it; but if not, he shall return it, with his objections, to that house in which it has originated, who, having entered the objections on their journal, shall proceed to reconsider it. If, after reconsideration, two-thirds of that house shall agree to pass

the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and, if approved by two-thirds of that house, it shall become a law. In such case the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each house, respectively. If any bill shall not be returned by the president within ten days (Sundays excepted) after it has been presented to him, the same shall be a law, as if he had signed it, unless the congress, by their adjournment, prevent its return, in which case it shall not be a law. Every order, resolution, or vote, to which the concurrence of the senate and house of representatives may be necessary, shall be subject to the same rules and limitations as are prescribed in the case of a bill.

By the constitution the congress shall have power—to lay and collect taxes, duties, imposts, and excises—to pay the debts and provide for the common defence and general welfare of the United States—to borrow money on the credit of the United States—to regulate commerce with foreign nations, among the several states, and with the Indian tribes—to establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies, throughout the United States—to coin money, regulate its value, and that of foreign coin, and to fix the standard of weights and measures—to provide for the punishment of counterfeiting the securities and current coin of the United States—to establish post offices and post-roads—to promote the progress of science and useful arts, by securing for limited times, to authors, and inventors, the exclusive right to their respective writings and discoveries—to constitute tribunals inferior to the supreme court—to define and punish piracies and felonies committed on the high seas, and offences against the law of nations—to declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water—to raise and support armies, but without appropriating money to that use for a longer term than two years—to provide and maintain a navy—to make rules for the government and regulation of the land and naval forces—to provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions—to provide for organizing, arming, and disciplining the militia, &c. reserving to the states, respectively, the appointment of the officers, and the authority of training the militia, according to the discipline prescribed by congress—to exercise exclusive legislation, in all cases whatsoever over such district, (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of congress, become the seat of the government of the United States, and to exercise like authority over all places, purchased by consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dock yards, and other needful buildings—and to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof.

The powers of congress, however, are subject to certain limitations; e. g. the privilege of the writ of habeas corpus shall not be suspended, unless the public safety requires it in cases of rebellion or invasion. No bill of attainder, or ex post facto law, shall be passed. No capitation, or other direct tax, shall be levied, unless in proportion to the census, or enumeration, herein before directed to be taken.—No tax or duty shall be laid on articles exported from any state—no preference shall be given by any regulation of commerce or revenue, to the ports of one state over those of another—

nor shall vessels bound to or from one state be obliged to enter, clear, or pay duties, in another—no money shall be drawn from the treasury, but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time. No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state. With regard to individual states it is provided, that no state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make any thing but gold and silver coin a tender in payment of debts; pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts; or grant any title of nobility. Moreover, no state shall, without the consent of the congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts, laid by any state on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the congress. No state shall, without the consent of congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another state, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay. The congress, under certain limitations, whenever two-thirds of both houses shall deem it necessary, may propose amendments to the constitution, established Sept. 17, 1787; or, on the application of the legislature of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid, to all intents and purposes, as part of the constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the congress. The senators and representatives before-mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States, and of the several states, shall be bound by oath or affirmation, to support the constitution; but no religious test shall ever be required as a qualification to any office, or public trust, under the United States. The executive power is vested by the constitution in a president of the United States of America. See PRESIDENT.

CONGRESS, in *Law*, is also used for an essay, or trial, made by appointment of a lay, or spiritual judge, in the presence of sergeants and matrons, to prove, whether or no a man be or be not impotent; in order to the dissolution of a marriage. See IMPOTENCY.

Neither the civil nor canon law make any mention of this trial of virility by congress; it had its origin in France, from the boldness of a young fellow, who, in open court, being hard pressed by his wife, demanded the congress. The judge, surprised by the novelty of the demand, found it could not be denied; as being the surest evidence the case could admit of.

In time it became a branch in the French jurisprudence, and was authorized by decrees and arrests: it obtained for about the space of one hundred and twenty years, and was annulled by an arrest of parliament in 1677, as being found precarious; some having failed under the experiment out of mere modesty and shame, which is found to have the same effect with actual impotency.

CONGREVE, WILLIAM, in *Biography*, a celebrated English dramatic writer, descended from an ancient family in Staffordshire, which traces its lineage beyond the Norman conquest. Neither the time nor the place of his birth can be ascertained with any degree of precision; according to the inscription on his monument, it was in the year 1672, and he himself declares that he owed his nativity to England; though by many of his biographers it has been asserted that he was born in Ireland. Wherever he was born, it is known that he was educated, first at Kilkenny, and afterwards at Dublin, his father having found military employment that stationed him in Ireland. After he had passed the usual preparatory studies, he was sent, at the age of sixteen, to study the law in the Middle Temple. For this genius does not appear to have been adapted; he looked, at a very early period of life, to polite literature as that by which he might be distinguished. By a feigned name he published the "Incognita, or Love and Duty reconciled," a novel, which has been characterized as sprightly in dialogue, intricate in plot, and unnatural; and Dr. Johnson says "he would rather praise than read it." As a dramatic writer, Congreve's first piece was the "Old Bachelor," written at the age of twenty, and, according to the author's own account, to amuse himself in a slow recovery from a fit of sickness; but which was regarded by Dryden, and others who were his contemporaries, as a very wonderful performance. Its success was very great; few plays have been so beneficial to the writer, for it procured him the patronage of the earl of Halifax, who was the Mæcenas of the day, and who deserves the praise of having bestowed more public patronage on the muses than they have ever received before, or perhaps since, in this country. Upon Congreve the noble lord bestowed the office of commissioner for licensing coaches; and soon after gave him a place in the pipe-office, and another in the customs of 600*l.* per annum.

If the *Old Bachelor* be nearly examined, says Dr. Johnson, "it will be found to be one of those comedies which may be made by a mind vigorous and acute, and furnished with comic characters by the perusal of other poets, without much actual commerce with mankind. The dialogue is one constant reciprocation of conceits, or clash of wit, in which nothing flows necessarily from the occasion, or is dictated by nature. The characters both of men and women are either fictitious or artificial; and the catastrophe arises from a mistake not very probably produced, by marrying a woman in a mask. Yet this gay comedy, when all these deductions are made, will still remain the work of very powerful and fertile faculties; the dialogue is quick and sparkling, the incidents such as seize the attention, and the wit so exuberant that, it 'o'er-informs its tenement."

Congreve's next play was "The Double Dealer," which was not received with equal kindness by the public, but which was honoured with the patronage of the queen, on whose death he wrote a poetical tribute to her memory; in which, says his biographer, "all is unnatural, and yet nothing is new." In the year 1695, his prolific pen produced "Love for Love," a comedy of nearer alliance to life, and exhibiting more real manners, than either of the former. This proved a very popular and profitable piece: and in the same year he published an irregular ode to king William, on the taking of Namur; which exhibited less of the powers of poetry, than of the spirit of loyalty. With the comedy of *Love for Love*, the new theatre was opened, under the direction of Betterton the tragedian; where, in 1697, was exhibited "The Mourning Bride," a tragedy, so written, as to shew that the author was sufficiently qualified for either kind of dramatic poetry.

About this time began a long and bitter controversy between Jeremy Collier and the poets. In the reign of Charles I., the puritans had raised a violent clamour against the drama, which they regarded as unfit for the encouragement of Christians. This had in a great measure subsided, when, in 1698, Collier published "A Short View of the Immorality and Profaneness of the English Stage;" in which he attacked with great justice, though perhaps with some degree of aggravation, the licentiousness of the dramatic writers, among whom Congreve was included. The poet replied, and endeavoured to palliate the alleged enormity of particular passages, though it was impossible to vindicate the general character and tendency of his pieces. Collier replied, and Congreve retired from the contest; and shortly after published his last comedy of "The Way of the World." This was reckoned the most perfect of his dramatic pieces; but it was received with so little favour on the stage, that, being in a high degree offended and disgusted, he resolved to commit his quiet and his fame no more to the caprices of an audience. From this time his life ceased to the public; he lived for himself and for his friends; and among his friends he was able to name every man of his time whom wit and elegance had raised to reputation.

Congreve continued to write copies of verse upon particular occasions, and in the year 1710, he published a collection of his plays and miscellaneous poems, dedicated to his patron lord Halifax, to whose person and party he remained attached in all fortunes. Such was the respect which Congreve inspired, as well by his private character as his genius, that in the great political change which brought the Tories into power, his places were untouched, and he was allowed to maintain a dignified neutrality, praised and complimented on both sides. On the return of his own friends to power, his emoluments were increased by the secure place of secretary to the island of Jamaica, which raised his public income to full 1200*l.* a year: yet, says Dr. Johnson, his honours were far greater than his profits. Every writer mentioned him with respect; and, among other testimonies to his merit, Steele made him the patron of his "Miscellany," and Pope inscribed to him his translation of the *Iliad*.

Indolence was the result of Congreve's affluence. He not only ceased to make any literary exertions, but seems, with a considerable degree of affectation, to have declined the character of a man of letters; and when he received a visit from Voltaire, the topic of his writings being introduced, Congreve spoke of them as trifles beneath him, and hinted that he expected to be visited only as a gentleman. Voltaire replied, that had Mr. Congreve been so unfortunate as to be a mere gentleman, he should never have been desirous of seeing him.

The latter years of his life were clouded with a considerable portion of sickness and infirmity. Cataracts in his eyes at length terminated in total blindness. The melancholy state was aggravated by the gout, for which he sought relief by a journey to Bath, but, being overturned in his chariot, he returned to his house in London, where he died, Jan. 20, 1728-9, in the sixtieth year of his age. Having lain in state in the Jerusalem chamber, he was buried in Westminster Abbey, where a monument is erected to his memory by the duchess of Marlborough; to whom, for reasons either not known, or not mentioned, he bequeathed a legacy of ten thousand pounds, in preference to the claims of kindred, at that time reduced to difficulties and distress.

It does not appear that any peculiar moral excellencies, or any remarkable talents for social intercourse, obtained for Congreve those marks of attachment and regard which

we have seen that he enjoyed. He lived in an easy independence, and, by the exercise of a polished good nature, pleased and flattered those who associated with him, and never offended any one. He stands first among the English writers of comedy: a distinction for which he is indebted, not to such a lively and humorous delineation of natural characters as delights and instructs in the scenes of Moliere, but to a continuation of wit and repartee in the dialogue, joined with originality of plot. His personages are always strongly marked and well supported. One or two of his comedies are still exhibited, and beheld with pleasure, though so little resembling the productions of the present age. His "Mourning Bride" is interesting, and its principal characters well contrasted; it maintains its place in our theatres, and has, during the present season, been represented with the highest applause. Biogr. Britan. Johnson's Lives of the English Poets.

CONGRIER *en Pouvance*, in *Geography*, a town of France, in the department of the Mayenne; $6\frac{1}{2}$ leagues S.W. of Laval.

CONGRUITY, or CONGRUENCY, in the *Schools*, a suitability or relation of agreement between things; where-by we come at the knowledge of what may be expected from them.

The system of congruity in matters of grace consists in this; that God, who knows perfectly the nature of grace, and the dispositions of the will in all the circumstances that shall befall a man, gives graces, wherewith, by virtue of their congruity with the will of a man, considered in those circumstances, man will always infallibly, but not necessarily, do what God would have him do; because the will, in the language of the congruists, does always infallibly, though voluntarily, choose what appears best.

CONGRUITY, *merit of*. See MERIT.

CONGRUITY, in *Geometry*, is applied to figures, lines, &c. which exactly correspond when laid over one another; as having the same terms, or bounds.

Those things between which there is a congruity are equal and similar.

Euclid, and by his example, most other geometricians, demonstrate all their elements from the sole principle of congruity: M. Leibnitz, and after him Wolfius, substitute the notion of similitude in lieu of that of congruity.

CONGRUITY, in a lax sense, is used to express an aptitude, in some bodies, to unite, or incorporate; by reason of some similitude or fitness of their figures: as incongruity denotes an unfitness of their surfaces for joining together. Thus, quicksilver will unite with gold, and many other metals, but will roll off from wood, stone, glass, &c.; and water, which will wet salt, and dissolve it, will slip off from tallow without adhering to it; as also from a dusty surface, and from the feathers of water fowl.

Two drops of water or of mercury, will, on contact, immediately join and coalesce; but oil of tartar, poured upon quicksilver, and spirit of wine and oil of turpentine on that, and air over all, will remain in the same vessel without any manner of union, or mixture with each other. And the cause of this phenomenon is, that the figures of some bodies will not admit other bodies near enough to be within their spheres of attraction, whence they cannot join and cohere; but where their fitness of figure will let them approach near enough to feel each others' attractive power, then they close and hold together. See COHESION.

CONG-TCHIN, in *Geography*, a town of China, of the third rank, in the province of Quang-si; 20 miles N.E. of Ping-lo.

CONGUSTUS, in *Ancient Geography*, a town of Asia, in Galatia. Ptolemy.

CONHOCTON CREEK, in *Geography*, a creek of America, in the western parts of the state of New York, in the Genesee country, which runs over a bed of gravel at the foot of the hills that surround the newly established post-town, called Bath, and, about 20 miles below this town, falls into Tyoga river. In this creek there is a considerable fall, just above the town, which affords a very fine seat for mills. Extensive saw and flour mills have already been erected upon it; the principal saw in the former of which, gave, when Mr. Weld visited the mill, 120 strokes in a minute, sufficient to cut, in the same interval of time, 7 square feet, superficial measure, of oak timber; and yet capable, when the water is high, of producing effect much more expeditiously. During floods, light bateaux may pass along the creek, Tyoga and Susquehannah rivers, from Bath to Chesapeake bay, without interruption.

CONI, a large fortified town of France, in the department of Stura, which was formerly a part of Piedmont in Italy, belonging to the king of Sardinia. It is situated on the confluence of the Gese and the Stura, 42 miles S. from Turin, 54 N.E. from Nice, and 615, or 820 kilometres, from Paris. As chief place of the department, it has a prefect, a court of justice, and several tax offices, and is the residence of the brigade-general commanding the department. The fertility of the soil of its district, equally abundant in corn and pastures, and the advantage of a canal which goes from the river Stura to the Po, and facilitates its communication with the interior parts of France, render Coni the centre of a considerable commerce. Its inhabitants amount to 16500. The population of the canton, including 16 communes, is 17,275. The whole district comprises 85 communes with 121,433 inhabitants, upon a territorial extent of 2530 kilometres.

Coni is said to have been first founded in 1520, during the pontificate of Calixtus II.; and the following account is given of its origin. The inhabitants of some villages having been grievously oppressed by their lords, who, among other enormities, pretended a privilege granted by the emperor to despoil the brides before the husbands touched them, the people, at length, attacked their lords, expelled them the country, and destroyed their castles, which had served as their protection, and left their oppressors should return with foreign aid, they left their home and founded Coni. Their number daily increasing, they formed an alliance with the city of Asti, and Luchin, duke of Milan, and became a flourishing republic, which form of government continued for some years. At length they submitted to Charles of Anjou, comte of Provence. Some time after his death, they came under Jane, queen of Naples, who was incapable of supporting the weight of government; and therefore the town of Coni, in order to ensure protection, voluntarily submitted to Amadeus VI., comte of Savoy, to whom it afterwards continued faithful. After valiantly defending itself against many successive sieges, for near three centuries, the rapid successes of the French in Piedmont, during the months of April and May in 1796, obliged the king of Sardinia to make overtures for peace, and to surrender Coni, with Alexandria, Sufa, and Tortona, into the hands of the French, as hostages of his good faith; and it afterwards became the principal place of a district, as we have already stated, in one of the six Piedmontese departments, called Stura.

CONIA, in *Botany*, the name of a genus formed by Ventenat, for the powdery byss of Linnæus and other authors.

CONIC SECTIONS.

CONIACI, in *Ancient Geography*, a people of Spain, placed by Strabo near the sources of the Ebrus, in the vicinity of the Cantabri.

CONIC SECTIONS, as the name imports, are such curves as are produced by the mutual intersection of a plane and the surface of a solid cone. The nature and properties of these figures were the subject of an extensive branch of the *Ancient Geometry*, and formed a speculation well suited to the subtle genius of the Greeks. In modern times, the conic geometry is intimately connected with every part of the higher mathematics and natural philosophy. A knowledge of those discoveries, that do the greatest honour to the last and the present centuries, cannot be attained without a familiar acquaintance with the figures that are now to engage our attention.

In this article we shall treat of the cone, and the more general properties of those figures called the conic sections; and we shall conclude with a short historical account of this branch of mathematical learning. The more particular properties of each figure will be delivered under the proper heads in the progress of our work.

We begin with premising a few lemmas, on which the theory of conic sections, we are to deliver, is founded.

LEMMAS.

Definition. If a right line, A B (*Plate II. Conic. fig. 1.*), be fo divided in the points D and E, that AD is to DB as AE is to EB; then that right line is said to be harmonically divided.

Cor. If a right line, A B, be divided in E, then it cannot be cut in D and *d*, so as to be harmonically divided both in E and D, and in E and *d*.

For, if it were possible, it is plain that AD would be to DB as A *d* to *d*B, 11. 5. E: which is absurd, 14. 5. E.

LEMMA I. *Fig. 1.*

If a right line, A B, be bisected in C, and cut in E and D, so that CA or CB is a mean proportional between CE and CD: then A B is harmonically divided in D and E.

For, because CD : CA :: CA : CE
therefore, CD + CA : CD - CA :: CA + CE : CA - CE
that is, A D : D B :: A E : E B.

Cor. If A B be bisected in C, and harmonically divided in D and E, then A C or C B is a mean proportional between C D and C E. *Cor. Def. 1.*

LEMMA II. *Fig. 2.*

If two tangents of a circle be drawn from the same point, A, then any chord of the circle, as E D, which, being produced, passes through A, and cuts the line, B C, that joins the two points of contact, in F, is harmonically divided in the points F and A.

Let O be the centre of the circle, and draw O H perpendicular to E D, and draw O B and O C to the points of contact. Because the angles at B, H, and C, are all right angles, 18. 3. E, the circle described on the diameter A O will pass through A, B, H, O, and C, 31. 3. E: therefore $A F \times F H = B F \times F C = E F \times F D$, 35. 3. E: therefore $A F \times F H + F H^2$, or $A H \times F H = E F \times F D + F H^2 =$ (because E D is bisected in H) $H D^2$, 5. 2. E. Therefore E D is harmonically divided in F and A, *LEM. 1.*

Cor. And if a chord, as E D, which, when produced, passes through A, be harmonically divided in A and F, then F is a point in the chord B C.

For, if not, then the chord, D E, could be harmonically divided at A and F, and also at A, and another point, different from F, which is absurd. *Cor. Def.*

LEMMA III. *Fig. 3 and 4.*

Let C be the centre of a circle, and let D and E be two points in a diameter, A B, and both on the same side of the centre; and let the radius of the circle be a mean proportional between C D and C E: draw M N perpendicular to A B through E; then any chord, as H K, which, being produced if necessary, passes through D, and cuts M N in F, is harmonically divided in D and F.

Draw C L perpendicular to H K from the centre C. Because $C A^2 = C D \times D E$, therefore $C A^2 - C D^2$ (or $C D^2 - C A^2$), or $A D \times D B = E C \times C D - C D^2$ (or $C D^2 - E C \times C D$), or $C D \times D E$. And because the angles at E and L are right angles, therefore $L D \times D F = C D \times D E = A D \times D B = H D \times D K$, 35. 3. E. = (because H K is bisected in L), $L K^2 - D L^2$ (or $D L^2 - L K^2$). Therefore, $L K^2 = D L^2 + L D \times D F$ (or $D L^2 - L D \times D F$) = $D L \times L F$: therefore H K is harmonically divided in D and F. *LEM. 1.*

LEMMA IV. *Fig. 5 and 6.*

The same construction being made as in the last lemma, if H K be a chord, which, when produced if necessary, passes through D; then tangents of the circle drawn from the extremities of H K will meet one another in the line M N. And if tangents of the circle be drawn from a point assumed in M N, the chord drawn through the two points of contact, being produced if necessary, will pass through the point D.

Let H K be a chord passing through D, and let tangents drawn from H and K meet in F: draw C F (cutting H K in L) to the centre of the circle, and join C E and F E. It is manifest that $F C \times C L = C K^2$, 8. 6. E. = $C D \times C E$, hyp. Therefore a circle described through D, F, and L, will pass through E, 36. 3. E; therefore the angle F E D = the angle F L D, 21. 1. E. Therefore F E is perpendicular to A B, and F is a point in M N drawn from E perpendicular to A B.

Next, let F be in M N, and let H K and A B, both produced if necessary, intersect in *d*. Because the angles F L *d* and F E *d* are right angles; therefore $F C \times C L = d C \times C E$, 36. 3. E. But $F C \times C L = C K^2 = C D \times D E$; therefore $d C \times C E = D C \times C E$; therefore the point *d*, in which H K and A B intersect, is the same as the point D.

LEMMA V. *Fig. 7.*

If the base of a triangle, A B, be bisected in D, and C G be drawn parallel to A B through the vertex; then any line, as E F, parallel to C D, and terminated by C B and C A, produced if necessary, is bisected by C G.

Draw B H K parallel to C D. Because A D = D B; therefore A C = C K, 2. 6. E. Therefore B H = H K. And, it is plain that E F, parallel to B K, is likewise bisected.

LEMMA VI. *Fig. 8 and 9.*

If A B, the base of a triangle, be harmonically divided in D and E, and the lines C D and C E be drawn; then any line, as H F, parallel to C E, and terminated by B C and C A, produced if necessary, is bisected by C D.

Draw L K parallel to C E through D.
Because A D : D B :: A E : E B.
Alternando, A D : A E :: D B : E B.
But, on account of equiangular triangles,
A D : A E :: D L : C E, 4. 6. E.
and D B : B E :: D K : C E;
therefore D L : C E :: D K : C E.

Therefore

CONIC SECTIONS.

Therefore $DL = DK$, 9. 5. E. Therefore any line parallel to LK , as FH , is bisected by CD .

Cor. If $H F$ be bisected by CD , and CE be parallel to HF , then $A B$ is harmonically divided in D and E .

For, if not, then $H F$ could be bisected by two lines drawn through C ; which is absurd.

Of the Cone and its Sections.

DEFINITIONS.

Fig. 10. I. Let $A D B$ be a circle, and V a fixed point without the plane of the circle; then, if a right line, passing continually through the point V , be carried round the whole periphery of the circle $A D B$, that right line, being extended indefinitely on the same side of V as the circle, will describe a conic surface; and, if it be likewise extended indefinitely on the other side of V , it will describe two opposite conic surfaces.

Cor. A straight line drawn from the vertex to any point in a conic surface, being produced indefinitely, is wholly in the opposite surfaces.

For a line, so drawn, will coincide with the line that generates the conic surfaces, when this line, by being carried round the circumference of the base, comes to the proposed point.

II. The solid figure, contained by the conic surface and the circle $A D B$, is called a cone. The point V is named the vertex of the cone; the line $V C$, drawn to the centre of the circle, the axis of the cone; and the circle $A D B$, the base of the cone.

III. A right cone is when the axis is perpendicular to the plane of the base; otherwise, it is a scalene, or oblique cone.

IV. A right line that meets a conic surface in one point only, and is every where else without that surface, is called a tangent.

PROP. I. *Fig. 10.*

The common intersection of a conic surface and a plane $V D E$, that passes through the vertex, and cuts the base of the cone, is a rectilinear triangle.

For the common section of the plane of the base, and the plane drawn through the vertex, (which is a right line, 3. 11. E.), will cut the periphery of the base in two points, D and E , and in these two points only; then, having drawn $D V$ and $E V$ to the vertex of the cone, these lines will be both in the conic surface (*Cor. Def. 1.*), and also in the plane surface; and there are no points, excepting in these lines indefinitely produced, which are common to both the surfaces. Therefore the figure $D V E$, which is the common intersection of the cone and a plane through the vertex, is a rectilinear triangle.

PROP. II. *Fig. 11 and 12.*

If two points, D and E , (not in the same right line with the vertex) be assumed in a conic surface, the right line that joins them falls wholly within the conic surface, and when produced both ways it falls wholly without the surface; but if the assumed points be in opposite surfaces, the right line that joins them falls without the conic surfaces, and, when produced, it falls within one conic surface on one side, and within the other conic surface on the other side.

From V , the vertex of the cone, draw the lines $V D$ and $V E$, cutting the periphery of the base in the points B and C ; then, a plane being drawn through the vertex and the points D and E , that plane will cut the base in the chord $B C$, and the common sections of the plane and the conic

surfaces are the two right lines $V B$ and $V C$ indefinitely produced, *Pr. 1.* Now the right line $D E$, which is wholly contained in this plane, can meet the lines $V B$ and $V C$ only in the points D and E . When the points D and E are in the same conic surface, then the line $D E$ is contained in the angle $B V C$ within the conic surface, and, produced both ways, it is contained in the adjacent angles $B V M$ and $C V N$ without the conic surface. On the other hand, when D and E are in opposite surfaces, $D E$ is contained in the angle $B V M$, or $C V N$, without the conic surfaces, and, being produced both ways, it is contained either in the angle $B V C$, or in the angle $M V N$, within the conic surfaces.

Cor. A right line cannot meet a conic surface in more than two points.

PROP. III. *Fig. 11.*

If a point, E , be assumed in a conic surface, and a line, $P Q$, be drawn through it, so as to be parallel to a right line, $V B$, passing through the vertex, and contained in the conic surfaces; then the right line, $P Q$, will not meet either of the opposite surfaces in another point, but it will fall within the surface, in which the assumed point E is, on the one side, and it will be wholly without both surfaces on the other side.

For if a plane be conceived to be drawn through the line $V B$ and the point E , the line $P Q$, parallel to $V B$, will be wholly in that plane, 7. 11. E.; and the common sections of the plane and the conic surfaces will be the line $V B$ and the line $V E C$ drawn through the vertex and the point E , *Pr. 1.* Now the line, $Q P$, does not meet either of the lines $V B$ or $V C$ in another point different from E . Also $Q E$, the part of the line that is contained in the angle $B V C$, is within the cone; and $P E$, the part of it that is contained in the angle $C V N$, is without both the opposite surfaces.

PROP. IV. *Fig. 12.*

If a plane be drawn through the vertex of a cone and a tangent of the conic surface $G H$, it will meet the conic surface only in the line, $V D$, drawn through the vertex of the cone and the point of contact of the tangent.

For, because the point D and the vertex V are common both to the plane surface and to the conic surface, therefore the line $V D$, indefinitely produced, is likewise common to both surfaces. And because $G H$ meets the conic surface only in the point D , and is every where else without the surface, therefore any line (different from $V D$), as $V F$, drawn in one of the conic surfaces, is contained on one side of the plane; and the same line continued in the opposite conic surface, as $V K$, is contained on the other side of the plane.

Cor. 1. Any straight line, drawn in the plane, $V G H$, so as to meet the line $V D$, is a tangent of the conic surfaces.

Cor. 2. No other plane, besides the plane $V G H$, can be drawn so as to touch the conic surfaces in the line $V D$ without cutting them.

For, $R S$ the common section of the plane $V G H$, and the plane of the base, is a tangent to the periphery of the base, *Cor. 1.* And, if there were two such planes, there would likewise be two tangents of a circle drawn through the same point of the periphery, which is absurd.

PROP. V. *Fig. 13.*

If either of two opposite conic surfaces be cut by a plane parallel to the base of the cone, the section is a circle, having its centre in the axis of the cone.

Through

Through V C, the axis of the cone, let two planes be drawn cutting the base in the lines C D and C E, and the plane parallel to the base, in the lines G H and G L, and the conic surfaces in the lines V H D and V L E; then, because the base is parallel to the cutting plane, therefore C D is parallel to G H and C E to G L, 16. 11. E. Therefore, on account of equiangular triangles, 4. 6. E.

$$DC : CV :: HG : GV$$

$$CV : CE :: GV : GL$$

$$\text{Ex æquo } DC : CE :: HG : GL$$

But $DC = CE$, therefore $HG = GL$. And in like manner it may be shewn that any right line, drawn from G to a point in the intersection of the plane, and the conic surface, is equal to G H; therefore the section is a circle.

Cor. If, through a point situated within or without a conic surface, two straight lines, both parallel to the plane of the base of the cone (that is, parallel to straight lines in that plane), be drawn to cut, or touch the conic surface: then the rectangle contained by the two segments (between the point and the conic surface), of one of the lines when it cuts, or the square of its segment when it touches the conic surface, is equal to the rectangle contained by the two segments of the other line when it cuts, or to the square of its segment when it touches the conic surface.

For a plane drawn through the two lines will be parallel to the plane of the base, 15. 16. E; and it will intersect the conic surface in the periphery of a circle: whence the corollary is manifest, 35 and 36. 3. E.

PROP. VI. Fig. 14.

If two diameters of the base of a cone, as A B and C D, intersect one another at right angles, a plane drawn through the vertex of the cone, and one of the diameters, C D, will bisect any straight line, as E F, terminated both ways by one of the conic surfaces, and parallel to the other diameter A B.

Through V and E F draw a plane cutting the conic surface in the lines V G and V K, and the plane of the base in the line G H K; because E F is parallel to A B: therefore G K is parallel both to A B and E F, 16. 11. E; and it is perpendicular to C D; therefore G K is bisected by the diameter C D, 3. 3. E. And, because G K is bisected in H, therefore E F, parallel to G K, is bisected by V H, that is, by the plane drawn through V and C D.

PROP. VII. Fig. 15. Plate III.

If a point, as B, be assumed in the plane of the base of a cone, but without the periphery of the base, and, from that point, two tangents, B P and B Q, be drawn to the base, and likewise a straight line, B V, to the vertex of the cone: then any straight line, as E F, parallel to B V, and terminated both ways by one of the conic surfaces, is bisected by a plane drawn through V, the vertex of the cone, and cutting the plane of the base in the chord P Q.

Because B V and E F are parallel to one another, therefore they are in one plane, 7. 11. E: let the plane, drawn through B V and E F, cut the conic surface in the lines V E G, and V F K; and let the same plane cut the plane of the base in the line B G K, and the plane passing through V, and the chord P Q in the line V D H. Because G K is harmonically divided in H and B, Lem. 2. therefore E F, parallel to B V, is bisected by the line V H, Lem. 6. But D, the point where V H cuts E F, is the point where the plane drawn through V and the chord P Q cuts E F: therefore E F, parallel to B V, is bisected by that plane.

PROP. VIII. Fig. 16.

Let a plane, passing through the vertex of a cone, cut the plane of the base in a diameter of the base C D: and let A B, a diameter of the base, be perpendicular to C D; and let M N be drawn through the vertex of the cone parallel to A B: then if a right line G K, in the plane C V D, and terminated by one of the conic surfaces, be bisected by a plane passing through M N, this plane will bisect all right lines terminated by one of the conic surfaces and parallel to G K.

Let the plane which bisects G K cut the plane of the base in the line P Q, and the plane C V D in the line V H O: through V draw V L parallel to G K, and let it meet C D produced in L. Because M N is parallel to A B; therefore P Q (the common section of two planes drawn through M N and A B) is parallel to M N and to A B, 16. 11. E: therefore P Q is perpendicular to C D. Because G K is bisected by V O, and is parallel to V L; therefore C D, the base of the triangle C V D, is harmonically divided in L, and O, Cor. Lem. 6. consequently, if two tangents of the base be drawn from L, the chord that joins the points of contact of these tangents will pass through O, Cor. Lem. 2; and it will be perpendicular to the diameter C D: therefore that chord will coincide with the line P Q, which is the only line that can be drawn through O perpendicular to C D. Therefore all right lines, terminated by one of the conic surfaces, and parallel to V L or G K, are bisected by the plane V P Q drawn through M N to bisect G K, Pr. 7.

If G K be parallel to C D, then C D will be bisected in O, and P Q will coincide with A B; so that this proposition, in this case of it, is the same as Prop. 6.

Cor. If a plane be drawn through M N to bisect any one right line terminated by one of the conic surfaces, and parallel to a line G K in the plane V C D, the same plane will bisect all right lines terminated by one of the conic surfaces and parallel to G K.

For, if not, then the same straight line could be bisected by two planes both passing through M N, which is absurd.

PROP. IX. Fig. 17.

Let a plane, passing through the vertex of a cone, cut the plane of the base in a line C D, not passing through E the centre of the base: draw the diameter, A F B, perpendicular to C D, and produce it to M; so that E M may be a third proportional to E F and E B the radius of the base of the cone, and draw M V N through the vertex: then if a right line G K, in the plane C V D, and terminated by one of the conic surfaces, be bisected by a plane passing through M N, this plane will bisect all right lines terminated by one of the conic surfaces and parallel to G K.

Let the plane which bisects G K cut the plane of the base in the line P Q M, and the plane C V D in the line V H O: through V draw V I, parallel to G K, and let it cut C D produced in L. Because V O bisects G K, and V I is parallel to G K, therefore C D, the base of the triangle C V D, is harmonically divided in O and L, Cor. Lem. 6; therefore if two tangents of the base be drawn from L, the chord that joins the points of contact of these tangents will pass through the point O, Cor. Lem. 2; but the same chord, being produced, likewise passes through the point M, Lem. 4: therefore that chord will coincide with P Q, which is the only right line that can pass through both the points O and M, therefore all right lines terminated by one of the conic surfaces and parallel to V I, or G K, are bisected by the plane V P Q drawn through M N to bisect G K, Pr. 7.

Cor.

Cor. If a plane be drawn through MN to bisect any one right line, terminated by a conic surface, and parallel to a line GK, in the plane VCD, or parallel to the plane VCD, that plane will bisect all right lines terminated by a conic surface, and parallel to GK.

For, if not, then the same right line could be bisected by two planes, both passing through MN; which is absurd.

PROP. X. *Fig.* 18.

Let a plane, passing through the vertex of a cone, cut the plane of the base in a line CD, which neither cuts nor touches the periphery of the base: draw ABF, through E, the centre of the base, perpendicular to CD, and take EM, a third proportional to EF, and the radius of the base of the cone; and draw MV through the vertex: then if a right line GK, parallel to the plane CVD, and terminated by one of the conic surfaces, be bisected by a plane passing through MV, this plane will bisect all right lines terminated by one of the conic surfaces, and parallel to GK. But the point H, in which the plane, that bisects GK, cuts GK, must not be in the same right line with the point M, and the vertex of the cone.

Let the plane which bisects GK, cut the plane of the base in the line PQ, draw VL parallel to GK; and because GK is parallel to the plane CVD, therefore VL parallel to GK, is in the plane CVD, and it will cut the plane of the base in L, a point of the line CD. And, because GK is parallel to VL, therefore they are contained in one plane, 7. 11. E. Let this plane be drawn, and let it cut the conic surface in VR and VS, the plane of the base in LRS, and the plane VPO, in VO. Because GK is parallel to VL, and it is bisected by VO, therefore SR, the base of the triangle SVR, is harmonically divided in O and L, *Cor. Lem.* 6.; therefore, if two tangents of the base be drawn from L, the chord that joins the points of these tangents will pass through the point O, *Cor. Lem.* 2.; but, because L is a point in CD, the same chord will pass through M, *Lem.* 4.; and, because the point O does not fall upon M, therefore the chord will coincide with PQ, which is the only line that can pass both through O and M. Therefore, all right lines, terminated both ways by one of the conic surfaces, and parallel to VL, or GK, are bisected by the plane, VPQ, *Pr.* 7.

PROP. XI. *Fig.* 19.

Let a plane touching a conic surface cut the plane of the base in a line, CD, which touches the periphery of the base in P; then, if a right line, GK, terminated by one of the conic surfaces, and parallel to the touching plane, VCD, be bisected by a plane drawn through V; this plane will bisect all right lines parallel to GK, and terminated by one of the conic surfaces.

Through V draw VL parallel to GK: because GK is parallel to the plane VCD, therefore, VL, parallel to GK, is in the plane VCD, and it will cut the plane of the base in L, a point in CD. And, because VL is parallel to GK, therefore they are contained in one plane, 7. 11. E.; let this plane be drawn, and let it cut the conic surface in the lines VM and VN, the plane of the base in the line LMN, and the plane VQP, in the line VO. Because GK is parallel to VL, and it is bisected by VO, therefore, MN, the base of the triangle VMN, is harmonically divided in O and L, *Cor. Lem.* 6. Therefore, if two tangents of the base be drawn from L, the chord that joins the two points of contact of these tangents will pass through the point O, *Cor. Lem.* 2.; but the same chord likewise passes through Q, which is one of the points of

contact of tangents drawn from L; therefore, the chord coincides with the line QP. Therefore the plane VQP, bisects all right lines terminated by one of the conic surfaces, and parallel to VL, or GK, *Pr.* 7.

Fig. 20. 1st. 22, 23. If a cone be cut by a plane PQ, which neither passes through the vertex, nor is parallel to the base, then, a plane, as VMN, being drawn through the vertex parallel to the cutting plane, it will necessarily meet the plane of the base of the cone. The line of common section of the parallel plane, and the base of the cone MN, may have one or other of three different positions; viz.

Fig. 20. 1st. It may be without the base of the cone.

Fig. 21. 2dly. It may touch the periphery of the base of the cone.

Fig. 22. and 23. 3dly. It may cut the periphery of the base of the cone.

These three different cases offer three sections for our consideration that are very different from one another, and possess many properties that are peculiar to each, while they have many that are common to all the three.

Def. V. If the line of common section, MN, (*fig.* 20.), be without the base of the cone, then the plane VMN, drawn through the vertex, will be entirely between the two conic surfaces, not meeting either of them. In this case, the cutting plane PQ, will meet every line drawn from the vertex in one of the conic surfaces, and the curve line of common section will surround that conic surface, and will completely enclose a space. In this position of the cutting plane, the conic section is called an ellipse.

Def. VI. If the line of common section MN, (*fig.* 21.) touch the periphery of the base, then the plane drawn through the vertex will touch the conic surfaces, *Pr.* 4. And the opposite surfaces will be on different sides of it. In this case also the cutting plane will meet every line drawn from the vertex in one of the conic surfaces, excepting only the line of contact, VB, in which the touching plane meets that conic surface: and as the cutting plane is indefinitely extended along the touching plane without meeting it, it is obvious that the curve line formed by the common section of the cutting plane and the conic surface does not return into itself so as to enclose a space, but it is open on the side opposite to the vertex of the cone. In this position of the cutting plane, the conic section is called a parabola.

Def. VII. If the line of common section MN (*fig.* 22 & 23.) cut the periphery of the base, then the plane drawn through the vertex will divide each of the opposite conic surfaces into two parts lying on opposite sides of it. In this case the cutting plane being indefinitely extended will meet every line drawn from the vertex in those parts of the two conic surfaces that lie on the same side of the plane, through the vertex, as the cutting plane itself; and thus two curve lines will be formed by the common intersection, of the cutting plane, and the two opposite conic surfaces. It is obvious that these curve lines may be indefinitely extended, and that they do not return into themselves so as to enclose a space. In this position of the cutting plane the conic section, formed by its intersection with one of the conic surfaces is called a hyperbola; and the two conic sections formed by its intersections with the two opposite conic surfaces, are called opposite hyperbolas, or opposite sections.

Def. VIII. The nature of the several conic sections defined in the three last definitions depends entirely, as we have seen, on the relative position that the line of common section of the plane of the base and the plane drawn through the vertex parallel to the cutting plane, has in respect to the cir-

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cle that forms the base of the cone. As there will be frequent occasion to refer to this line, in the following theory of the conic sections, it will be requisite, for the sake of abridging language, to distinguish it by a peculiar name. For this purpose we shall call it the *determining line*.

Def. IX. Let a plane, as PQ , (*fig. 20* and *22*.) cut a conic surface, or opposite surfaces; and let MN be the *determining line*, or the common section, of the plane of the base and the plane drawn through the vertex parallel to the plane PQ ; from C , the centre of the base of the cone, draw CD perpendicular to MN , and take CE a third proportional to CD and CA or CB , the radius of the base: then, a line being drawn from the vertex V to the point E , it will meet the plane PQ in a point G , which is called the centre of the conic section, or opposite sections, formed by the common intersection of the plane PQ , and the conic surface, or opposite surfaces.

But, if the *determining line* MN (*fig. 23*.) cut the base of the cone, and pass through its centre, then, the diameter AB being perpendicular to MN , and VG being drawn through the vertex parallel to AB ; VG will meet the plane PQ in a point G , which, in this case, is the centre of the opposite sections.

Fig. 20, 22, 23. Cor. 1. The centre of an ellipse is a point within the figure; but the centre of two opposite hyperbolas is a point without both hyperbolas, and situated between them.

For, when the line MN is without the base of the cone, the point E and the line VE are within the conic surface; but, when MN cuts the base, then E and VE are without both of the two conic surfaces and between them.

Cor. 2. A parabola has no centre.

Fig. 21. For, in this case, the points E and D coincide with the point B , where MN touches the periphery of the base; and the line VE coincides with the line VB which does not meet the cutting plane PQ .

Cor. 3. The centre of a conic section is never in the axis of the cone, unless when the cutting plane is parallel to the base of the cone.

Def. X. A right line drawn in the plane of a conic section so as to meet the curve of the section in one point only, and which, being produced both ways, is contained on one and the same side of the section, is called a tangent of the section.

Cor. 1. A tangent of a conic section is a tangent of the conic surface.

For it can meet the conic surface only in the point in which it meets the section.

Cor. 2. There cannot be more than one tangent of a conic section at the same point of the curve.

For if there were two tangents, then two planes drawn through them and the vertex of the cone would meet the conic surface in the same right line without cutting the conic surface, which is absurd. *Cor. 2. Pr. 4*

PROP. XII.

A right line, drawn in the plane of a conic section, cannot meet the curve in more than two points.

For such a line does not meet the conic surface in more than two points. *Cor. 2.*

PROP. XIII.

A right line drawn through a point in a conic section, in the same plane with it, and parallel to a line drawn from the vertex in the conic surface, does not meet the curve of the conic section again in another point.

For it does not meet the conic surface in another point, Vol. IX.

Pr. 3. Thus, in the parabola, if PQ be drawn parallel to VB , (*fig. 21*.), then PQ meets the curve only in the point P .

PROP. XIV. *Fig. 24, 25, and 26. Plate IV.*

Every straight line, as FH , drawn through G , the centre of an ellipse, or opposite hyperbolas, and terminated both ways by the curve, or opposite curves, is bisected in the centre.

I. When the *determining line* MN , (*fig. 24* and *25*), does not pass through the centre of the base. Through V , the vertex of the cone, and the line FH , draw a plane cutting the conic surface in the lines VHL and VFK , and the plane of the base in the line LKM , and the plane VMN in the line VM . Because the point G is in the line VE ; therefore, the line LKM will pass through the point E . And because FH and VM are the common sections of the plane VKL , and two parallel planes (*viz.* the plane of the section and the plane VMN), therefore FH is parallel to VM , *16. 11. E.* And, because CB or CA , the radius of the base of the cone, is a mean proportional between CD and CE , and MN is perpendicular to AB ; therefore, the chord KL is harmonically divided in E and M , *LEM. 3.* And because LK is the base of the triangle KVL , and FH is parallel to VM , therefore, FH is bisected by VE , *LEM. 6.*: that is, $FG = GH$.

In the ellipse, when FH (*fig. 20*.) is parallel to MN , it will be perpendicular to a diameter of the base drawn perpendicular to the diameter AB ; therefore, it is bisected by the plane VAB , which cuts it in G , *Pr. 6.*

II. When the *determining line*, (*fig. 26*.) pass through the centre of the base. In this case, VG is parallel to the diameter AB . *Def. IX.* And LK , the common section of the plane of the base, and the plane VQK (drawn through V , and the line FGH), is parallel both to AB and to VG , *7. 11. E.* But the diameter MN is perpendicular to the diameter AB ; therefore, it is also perpendicular to LK , and it bisects LK , *3. 3. E.* And because FH and VM are the common sections of two parallel planes (*viz.* the plane of the conic section, and the plane VMN), therefore FH is parallel to VM . And because VM bisects the base of the triangle KVL , and VG is parallel to that base, therefore VG bisects FH parallel to VM . *LEM. 5.*

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XI. A straight line drawn through the centre of an ellipse, or opposite hyperbolas, and terminated both ways by the curve or opposite curves, is called a diameter of the ellipse, and a transverse diameter of the opposite hyperbolas.

XII. A straight line in the plane of a parabola, as PQ , (*fig. 21*.) drawn parallel to the right line VB , in the conic surface (which passes through the vertex of the cone, and the point in which the *determining line* touches the periphery of the base), is called a diameter of the parabola.

Cor. All the diameters of a parabola are parallel to one another.

XIII. A vertex of a diameter is a point where the diameter meets the curve of the conic section.

Cor. A diameter of a parabola has only one vertex, Pr. 13.

XIV. A straight line (which is not a diameter of an ellipse), terminated both ways by the curve of a conic section, and bisected by a diameter of the section, is said to be ordinately applied to that diameter; or it is called a double ordinate;

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ordinate; and the half of it, an ordinate of the diameter.

PROP. XV. *Fig.* 24, 25, and 26.

If a straight line be ordinately applied to a diameter of an ellipse, or a parabola, or to a transverse diameter of a hyperbola, then all right lines parallel to it and terminated both ways by the same curve, or by the opposite curve, are ordinately applied to the same diameter.

Let RST (*fig.* 24 and 25.) be ordinately applied to FH, a diameter of an ellipse or a parabola, or a transverse diameter of a hyperbola or opposite hyperbolas: then all other right lines, as PQ, parallel to RT, and terminated by the same curve, or the opposite curve, are ordinately applied to the same diameter FH. Draw a plane through V, the vertex of the cone, and the diameter FH. Then, in the case of the ellipse and hyperbola, when the *determining line* does not pass through the centre of the base, this plane will necessarily pass through the line VE. And, because the plane of the conic section is parallel to the plane VMN, therefore RT, in the former plane, is parallel to the latter plane. And because the plane drawn through V, and the diameter FH, passes through VE, and bisects RT, which it cuts in S, a point not in the same right line with V and E; therefore, the same plane will bisect all right lines in either of the opposite cones that are parallel to RT. *Pr.* 10. and *Cor.* 9. Therefore, the diameter FH in that plane will bisect all the right lines which it meets, that are parallel to RT, and terminated by the section, or either of the opposite sections.

And, when the *determining line* passes through the centre of the base (*fig.* 26), then, as before, RT is parallel to the plane VMN. And the diameter AB is perpendicular to the diameter MN, and GV is parallel to AB, *Def.* IX; therefore, the plane drawn through VG and FH, which bisects RT, will bisect all right lines in either of the opposite cones that are parallel to RT, *Pr.* 8. Therefore, FH in that plane will bisect all the right lines which it meets that are parallel to RT, and terminated by either of the opposite hyperbolas.

In the parabola, because the plane of the section is parallel to the plane VMN; therefore, RT, (*fig.* 27.) in the former plane, is parallel to the latter plane. And because VB is parallel to FH, therefore a plane may be drawn through them both; let this plane be drawn, and it will bisect all right lines in either of the opposite cones that are parallel to RT, *Pr.* 11. Therefore, FH, in that plane, will bisect all the right lines which it meets, that are parallel to RT, and terminated by the curve of the parabola.

PROP. XVI. *Fig.* 28.

A right line, drawn from a vertex of a diameter of an ellipse, or a parabola, or from the vertex of a transverse diameter of a hyperbola, so as to be parallel to a line ordinately applied to that diameter, is a tangent of the curve.

Fig. 28. Let FH be a diameter of an ellipse or a parabola, or a transverse diameter of a hyperbola, and RST, a line ordinately applied to that diameter; then FM, drawn from a vertex of the diameter, so as to be parallel to RT, is a tangent of the curve. For, if FM be not a tangent, it will cut the section again in another point (*Cor.* 2. *Def.* X), let it cut the section again in K, and bisect FK in I. Then, if a diameter of the section be drawn through I, FK will be ordinately applied to that diameter, *Def.* XIV; therefore that diameter would bisect RT parallel to FK, *Pr.* 15. Therefore RT would be bisected by two different diameters; *viz.* by the diameter FH, and by that

drawn through I. But, in the ellipse and hyperbola, all the diameters pass through the centre; and, in the parabola, they are all parallel to one another; therefore two diameters of a conic section will cut every straight line (which does not pass through the centre of the ellipse and hyperbola) in two different points. Therefore RT cannot be bisected by two different diameters. Therefore FM, parallel to RT, does not cut the curve again; that is, FM is a tangent of the conic section.

Cor. 1. If RT be ordinately applied to the diameter FH, it is parallel to a tangent, FM, at a vertex of that diameter.

For there cannot be two tangents of a conic section at the same point of the curve.

Cor. 2. All right lines ordinately applied to the same diameter of a conic section are parallel to one another.

For they are all parallel to a tangent at a vertex of that diameter.

PROP. XVII. *Fig.* 24 and 27.

A diameter of a conic section being given, to draw a right line that shall be ordinately applied to that diameter.

Fig. 24. Let FH be a diameter of an ellipse; draw a plane through the vertex V, and the diameter FH, cutting the plane of the base in the chord KL, which necessarily passes through the point E; draw tangents of the base from K and L, and let them intersect in O. Then O is a point in the *determining line* MN; *LEM.* 4; and VO being drawn to the vertex of the cone, it is in the plane VMN, and parallel to the plane of the ellipse. Now, all straight lines, as PQ and RT, in the plane of the ellipse, drawn parallel to VO, are ordinately applied to the diameter FH; for these lines are all bisected by the plane VKL, that is, by FH in that plane, *Pr.* 7.

The construction is exactly the same for the hyperbola.

Fig. 27. In the parabola the plane drawn through the diameter FH, passes through VB, parallel to FH, and it cuts the plane of the base in a chord BK, drawn from the point where the *determining line* MN, touches the periphery of the base; in this case draw KO, a tangent of the base, intersecting MN in O; then, as before, VO, drawn to the vertex, is parallel to the plane of the parabola; and all right lines, as RT, PQ, in that plane, parallel to VO, are ordinately applied to the diameter FH, *Pr.* 7.

Fig. 20, 21, 22, and 23. In all the conic sections, when the plane drawn through the vertex of the cone, and a diameter PQ, cuts the plane of the base in a diameter of the base AB; then all right lines, as RT, in the plane of the section, drawn parallel to the *determining line* MN, are ordinately applied to the diameter PQ. For, if a diameter of the base be drawn parallel to MN, that diameter will be parallel to RT, and perpendicular to the diameter AB; therefore RT is bisected by the plane VAB, that is, by PQ, the diameter of the section in that plane, *Pr.* 6.

PROP. XVIII.

Tangents drawn from the vertices, of a diameter of an ellipse, or of a transverse diameter of a hyperbola, are parallel to one another; but tangents of a conic section, drawn from the vertices of two different diameters, are not parallel.

Let a right line be ordinately applied, to a diameter of an ellipse, or to a transverse diameter of a hyperbola, *Pr.* 17; then the tangent of the curve at either vertex of the diameter is parallel to that right line; consequently, the two tangents at the extremities of the diameter are parallel to one another.

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And because a right line ordinarily applied to one diameter of a conic section is not ordinarily applied to another diameter; therefore a tangent at a vertex of one diameter is not parallel to a tangent at a vertex of another diameter.

Cor. If there be two parallel tangents of an ellipse, or of opposite hyperbolas; these tangents are drawn from the extremities of a diameter of the ellipse, or of a transverse diameter of the hyperbolas.

PROP. XIX. Fig. 28.

A straight line terminated both ways by the curve of a conic section, and parallel to a tangent, is ordinarily applied to the diameter drawn through the point of contact.

Let RT , terminated by the curve of a conic section, be parallel to a tangent of the curve FM ; then RT is ordinarily applied to the diameter FH , drawn through the point of contact. Draw PQ ordinarily applied to FH , *Pr.* 17. Then PQ is parallel to the tangent FM , *Cor.* 1, *Pr.* 16; therefore PQ is also parallel to RT . Consequently, RT is ordinarily applied to FH , *Pr.* 15.

PROP. XX. Fig. 29.

A straight line GT , drawn from the centre of opposite hyperbolas so as to be parallel to FO and HI lines touching the curves at the vertices of a transverse diameter FH , bisects all lines, as RS , terminated by the opposite hyperbolas and parallel to the transverse diameter: and if a transverse diameter, FH , be drawn parallel to a straight line, as RS , terminated by opposite hyperbolas, and bisected by a line GT drawn through the centre, this line is parallel to FO and HI the tangents at the vertices of the transverse diameter.

Draw the diameter RP , join S , P , and produce FH to cut SP in Q . Because RS is parallel to FH , and $RG = GP$; therefore $SQ = QP$: therefore SP is parallel to HI or FO , *Cor.* 1, *Pr.* 16. But GT is parallel to FO or HI : therefore GT is parallel to SP . Therefore it is manifest that GT bisects RS , 2. 6. E.

Again, if GT bisect RS , then is GT parallel to HI or FO ; for, because $RT = TS$, and $RG = GP$, therefore GT is parallel to SP , 2. 6. E. And because FH is parallel to RS , therefore $SQ = QP$, 2. 6. E.: therefore SP is parallel to HI , *Cor.* 1, *Pr.* 16. Therefore GT is parallel to HI or FO .

Def. XV. Let the determining line MN (*fig.* 30.) of two opposite hyperbolas cut the periphery of the base of the cone in M and N , and let tangents of the base be drawn from these points (which tangents will pass through the point E when MN does not pass through the centre of the base of the cone, *LEM.* 4; but they will both be parallel to the diameter AB and to the line VG , when MN does pass through the centre): through the line VG , and the two tangents PM and QN , let two planes be drawn cutting the plane of the hyperbolas in the lines GP and GQ , intersecting in the centre of the hyperbolas: then these lines are called asymptotes of the hyperbolas.

Cor. 1. The asymptotes do not meet the hyperbolas.

For the planes VPM and VQN meet the conic surfaces only in the lines VM and VN produced, *Pr.* 4.: therefore the lines GP and GQ , in those planes, are without the conic surfaces in which the hyperbolas are.

Cor. 2. The asymptotes GP and GQ are parallel to VM and VN , the lines in which the planes VMP and VNQ touch the conic surfaces.

For the plane VMP cuts the plane of the hyperbolas and the plane VMN (which are parallel planes) in the

lines GP and VM ; and the plane VNQ cuts the same planes in the lines GQ and VN .

Cor. 3. If a line be drawn parallel to one of the asymptotes through a point in one of the hyperbolas, that line does not meet the same hyperbola, nor the opposite one, again in another point.

For a line parallel to one of the asymptotes is parallel to one of the lines VM and VN in the conic surface; therefore it does not meet either of the conic surfaces again in another point, *Pr.* 3.

Cor. 4. A straight line in the plane of the hyperbolas, as FH , drawn through the centre of the hyperbolas within the angle contained by the asymptotes, will meet both the hyperbolas.

Because the asymptotes are parallel to VM and VN , therefore, if VO be drawn parallel to FH , it will be within the angle MVN ; and it is plain that FH , parallel to VO , meets both the conic surfaces.

LEMMA VII. Fig. 31.

Let AB and AC be two right lines that meet one another: then if BC , drawn through D , and terminated by AB and AC , be bisected in D , no other straight line, terminated by AB and AC , and drawn through D , will be bisected in that point.

Draw GH through D , and DE parallel to AC ; because $BD = DC$, therefore $AE = EB$, 2. 6. E. Therefore AE and EG are not equal to one another: and, consequently, GD and DH are not equal.

PROP. XXI. Fig. 30.

If a straight line, terminated by the asymptotes, as KL or ST , touch either of the hyperbolas, it is bisected in the point of contact: and if the middle point of a straight line, as KL or ST , terminated by the asymptotes be in either of the hyperbolas, that line is a tangent of the curve. Draw the diameter FH and let ab be ordinarily applied to it, *Pr.* 17: also draw de , between MV and VN , parallel to ab . Conceive a plane to be drawn through VG and FH , and let this plane cut the plane MVN in the line VO . It is manifest that VO is parallel to the diameter FH , 16. 11. E. And because a plane drawn through VG bisects ab , the same plane will bisect all right lines in either of the opposite cones that are parallel to ab , *Cor.* 9; therefore it will bisect de ; that is, $do = oe$. Because KL is a tangent, it is parallel to ab , *Cor.* 1, *Pr.* 16, and, consequently, to de . And because the asymptotes are parallel to VM and VN , *Cor.* 2. *Def.* XV., and FH is parallel to VO , and de to KL , it is plain that KL and de are similarly divided in H and O : therefore $KH = HL$.

Again, if KL meets the hyperbola in H , and is bisected there, it is a tangent. For, if not, then, a line being drawn between the asymptotes to touch the hyperbola in H , it would likewise be bisected in H as has already been shewn: which is absurd. *LEM.* 7. Therefore KL is a tangent.

PROP. XXII. Fig. 32. Plate V.

If a right line, that cuts an hyperbola or opposite hyperbolas, likewise cuts both the asymptotes; the segments between the hyperbola, or hyperbolas, and the asymptotes, will be equal.

Let the right line DE cut an hyperbola in S and P , and the asymptotes in D and E : draw the transverse diameter FH to bisect SP , and let KL be drawn to touch the hyperbola in H : because FH bisects SP , therefore SP is parallel to the tangent KL , *Cor.* 1, *Pr.* 16, but KL is bisected

in H, *Pr.* 21.; therefore D E, parallel to K L, is bisected in Q; and because D E and S P are both bisected in Q, therefore D S and S E are respectively equal to S P and P D.

Next let S R cut the two opposite hyperbolas in S and R; and the asymptotes in N and I: draw G T through the centre to bisect S R; and draw the transverse diameter F H parallel to S R; and let K L touch one of the hyperbolas at H, and draw K M parallel to S R: because G T bisects S R parallel to F H, therefore G T is parallel to K L, *Pr.* 20: because K M and F H are both parallel to S R, therefore they are parallel to one another: but K L is bisected at H, *Pr.* 21, therefore L M is bisected at G, and K M is bisected at O, 2. 6. E; therefore N I, parallel to K M, is bisected at T. And, because S R and N I are both bisected at T, therefore the segments S N and N R are respectively equal to the segments R I and I S.

PROP. XXIII. *Fig.* 32.

The curve of an hyperbola approaches the nearer to the asymptote the farther it is continued; and, if continued far enough, the distance of the curve from the asymptote will become less than any assigned distance how small soever.

Assume any point, as A in the hyperbola, and draw A X parallel to the asymptote G C; then A X does not meet the hyperbola again, *Cor.* 3. *Def.* XV: through A draw any line B C to a point, as Z, in the curve, and let B C meet the asymptotes in B and C, and draw B X perpendicular to A X, and Z Y perpendicular to the asymptote G C: because A B = Z C, *Pr.* 21, it is plain that B X = Z Y: now the more distant the point Z is, the nearer is the line A B to the line A X, and the less is B X, or Z Y the distance of the curve from the asymptote. And because A B may be drawn so as to make B X less than any assigned line, therefore a point of the curve may be found that shall be nearer to the asymptote than any assigned distance.

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Fig. 30. *Plate* IV. XVI. If a straight line be drawn through the centre of opposite hyperbolas parallel to the tangents S T and K L at the vertices of a transverse diameter F H, and a part of that line bisected in the centre, as I R, be taken equal to the segments S T and K L (it is plain that S T = K L) of the tangents terminated by the asymptotes; then I R is called a second diameter of the hyperbolas, and the extremities of it are called the vertices of the second diameter.

But the word diameter is often used to signify a straight line drawn through the centre of an ellipse or opposite hyperbolas, without regard to the magnitude of such line.

XVII. A straight line, terminated by two opposite hyperbolas and bisected by a second diameter, is said to be ordinately applied to that diameter; or it is called a double ordinate, and the half of it, an ordinate.

XVIII. Two diameters of an ellipse, or of opposite hyperbolas, that are mutually parallel to the ordinates of one another, are called conjugate diameters, or they are said to be conjugate to one another.

PROP. XXIV.

If a diameter of an ellipse, or of opposite hyperbolas, be parallel to the ordinates of another diameter, these two are conjugate diameters.

The demonstration of this proposition, in the case of the hyperbola, is manifest from *Prop.* 20th; for the ordinates

of a transverse diameter of a hyperbola are parallel to a tangent at a vertex of the diameter, *Cor.* 1. *Pr.* 16.

Fig. 33. *Plate* V. In the ellipse, let the diameter E D be parallel to P Q S an ordinate of the diameter F H; draw the diameter P R and join S R cutting E D in T. Because P Q = Q S, and P G = G R; therefore S R is parallel to F H. And because E D is parallel to P Q S, and P G = G R; therefore R T = T S. Therefore R S is an ordinate of the diameter E D. *Def.* XIV, and it is parallel to F H; therefore E D and F H are conjugate diameters, *Def.* XVIII.

Cor. If a diameter of an ellipse, as E D, be parallel to F O, a tangent at a vertex of another diameter F H; then F H is parallel to D I, a tangent at a vertex of E D.

For a tangent at a vertex of a diameter is parallel to the ordinates of that diameter.

Def. XIX. When a straight line drawn through a point, situated within or without a cone, meets one, or both, of the conic surfaces in two points, it is called a secant; and the two parts of such a line, between the point through which it is drawn and the conic surface or surfaces, are called the segments of the secant. And when a line, drawn from a point without a cone, touches one of the conic surfaces; that part of it between the point from which it is drawn and the conic surface is denoted by the word tangent in the following propositions.

PROP. XXV. *Fig.* 34, 35, and 36.

If a straight line be drawn from the vertex of a cone to a point, as B, in the plane of the base, but not in the periphery of the base; and, through any point, as P, situated without or within the cone, another straight line, parallel to the former, be drawn to cut or touch the conic surface, or opposite surfaces; then the square of the line drawn from the vertex of the cone to the point B is to the rectangle under the segments of the secant, or to the square of the tangent, drawn from the point P, as the rectangle under the segments of any line drawn from B to cut the base of the cone, is to the rectangle under the segments of any line, parallel to the base of the cone, drawn through the point P, to cut the conic surface.

Fig. 34. Let the point B be without the base of the cone, and let Q R, drawn through P without or within the conic surface, be parallel to V B, and let it cut the conic surface in Q and R: through P and the line V B draw a plane cutting the conic surface in the lines V G and V H, and the plane of the base in the line B G H; and through P draw L K parallel to G H. Because V B and P Q R are parallel, therefore the line P Q R is contained in the plane B V P, 7. 17. E; and the points Q and R are in the lines V H and V G, the common sections of the plane and the conic surface. Because Q P is parallel to V B and L K to G H, therefore the triangle Q P L is equiangular to the triangle V B H, and the triangle P K R to the triangle V G B: therefore 4. 6. E.

$$V B : P R :: B G : P K$$

$$V B : P Q :: B H : P L$$

Consequently, $V B^2 : P R \times P Q :: B G \times B H : P K \times P L$, 23. 6. E. But the rectangle $B G \times B H$ is equal to the rectangle under the segments of any other line drawn from B to cut the base of the cone, 35 and 36. 3. E; and the rectangle $P K \times P L$ is equal to the rectangle under the segments of any other line, parallel to the plane of the base, drawn from P to cut the conic surface, *Cor.* *Pr.* 5; and hence the proportion is manifest in this case.

Fig. 35. And if the point B be within the base of the cone, and a straight line (as P Q R), parallel to the line

V B

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VB that joins the point B and the vertex of the cone, be drawn to cut the opposite surfaces through a point P situated without or within the cone: the proposition may be demonstrated in this case, in the very same words as in the former case.

Fig. 36. And if the point P be without the cone as well as the line VB, and PS, parallel to VB, be drawn to touch the conic surface, instead of cutting it; then the plane PV B will meet the conic surface in a line VSM; and BM will touch the base of the cone, and PN, parallel to BM, will touch the conic surface. And because the two triangles SPN and VBM are equiangular, therefore,

$$VB : PS :: BM : PN$$

$$\text{And } VB^2 : PS^2 :: BM^2 : PN^2$$

But BM^2 is equal to the rectangle under the segments of any line drawn from B to cut the base of the cone; and PN^2 is equal to the rectangle under the segments of any line, parallel to the base of the cone, drawn from P to cut the conic surface; and hence the proposition is manifest in this case also.

PROP. XXVI. *Fig. 37.*

If a point be assumed without or within a cone, and two lines be drawn through it to meet a conic surface, or opposite surfaces, and so as to be parallel to two straight lines given by position; then the rectangle under the segments of the secant, or the square of the tangent, parallel to one of the lines given by position, has to the rectangle under the segments of the secant, or to the square of the tangent, parallel to the other line given by position, a ratio that is constantly the same, wherever the point (from which the lines are drawn) is assumed without or within the cone.

Fig. 37. Let VB and VC be two straight lines, drawn from the vertex of a cone to the plane of the base, and given by position (or parallel to lines given by position); and let PQ and MN be two straight lines drawn through any assumed point, as R, to cut the conic surface, and so as to be respectively parallel to CV and VB: and as CV^2 is to the rectangle $CK \times CL$ (contained by the segments of any line drawn from C to cut the base of the cone), so let D, any assumed line, or magnitude, be to E; and as VB^2 is to $BG \times BH$ (the rectangle contained by the segments of any line drawn from B to cut the base of the cone), so let F be to E; and draw ST parallel to the base of the cone through the point R; then, *Pr. 24.*

$$(CV^2 : CK \times KL, \text{ or } D : E :: PR \times RQ : SR \times RT, \text{ and } VB^2 : BG \times GH, \text{ or } F : E :: MR \times RN : SR \times RT. \text{ Therefore inverting and ex æquo,}$$

$$D : F :: PR \times RQ : MR \times RN.$$

And, as the same reasoning applies wherever the point R is assumed, therefore the ratio of the rectangles $PR \times RQ$, and $MR \times RN$ is the same with, or equal to, the constant ratio of D to F, wherever the point R is assumed.

And, in like manner, may the proposition be demonstrated in all other cases, or in all positions of the lines PQ, and MN, whether they cut, or touch, the same or opposite surfaces.

PROP. XXVII. *Fig. 38.*

If a point be assumed in the curve of an hyperbola, and a straight line be drawn through it to cut both the asymptotes; the rectangle, contained by the segments intercepted between the point in the curve and the asymptotes, will be equal to the square of the semidiameter to which the straight line is parallel.

First, let the straight line EMN, drawn through E in

the curve of a hyperbola and cutting the asymptotes in M and N, be parallel to the transverse diameter, GH; join HE, and produce it to meet the asymptotes in R and S: it is obvious that the triangle RGH is equiangular to the triangle REN, and the triangle GHS to the triangle SEM; therefore, 4. 6. E.

$$NE : ER :: GH : HR$$

$$SH : GH :: SE : EM$$

And, because $SH = ER$, and $SE = HR$, *Pr. 22.* therefore,

$$\text{ex æquo } NE : GH :: GH : EM$$

consequently, $ME \times EN = GH^2$, 17. 6. E.

Next, when the line is parallel to a second diameter. And if it touch the curve at the point H through which it is drawn, as KL; then the two segments, KH, and HL, are equal to one another, *Pr. 13.* and to the semidiameter GP, to which KL is parallel, *Def. XVI.*; whence the proposition is manifest. But if a line, as DF, drawn through the point of the curve, E, parallel to the second diameter GP, do not touch the hyperbola, let KL, parallel to GP, touch the hyperbola in H, and join HE, cutting the asymptotes in R and S. Because KL and DF are parallel (being, both, parallel to GP), therefore the triangles, RHL, and KHS, are respectively equiangular to the triangles REF and DES; therefore,

$$FE : ER :: HL : HR$$

$$SH : HR :: SE : ED$$

And, because $SH = ER$ and $SE = HR$, therefore,

$$\text{ex æquo } FE : HK :: HL : ED$$

consequently, $FE \times ED = HK \times HL = GP^2$.

Cor. If any number of straight lines, all parallel to one another, meet the two asymptotes and the hyperbola or opposite hyperbolas; the rectangles contained by the segments of the parallels, intercepted between the asymptotes and the curve, will be all equal to one another.

For each of the rectangles is equal to the square of the semidiameter drawn parallel to the lines.

PROP. XXVIII. *Fig. 38.*

If a point be assumed without or within a conic section, and two straight lines be drawn through it to cut or touch the section or opposite sections, and so as to be parallel to two lines given by position; then the rectangle under the segments of the secant, or the square of the tangent, parallel to one of the lines given by position, will have to the rectangle under the segments of the secant, or to the square of the tangents parallel to the other line given by position, a ratio that is always the same, wherever the point (through which the lines are drawn), is assumed without or within the section. And in the ellipse and hyperbola, or opposite hyperbolas, the constant ratio is equal to that of the squares of the diameters drawn parallel to the lines given by position.

For secants and tangents of a conic section are secants and tangents of a conic surface, and thus the first part of this proposition is included in proposition 25.

And because the diameters of an ellipse intersect in the centre, and are bisected there, *Pr. 14.*; therefore the ratio of the rectangles under the segments of the secants, is, in this case, the same with the ratio of the squares of the semidiameters, or the same with the ratio of the squares of the diameters themselves; and thus the second part of the proposition, in as much as it regards the ellipse, is manifest from the first part.

It remains to demonstrate the second part of the proposition in the case of the hyperbola. Assume any point, as F, (*fig. 38.*), in one of the asymptotes, and through F draw

B I and C E (terminated by the hyperbola, or opposite hyperbolas), parallel to two semidiameters G P and G H; and let B I, and C E, or these lines produced, cut the other asymptote in D and A. Because $BA = FI$, *Pr.* 22; therefore $BF \times FI = BF \times BA = GH^2$; and, in like manner, $EF \times FC = DC \times CF = GP^2$, *Pr.* 27. Therefore the ratio of the squares of the semidiameters G H and G P, or the ratio of the squares of the diameters themselves, is equal to the ratio of the rectangles $BF \times FI$ and $EF \times FC$. And because the ratio of the rectangle $BF \times FI$ to the rectangle $EF \times FC$ is equal to the ratio of the rectangles under the segments of any lines terminated by the curve or curves that intersect one another, and are parallel to B I and F D (the squares of the tangents being taken when the lines touch the curve instead of cutting it), therefore, in the case of the hyperbola also, the second part of the proposition is manifest from the first part.

Cor. 1. If two tangents be drawn to an ellipse, or a hyperbola, or opposite hyperbolas, from the same point, then these tangents are proportional to the diameters, or semidiameters, drawn parallel to the tangents.

For the squares of the tangents are proportional to the squares of the diameters.

Cor. 2. If a right line be ordinately applied to a diameter of an ellipse, or to a transverse diameter of a hyperbola; then as the square of the diameter is to the square of the conjugate diameter, so is the rectangle contained by the abscissæ of the diameter, between the vertices and ordinate, to the square of the ordinate.

For the double-ordinate is bisected by the diameter, and it is parallel to the conjugate diameter.

PROP. XXIX. *Fig.* 39.

If an ordinate be drawn to a second diameter of opposite hyperbolas; the square of this second diameter is to the square of the conjugate diameter, as the sum of the squares of the second diameter, and of the part of it between the centre and the ordinate, is to the square of the ordinate.

Let P Q (*fig.* 39.) be a second diameter of two opposite hyperbolas, and F H the diameter conjugate to it, and let M O be an ordinate to P Q; draw M N parallel to P Q; then M N will be an ordinate of the diameter F H; *Def.* XX.

Therefore, $GH^2 : GP^2 :: FN \times NH$, or $GN^2 - GP^2 : MN^2$, *Cor. 2. Pr.* 27;

therefore $GH^2 : GP^2 :: GN^2$, or $MO^2 : GP^2 + MN^2$ 12. 5. E. and invertendo, $GP^2 : GH^2 :: GP^2 + MN^2 : MO^2$.

PROP. XXX. *Fig.* 40.

If a right line, as P T, drawn through a point P in the surface of a cone so as to be parallel to a right line V B contained in the conic surface, meet two parallel lines (in the points R and S) that cut or touch the conic surface or opposite surfaces: then P R is to P S as the rectangle under the segments of the secant, or the square of the tangent, drawn through the point R, is to the rectangle under the segments of the secant or to the square of the tangent, drawn through the point S.

Through the two parallels P T and V B (*fig.* 40.) draw a plane cutting the conic surface again in the line V A, and the plane of the base in the line B A; and, through R and S, draw M N and H G parallel to A B. Because P T is parallel to V B and R N to S G, therefore R N G S is a parallelogram; and R N is = G S. It is obvious that the triangles P M R and P H S are equiangular: therefore P R is to P S as M R is to H S, 4. 6. E, or as $MR \times RN$

is to $HS \times SG$, 1. 6. E. But $MR \times RN$ and $HS \times SG$ are respectively equal to the rectangles contained by the segments of any two lines, parallel to the base of the cone, drawn through R and S to cut the conic surface, *Cor. Pr.* 5, and hence the proposition is manifest, when P T meets two lines parallel to the plane of the base.

And if P T meet two parallel lines D E and I K, not parallel to the plane of the base; then, let the same construction be made as before; and because D E is parallel to I K, and M N to G H; therefore, $DR \times RE : MR \times RN :: IS \times SK : HS \times SG$;

Alternando, $DR \times RE : IS \times SK :: MR \times RN : HS \times SG$. Therefore, as is obvious from what has already been shown,

$$PR : PS :: DR \times RE : IS \times SK.$$

And if S be without the cone and the line drawn through it touch the conic surface instead of cutting it, the reasoning is still the same, when the square of the tangent is taken in place of the rectangle under the segments of the secant.

PROP. XXXI.

If two points be assumed in the diameter of a parabola, or in a right line drawn through a point in the curve of an hyperbola parallel to one of the asymptotes, and two parallel lines be drawn from these points to cut, or touch, the curve or opposite curves; then, as the rectangle under the segments of the secant or the square of the tangent, drawn from one of the assumed points, is to the rectangle under the segments of the secant, or to the square of the tangent, drawn from the other assumed point, so is the segment of the diameter of the parabola, or of the line parallel to the asymptote, between the first assumed point and the curve, to the segment of the same line between the second assumed point and the curve.

Because all the diameters of a parabola, *Def.* XIII. and all the straight lines drawn parallel to an asymptote of a hyperbola, *Cor. 2. Def.* XV. are parallel to a right line contained in the conic surface; and because secants, and tangents of a parabola, or a hyperbola, are secants and tangents of a conic surface: therefore it is manifest that this proposition is included in the last proposition.

Cor. The squares of the ordinates drawn to a diameter of a parabola are proportional to the abscissæ of the diameter between the ordinates and the vertex.

Fig. 43. For the double ordinates of a diameter of a parabola, as G F D and L K E are parallel to one another; *Cor. Def.* XVII. therefore, by this proposition, $GF \times FD$, or $GF^2 : LK \times KE$, or $LK^2 :: AF : AK$.

PROP. XXXII. *Fig.* 41, 42, and 43.

If an ordinate be drawn to a diameter of a conic section, which is not a second diameter of a hyperbola: then, in the ellipse, the square of the ordinate is equal to a rectangle contained by an abscissæ of the diameter and a constant line, deficient by a rectangle similar to that contained by the constant line and the diameter; and, in the hyperbola, the square of the ordinate is equal to a rectangle contained by an abscissæ of the diameter, and a constant line, exceeding by a rectangle similar to that contained by the constant line and the diameter: and in the parabola, the square of the ordinate is equal to a rectangle contained by the abscissæ of the diameter and a constant line.

Let A B (*fig.* 41 and 42.) be a diameter of an ellipse, or a transverse diameter of a hyperbola, F G an ordinate of it, and D E the conjugate diameter; draw A H perpendicular to A B and equal to a third, proportional to A B and D E, and

CONIC SECTIONS.

and join BH; draw FL parallel to AH, and complete the parallelograms AK, FN and AM. It is obvious that BA is to AH as BF is to FL, 4. 6. E. or as BF × FA is to FL × FA or the rectangle FN, 1. 6. E. And because AH is a third proportional to BA and ED, therefore,

$$BA : AH :: BA^2 : DE^2, \text{ Cor. 2, 20. 6. E.} :: AF \times FB : FG^2. \text{ Cor. 2. Pr. 28.}$$

Therefore,

$$AF \times FB : FG^2 :: AF \times FB : \text{rect. FN, 14. 5. E.}$$

Therefore $GF^2 = \text{rectangle FN}$. Now, in the ellipse, the rectangle FN is deficient from the rectangle AM, contained by the absciss AF and the line AH (which is the same for all the ordinates) by the rectangle NM, similar to the rectangle AK, contained by AH and AB; and, in the hyperbola, the rectangle FN exceeds the rectangle AM by the rectangle NM, similar to the rectangle AK.

In the parabola (fig. 43.) let one ordinate of a diameter be pitched upon, as LK, and take AH, a third proportional to the absciss AK and the ordinate LK; then, if FG be any other ordinate,

$$LK^2 : FG^2 :: AK : AF, (\text{Cor. Pr. 31}) :: AK \times AH : AF \times AH.$$

And because $LK^2 = AK \times AH$, therefore $FG^2 = AF \times AH$, the rectangle contained by the absciss AF and the line AH, which is the same for all the ordinates of the diameter.

Def. XX. The constant line AH is called the parameter of the diameter AB; and, in the ellipse and hyperbola, it is a third proportional to the diameter AB, and the conjugate diameter DE; but, in the parabola, it is a third proportional to the absciss of any one ordinate of a diameter, and the ordinate itself.

SCHOLIUM.

The phrases "deficient" and "exceeding by a rectangle similar to another rectangle," occur in Euclid's Elements, 27 and 28. 6. E. although they are now generally disused by geometers; and, it must be confessed, they are far from expressing the meaning they are intended to convey, in a simple and perspicuous manner. These expressions have been used in enunciating this proposition, with the view of drawing the attention to the distinguishing circumstances from which the several conic sections derived their names. For Apollonius gave the name of the ellipse to one of these curves, on account of the defect of the square of the ordinate from the rectangle contained by the absciss and the parameter: and he called another of them an hyperbola, from the excess of the same square above the same rectangle; and the third a parabola, on account of the exact equality of the same two spaces.

PROP. XXXIII. Fig. 44. Plate VI.

Let a scalene cone be cut by a plane drawn through the axis perpendicular to the plane of the base, making the triangular section VAB; and let VD, cutting AB produced, in D, be drawn so as to make the angle BVD equal to the angle VAB; and let IE be drawn in the plane of the base perpendicular to AD: then, if a point be assumed in the plane of the base of the cone, but without the base, the square of the line drawn from that point to the vertex of the cone is greater than, or equal to, or less than, a rectangle contained by the segments of any line drawn from the same point to cut the base of the cone, according as the assumed point is on the same side of the line IE as the base of the cone, or in the line IE, or on the opposite side of the line IE.

For, let I be any point in the line IE, and draw IV to the vertex, and IK to cut the base of the cone through the

centre C. Because the angle BVD is equal to the angle BAV, therefore VD is a tangent of a circle described about the triangle AVB, 32. 3. E.; therefore $VD^2 = AD \times DB$ (36. 3. E.) $= DC^2 - CB^2$, 6. 2. E.: to these equals add DI^2 ; and $VD^2 + DI^2 = DC^2 + DI^2 - CB^2$. But it is evident that DI is perpendicular to the plane AVD; therefore, $VD^2 + DI^2 = VI^2$, 47. 1. E.; and $DC^2 + DI^2 - CB^2 = IC^2 - CL^2 = KI \times IL$, 6. 2. E. Therefore, $KI \times IL = VI^2$.

Secondly, let M be a point, without the base of the cone, and on the same side of the line IE, as the base; and, let a plane drawn through MV, and the centre of the base, cut the cone in the triangle KVL, and the plane of the base in the line KLM: produce KM to meet IE in I, and draw IV. It has been shewn that $IV^2 = IK \times IL$; therefore, if a circle be described about the triangle KVL, VI will be a tangent of that circle (32. 3. E.) and the line VM, will cut its periphery in a point *m*, situated between V and M; and because V, *m*, L, and K are points in the same circle, therefore $VM \times Mm = KM \times ML$, 36. 3. E. But VM^2 is greater than $VM \times Mm$; therefore it is also greater than $KM \times ML$.

Thirdly, let N be a point in the plane of the base of the cone on the opposite side of the line IE; and, the same construction being made as before, it is manifest that VN will be entirely without the circle described about the triangle KVL (of which VI is a tangent); and that VN, when produced, will cut the periphery as at *n*; then $nN \times NV = NK \times NL$. But NV^2 is less than $nN \times NV$; therefore it is less than $NK \times NL$.

Cor. If I be a point in the plane of the base of the cone, such that $IV^2 = IK \times IL$: then I is a point in the line found in the manner described in the enunciation of this proposition.

PROP. XXXIV. Fig. 45.

If a scalene cone be cut by a plane perpendicular to the plane of the base, making the triangular section VAB; and let IE be the line found in the last proposition; also, let the cone be cut by a plane, making an elliptical section, PQH, the determining line of which, MN, is parallel to the line IE; and let FH be the diameter of the section that is parallel to MN. Then, if MN fall between the base of the cone and IE, FH is the least diameter of the section; and, if MN fall upon IE, all the diameters of the section are equal to FH and to one another; and if FH fall on the opposite side of IE to the base of the cone, FH is the greatest diameter of the section.

Let RS be any diameter of the section different from FH, and draw V K (meeting MN in K) parallel to RS; and let KLT cut the base of the cone. Because RS and HF are bisected in the centre G, therefore,

$$RG^2 : HG^2 :: VK^2 : KL \times KT, \text{ Pr. 25.}$$

Now, if MN fall between the base of the cone and IE, then VK^2 is greater than $KT \times KQ$, Pr. 33; therefore RG is greater than HG; and, in this case, FH is the least diameter of the section.

And, if MN fall upon IE, then $VK^2 = KT \times KL$; therefore $KG = HG$; and, in this case, the section is a circle.

And, lastly, if MN be on the other side of IE to the base, then VK^2 is less than $KT \times KL$; therefore RG is less than HG; and, in this case, FH is the greatest diameter of the section.

Cor. 1. If a section of a cone, not parallel to the plane of the base, be a circle, then IE, the line found in Prop. 32, is the determining line of that section.

$$\text{For } RG^2 : HG^2 :: KV^2 : KT \times KL.$$

And,

And, because the section is a circle, therefore $RG = HG$; therefore $KV^2 = KT \times KL$; therefore K is a point in the line IE , *Cor. Pr. 25*. And, in like manner, it may be shewn that every point of the determining line of the section is in the line IE .

Cor. 2. Let PQ be the common section of the plane VAB , and the plane of the ellipse; then PQ is a diameter of the ellipse. It is manifest that MN is perpendicular to the plane VAB ; therefore FH , parallel to MN , is perpendicular to the same plane and to PQ . Also PQ and FH are conjugate diameters, *Pr. 17*. Therefore, when the plane VAB is perpendicular to the plane of the cone, FH , the diameter of the ellipse, parallel to the base of the cone, cuts its conjugate diameter, PQ , at right angles.

SCHOLIUM.

If $FPQH$ be a section of the cone, of which IE is the determining line, it is plain that PQ is parallel to VD ; therefore, the angle $VQP = \text{angle } BVD = \text{angle } VAB$. Therefore, the triangle PVQ is similar to the triangle BAV ; but the angles at the base of the one triangle have a sub-contrary position to the equal angles at the base of the other triangle. For this reason a section of a cone that has the line IE (found as in *Prop. 32*) for its determining line, is called a sub-contrary section.

The word ellipse has hitherto been used to denote, generally, those sections of a cone which have their determining lines without the base of the cone; but, as it has been shewn that the conic section is a circle in one particular case (*viz.* the sub-contrary section) included in this general definition, precision requires that the term ellipse be hereafter restricted in its signification, so as to exclude that particular case.

PROP. XXXV. *Fig. 46.*

An ellipse being given, it is required to draw a diameter of it that shall be equal to FH , the diameter which is parallel to the base of the cone; but the plane VAB , drawn through the vertex of the cone, and that diameter of the base which is perpendicular to the determining line of the ellipse, must not be perpendicular to the plane of the base of the cone.

Draw the line IE , as in proposition 32. And because IE and MN are perpendicular to two different diameters of the base of the cone, they are not parallel: let them meet in K , and draw VK , and the diameter RS , parallel to VK ; then $FH = RS$. For, because RS and FH are bisected in the centre G , therefore,

$$VK^2 = KT \times KL :: FG^2 = RG^2, \text{ Pr. 24.}$$

But $VK^2 = KT \times KL$; therefore, $FG = RG$.

Cor. Only one diameter can be drawn that shall be equal to FH .

For, if $FH = RS$, then $VK^2 = KT \times KL$; therefore, K is in the line IE ; and IE can meet MN only in one point.

Def. XXI. A diameter of a conic section, that cuts its ordinates at right angles, is called an axis.

Cor. Because two conjugate diameters of an ellipse, and opposite hyperbolas, cut their ordinates in the same angles, *Pr. 24*; therefore, if these become axes of these curves, there will necessarily be two; and these will be conjugate diameters, and they will cut one another at right angles.

PROP. XXXVI. *Fig. 47 and 48.*

An ellipse has only two axes.

Let FH (*fig. 47*) be the diameter of the ellipse drawn parallel to the base of the cone; and, first, let FH be the greatest or

the least diameter of the ellipse, *Pr. 34*; then, it has already been shewn, that FH cuts its conjugate PQ , at right angles, *Cor. 2 Pr. 34*; and, therefore, FH and PQ are axes of the ellipse, *Cor. Df. XXI*. Also they are the only axes of the ellipse. For, let XY be any other diameter, then XY is not perpendicular to FH ; draw FZO , (cutting the ellipse again in O) perpendicular to FY , and draw GO . Because FH is the greatest or least diameter of the ellipse; therefore, FG is not equal to GO ; therefore, FZ is not equal to ZO , *47. 1. E*. Therefore FO , perpendicular to XY , is not an ordinate of XY ; therefore, XY is not an axis.

Secondly, when FH is not the greatest or least diameter of the ellipse, draw the diameter RS equal to FH , *Pr. 35*; and draw the diameter LK and DE to bisect the angles contained by FH and RS ; join FS . And, because LK bisects the angle at the vertex of the isosceles triangle FGS , it will bisect the base FS , and will cut it at right angles. And because LK cuts FS , one of its ordinates at right angles, therefore LK is an axis; and, it is plain, that DE , parallel to FS , is another axis and the conjugate of LK . Also, LK and DE are the only axes of the ellipse. For, let XY be any other diameter; then XY is not perpendicular both to FH and to RS ; let it be not perpendicular to FH , and draw FZO (cutting the ellipse again in O) perpendicular to FY , and join GO . Because RS is the only diameter of the ellipse that is equal to FH , *Cor. Pr. 35*; therefore FG is not equal to GO ; therefore FZ is not equal to ZO . And because FO , perpendicular to XY , is not an ordinate of XY , therefore XY is not an axis.

PROP. XXXVII. *Fig. 49.*

A hyperbola has only two axes.

Let G and GK be the asymptotes of the hyperbola, and draw the transverse diameter GA to bisect the angle of the asymptotes, and the second diameter DE to bisect the adjacent angle; let FK , drawn between the asymptotes, be perpendicular to GA , and meet the hyperbola in M and N . Because FK is perpendicular to GL , and the angle $FGL = \text{the angle } KGL$, therefore $FL = LN$, *26. 1. E*. But $FM = NK$, *Pr. 22*; therefore $ML = LN$. Therefore, MN perpendicular to GA , is an ordinate of GA ; therefore, GA is an axis; and DE , parallel to MN , is the conjugate of GA , and another axis, *Pr. 24*.

And if GA do not bisect the angle FGK , then FK , perpendicular to GA , will not be bisected in L ; therefore ML will not be equal to LN ; therefore in this case, MN , perpendicular to GA , is not an ordinate of GA . Therefore, the hyperbola has no axes besides GA and DE .

PROP. XXXVIII. *Fig. 50.*

A parabola has only one axis.

Let OS , terminated by the curve, be perpendicular to any diameter, and draw the diameter PQ to bisect OS ; and, because all the diameters of the curve are parallel, therefore, PQ is perpendicular to OS , and an axis of the curve, *Def. XXI*. And because OS can be an ordinate of only one diameter, therefore there is only one axis.

PROP. XXXIX. *Fig. 51 and 52.*

The two axes of an ellipse are always unequal; and the greater axis is the greatest diameter, and the less the least diameter of the curve. And that axis of a hyperbola, which is a transverse diameter, is the least of all the transverse diameters.

CONIC SECTIONS.

Let AB and DE (*fig. 51.*) be the two axes of an ellipse, C the centre, and CH any semidiameter; draw HP perpendicular to AB, and HQ perpendicular to DE. Because AB and DE are conjugate diameters; and HP an ordinate to AB, and HQ an ordinate to DE; therefore,

$$AB^2 : DE^2 :: AP \times PB : HP^2, \text{ Cor. 2 Pr. 28.}$$

Now, if AB be supposed to be equal to DE, it will follow that $AP \times PB = HP^2$; therefore, $AP \times PB + CP^2 = HP^2 + CP^2$, or $AC^2 = CH^2$. Therefore, $AC = CH$; and the ellipse will be a circle, which is not the case, *Cor. 1. Pr. 33.* Therefore, AB and DE are unequal; let AB be supposed to be greater than DE.

Because AB^2 is greater than DE^2 , therefore $AP \times PB$ is greater than HP^2 , and $AP \times PB + CP^2$, or AC^2 , is greater than $HP^2 + CP^2$, or CH^2 . Therefore the semi-axis AC is greater than any other semi-diameter HC.

In like manner,

$$DE^2 : AB^2 :: DQ \times QE : HQ^2.$$

Therefore $DQ \times QE$ is less than HQ^2 ; and $DQ \times QE + CQ^2$, or CD^2 , is less than $HQ^2 + CQ^2$, or CH^2 . Therefore the semi-axis DC is less than any other semi-diameter CH.

Fig. 52. In the hyperbola, a tangent of the curve drawn from the extremity of the axis CA, as AT, falls between the centre and the curve; and because CA, the semi-axis, is less than any other line drawn from C to AT, much more is it less than a semi-diameter CH drawn from C to the curve on the other side of AT.

DEFINITION XXII.

The greater axis of an ellipse is called the transverse axis; and the less, the conjugate axis; and, in the hyperbola, that one is the transverse axis which is a transverse diameter, and the other is the conjugate axis.

PROP. XL. *Fig. 51 and 52.*

A diameter of an ellipse nearer the transverse axis is greater than one more remote; and a transverse diameter of the hyperbola nearer the transverse axis is less than one more remote.

Fig. 51. Let CK and CH be two semi-diameters of an ellipse; join HK, and draw AG parallel to HK; join CG and draw CL to bisect HK. Because CL bisects HK, it will likewise bisect AG, *Pr. 15.* And because AM = MG, and AC is greater than CG, therefore the angle AMC is greater than the angle GMC, *25. 1. E.*; that is, the angle KLC is greater than the angle HLC. And because HL = LK, therefore KC, nearer to CA, is greater than HC more remote from CA, *24. 1. E.*

In the hyperbola, the same construction being made, because AC is less than CG, therefore the angle AMC, or KLC, is less than the angle GMC, or HLC. Therefore CK is less than CH.

DEFINITIONS. *Fig. 53, 54, and 55.*

XXIII. Let AB (*fig. 53 and 54.*) be the transverse axis, DE the conjugate axis, and C the centre of an ellipse, or hyperbola, or opposite hyperbolas; and let CF and C*f* be taken in the transverse axis, such that CF^2 and Cf^2 are each equal to $CA^2 - CD^2$ in the ellipse, and to $CA^2 + CD^2$ in the hyperbola; then the two points F and *f* are called the foci of the ellipse, hyperbola, or opposite hyperbolas.

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Fig. 55. But the focus of a parabola is a point F in the axis, within the curve, and distant from the vertex by a line equal to one fourth part of the parameter of the axis.

Cor. The distance of each of the foci of an ellipse from either extremity of the conjugate axis is equal to half the transverse axis; and the distance of either of the foci of a hyperbola from the centre is equal to the distance between the extremities of the transverse and conjugate axes.

XXIV. If F (*fig. 53 and 54.*) be a focus of an ellipse, or hyperbola, or opposite hyperbolas, and AG be taken in the transverse axis (on the opposite side of the vertex to the focus F), such that AF is to AG as CF is to CA; then a line, as HK, drawn through G perpendicular to the transverse axis, is called a directrix of the ellipse, or hyperbola, or opposite hyperbolas.

Fig. 55. But the directrix of a parabola is a line, as HK, perpendicular to the axis, drawn through a point G as far distant from the vertex of the axis on the one side as the focus is on the other side.

Cor. An ellipse, hyperbola, or opposite hyperbolas, have two directrices; one corresponding to each focus. For the same construction that is made for one focus, may be made for the other focus.

PROP. XLI. *Fig. 53 and 54.*

Let AB be the transverse, and DE the conjugate, axis of an ellipse, or hyperbola, or opposite hyperbolas; from any point in the curve, or opposite curves, as M, let MC be drawn to the centre, and MP perpendicular to the transverse axis, and take CO, in the same axis, such that CO^2 may be equal to $MC^2 - CD^2$ in the ellipse, and to $MC^2 + CD^2$ in the hyperbola; then as AC is to CF so is PC to CO.

For, because AB and DE are conjugate diameters, therefore,

$AC^2 : CD^2 :: AP \times PB : MP^2, \text{ Cor. 2. Pr. 28,}$ therefore, $AC^3 : AC^2 \mp CD^2 :: AP \times PB : AP \times PB \mp MP^2$. But in the ellipse $AC^2 - CD^2 = CF^2$; and $AP \times PB - MP^2 = AC^2 - CP^2 - MP^2 = AC^2 - MC^2 = AC^2 - AC^2 - CD^2 - CO^2 = CF^2 - CO^2$; and, in the hyperbola, $AC^2 + CD^2 = CF^2$; and $AP \times PB + MP^2 = -PC^2 - AC^2 + MP^2 = MC^2 - AC^2 = CO^2 - CD^2 = CA^2 - CO^2 - CF^2$. Therefore, the last analogy becomes,

$$AC^2 : CF^2 :: AC^2 \mp CP^2 : CF^2 \mp CO^2$$

Consequently $AC^2 : CF^2 :: CP^2 : CO^2$ *19. 5. E.*

$$\text{And } AC : CF :: CP : CO.$$

PROP. XLII. *Fig. 53 and 54.*

If M be a point in an ellipse or hyperbola, and MF and M*f* be drawn to the foci; then, in the ellipse, the sum of MF and M*f* is equal to the transverse axis; and, in the hyperbola, the difference of MF and M*f* is equal to the transverse axis.

Draw MP perpendicular to the transverse axis, and take CO as in the last proposition. And, because

$$AC : CF :: CP : CO, \text{ Pr. 41.}$$

Therefore $AC \times CO = FC \times CP$; and $4 AC \times CO = 4 CF \times FO$. But, because AB and F*f* are bisected in C, therefore $4 AC \times CO = BO^2 - AO^2$, *8. 2. E.*, and $4 FC \times CP = PF^2 - PF^2 = fM^2 - MF^2$, *47. 1. E.*; therefore $BO^2 - AO^2 = fM^2 - MF^2$.

Again, $MF^2 + Mf^2 = fP^2 + FP^2 + 2 MP^2 = 2 FC^2 + 2 CF^2 + 2 MP^2 = 2 FC^2 \pm 2 CD^2 + 2 CO^2 = 2 AC^2 + 2 CO^2 = BO^2 + AO^2$.

3 H

And,

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And, because $BO^2 + AO^2 = fM^2 + MF^2$, and $BO^2 - AO^2 = fM^2 - MF^2$; therefore, by adding the equals, $2BO^2 = 2fM^2$; and, by subtracting the equals, $2MF^2 = 2AO^2$. Therefore $fM = BO$, and $FM = AO$; whence the proposition is manifest.

PROP. XLIII. *Fig. 53, 54, and 55.*

A straight line drawn from any point in a conic section to a focus has to a perpendicular drawn to the corresponding directrix, a ratio that is constantly the same wherever the point is assumed in the curve; and, in the ellipse, the constant ratio is a ratio of minority (or of a less magnitude to a greater); in the hyperbola, the constant ratio is a ratio of majority (or of a greater magnitude to a less); and, in the parabola, the constant ratio is a ratio of equality.

Fig. 53 and 54. Let M be a point in an ellipse or hyperbola, and draw MF to a focus and MK perpendicular to the directrix HG , which corresponds to that focus; draw MP perpendicular to the transverse axis and take CO as in *Prop. 41.* Then

$$AC : CF :: CP : CO, Pr. 41.$$

Invertendo, $CF : CA :: CO : CP$

Therefore $CF : CA :: FO : AP, 10. 5. E$

But $CF : CA :: AF : AG, Def. XXIV.$

Therefore $CF : CA :: AO : GP, 12. 5. E$

But, as has been shewn in the demonstration of the last proposition, $AO = MF$, and $GP = MK$; therefore

$$CF : CA :: MF : MK.$$

But the ratio of CF to CA is a constant ratio; and it is a ratio of minority in the ellipse, and a ratio of majority in the hyperbola.

Fig. 55. In the parabola, $GA = AF$, and $4AF \times AP = 5P^2, Def. XXIII.$; but $4AF \times AP = GP^2 - P^2, S. 2. E$; therefore $MP^2 = GP^2 - P^2$; and $MP^2 + P^2 = GP^2$, or $MF^2 = GP^2$, or MK^2 . Therefore $MF = MK$.

Most branches of human learning take their origin from a few detached truths, viewed at first without connexion, and which, in the progress of knowledge, are at length joined together in one body of science. But when a science has risen, by accumulated discoveries, to such a degree of importance as to interest the curiosity of mankind, it is often too late to retrace its history, and to delineate its rise and progress in an accurate and satisfactory manner. It generally happens that the authors of many of the subordinat discoveries have already fallen into oblivion; and that some important improvements are disputed, and ascribed to different inventors by different writers. In reviewing the history of the conic sections, we must add, to the causes which commonly obscure the origin of all the sciences; the very high antiquity of this branch of the mathematics, and the loss of the early geometers who have written on it. No work of antiquity that professedly treats of the history of the conic sections has reached our time; and there is little to satisfy curiosity in this inquiry, excepting a few incidental notices collected from different authors.

The discovery of the curves, denominated the conic sections, is attributed to the philosophers of the school of Plato; and it is even ascribed, by some authors, to the founder, himself, of that celebrated sect. Other authors, grounding their opinion on a few words in an epigram of Eratosthenes, have given the honour of this discovery to Menechmus, who lived a little posterior to the time of Plato. But the information derived from ancient writers is too scanty to enable us to decide concerning the original disco-

verer of the conic sections, or to form a well-founded judgment of the respective inventions of the early mathematicians whose works have not come down to our time. We know nothing of Aristotle, or Conon the friend of Archimedes, excepting that they treated of the conic sections; and that they deserved the commendations of succeeding geometers by improving and extending the branch of science which they cultivated.

It is probable that the theory of the conic sections, like other parts of science, grew up gradually from a small beginning, increasing in magnitude and importance by the successive improvements of many geometers. New and difficult problems would naturally lead to new artifices and inventions for their solution; and they would thus contribute to the extension of knowledge. The history of the mathematics mentions two problems, famous in ancient times, much agitated by the geometers of the Platonic school, and both of them so difficult as to transcend the limits of the ordinary, or plane, geometry. We allude to the problems of the duplication of the cube, and the trisection of an angle; and there is no doubt but that the theory of the conic sections received great additions, and was enriched with many new properties, by the researches that were undertaken for resolving these problems. Two solutions of the former problem, derived from the conic sections, are preserved by Eutocius, in his commentary on the works of Archimedes, which are attributed by him to Menechmus. Some solutions of the latter problem, by means of the conic sections, are likewise extant in ancient authors, for which science is probably indebted to the ingenuity of the followers of Plato.

The testimony of ancient authors, as well as the solutions of the problems which we have just mentioned, lead us to infer that great progress had been made in investigating the properties of the conic sections before the time of Archimedes. This conclusion is confirmed by the writings of that celebrated mathematician. Many principal propositions are there expressly said to have been demonstrated by preceding writers, and are spoken of as truths commonly divulged and known to mathematicians. Archimedes himself, perhaps the greatest genius of antiquity, and deserving to be ranked with Galileo and Newton, enriched the theory of the conic sections with many noble discoveries. After a lapse of two thousand years, the quadrature of the parabola is still the most remarkable instance, within the precincts of geometry, of the exact equality of a curvilinear to a rectilinear space. To this beautiful discovery there must be added, the determining of the proportions of the elliptic spaces to one another, and to the circle; and likewise the mensuration of the solids generated by the revolution of the conic sections about their axes.

But we are chiefly indebted to the preservation of the writings of Apollonius for a more perfect knowledge of the theories of the ancient geometers concerning the conic sections. Apollonius was born at Perga, a town of Pamphylia, and he is said to have lived under Ptolemy Philopater, about forty years posterior to Archimedes. He was instructed in geometry in the school of Alexandria; and, under the successors of Euclid, he there acquired that superior skill in the science which distinguishes his writings. Besides his great work on the conic sections, he published many smaller treatises, relating chiefly to the geometrical analysis, which have all perished, and are known to us only by the account given of them in the seventh book of the mathematical collections of Pappus.

The treatise of Apollonius on the conic sections is written

ten in eight books, and it was esteemed a work of so much merit by his contemporaries as to procure for its author the title of the great geometrician. The purpose of the four first books, as we are informed in the prefatory epistle to Eudæmus, is to deliver the elements of the science; and, in this part of his work, Apollonius professes only to have collected and methodized what had already been published by former writers. One improvement introduced by him deserves to be particularly mentioned; as it is a curious instance of the progress of the mind in generalizing its first conceptions. The conic sections, according to the definitions now given of them, are such curves as are produced by the common section of a plane and a cone of whatever kind. But the first mathematicians who noticed these curves, did not define them in a way so general. They confined their attention to the right cone only; and, even in this kind of cone, they always supposed the cutting plane to be perpendicular to the slant side. In this view of the matter it is manifest, that the species of the curve would depend on the sort of cone by which it was produced. If the vertical angle of the cone were supposed to be an acute-angle, then the cutting plane, perpendicular to the slant side, would meet one of the conic surfaces only, and the line of common section would surround the whole, and would be an ellipse. If the vertical angle of the cone were supposed to be a right-angle, then the cutting plane would still meet only one of the conic surfaces, but the line of common section, not embracing the whole contour of the solid, would, in this case, be a parabola; and, lastly, if the vertical angle of the cone were supposed to be obtuse, then the cutting plane would intersect both the opposite conic surfaces, and the curve produced would be a hyperbola. It is true that the curves, thus defined, were rightly denominated conic sections, considering them as parts of a class; but it did by no means follow that they comprehended all the species of the class. Even retaining the right cone, yet curves of a different nature might possibly be produced merely by varying the inclination of the cutting plane: and much more so, if the species of the cone, and the position of the cutting plane, were both changed. To Apollonius belongs the honour of having generalized the ancient definitions of the conic sections, and of presenting the subject in the more perfect form in which it still continues to be taught: and the improvement is equivalent to the discovery that all the possible sections of any cone, are reducible to three distinct species and no more.

Before the time of Apollonius, the names of the several conic sections were likewise different from those that they now bear. In conformity to the ancient definitions of the curves, the ellipse was called the section of an acute-angled cone by the more early geometricians: and, in like manner, the parabola, and hyperbola, were denominated the sections of a right-angled, and obtuse-angled, cone. The present names are commonly supposed to have been invented by Apollonius; and, in compliance with the generality of writers, we have noticed the properties from which he derived them. But the received opinion on this point is probably not well founded: for both the terms, parabola and ellipse, occur in the writings of Archimedes, which were prior to the time of Apollonius.

The four first books of the conics of Apollonius is the only part of that work that has come down to us in the original Greek. On the revival of learning, the lovers of the mathematics had long to regret the loss of the original of the latter part of this important treatise. In the year 1658, Borelli, passing through Florence, found an Arabic manuscript in the library of the Medici family, which he

judged to be a translation of all the eight books of the conics of Apollonius. Transported with joy, he had interest enough to prevail on the duke of Tuscany to entrust him with the manuscript, which he carried to Rome: and, having procured the assistance of Abraham Ecchelenfius, a person skilled in the Arabic tongue, he published a Latin translation of it in 1661. The manuscript, discovered by Borelli, was entitled, "Apollonii Pergæi Libri Octo," and was supposed to be a complete translation of the work of the ancient geometrician: but, on examination, it was found to contain the first seven books only. Two other Arabic translations of the conics of Apollonius have been discovered by the industry of learned men: but both of them have the same defect as that found at Florence. From the circumstance of all the three manuscripts agreeing in the want of the eighth book, it is reasonable to suppose that this part of the treatise had already perished when the translations were written: and there is now no room to hope that the loss will ever be recovered. It is not easy to ascertain in what age the original of Apollonius's work disappeared; but we know that the whole of it was extant in the time of Pappus Alexandrinus. In the "Collectiones Mathematicæ" this author has given a succinct account of the contents of all the eight books, and has added the lemmas required for the demonstrations of the propositions they contain: and this circumstance enabled Dr. Hailey to annex, to the complete edition of the conics of Apollonius, which he published in 1710, a restoration of the eighth book executed with so much ability as to leave little room to regret the want of the original.

In the four last books of his treatise, Apollonius, as he informs us in the prefatory epistle, delivers the higher and more abstruse parts of the theory of the conic sections. He here claims the merit of originality, and professes to develop the results of his own researches. And it must be confessed that the genius, invention, and geometrical skill, displayed in this part of his work, are such as fully to justify the honourable appellation bestowed on him by his contemporaries. This treatise must be allowed, even in the present times, to contain a very extensive, if not a complete, theory of the conic sections. This branch of the mathematics has, perhaps, been more cultivated than any other, since the revival of learning; but the industry of modern mathematicians has discovered few properties of their curves, of which some traces are not to be found in the work of the great geometrician. Montucla thus delivers his opinion of the treatise of Apollonius: "Pour donner enfin de l'ouvrage d'Apollonius l'idée qu'il mérite, je remarquerai que nous avons dans notre langue, et en style algèbre, un traité des sections coniques dont on fait cas avec justice; je veux parler de celui de M. le marquis de l'Hôpital: cependant je ne craindrai point de dire qu'il y a dans le géomètre ancien un théorie bien plus étendue et plus complète de les courbes que dans le géomètre moderne."

The mathematicians, who followed Apollonius, seem to have been content with the humble task of commenting on his treatise. It would be uninteresting to enumerate the crowd of commentators who, at different times, have written on his work, and have endeavoured to render it of more easy access to the general class of mathematicians. Among the number we find the name of the learned Hypatia, the daughter of Theon: and we still possess the lemmas of Pappus Alexandrinus for all the eight books, and the commentary of Eutocius on the four first books. Since the revival of learning, the theory of the conic sections has been much cultivated, and is the subject of a great variety of ingenious works.

There is a relation subsisting between all the parts of human knowledge, which frequently connects speculations the most abstract, and seems 'g'y the most barren, with inquiries that are highly interesting to us, and most fertile in useful consequences. In studying the properties of the conic sections, the followers of Plato sought merely to gratify a contemplative turn of mind. Their researches were chiefly undertaken with the view of resolving speculative problems; they were directed to no immediate object of practical utility. It excites some degree of admiration, when we reflect that enquiries, purely intellectual, and apparently so little connected with external things, have, in modern times, been employed to explain many of the most remarkable phenomena of the material world. The doctrine of the conic sections is equally useful in the science of optics, and in determining the path of a projectile body. Above all, this branch of the mathematics derives its chief importance from the applications that are made of it in modern astronomy.

The uses of the conic sections in physical science have, as it is natural to conjecture, led modern mathematicians to consider these curves under particular points of view suited to their purposes. It is for this reason that the properties of those remarkable points, called foci, have been investigated with so much care in latter times. In optics, these points are almost exclusively the subjects of consideration when the conic sections are concerned; and, in astronomy, the sun invariably occupies one of the foci of the elliptical orbits which the planets and comets describe round him. These points did not entirely escape the penetration of the ancient geometricians. Apollonius has anticipated the moderns here, as well as in other parts of this science. He has unfolded many of the most curious properties of the foci, in the ellipse and hyperbola. He treats of them under the appellation of "Puncta ex applicatione facta;" which signifies that they are points formed by cutting the transverse axis in the ellipse, and the transverse axis produced in the hyperbola, into two segments containing a rect. angle equal to the square of half the less axis; and the phrase is thus equivalent to the modern definitions of the same points. The focus of the parabola is not noticed by Apollonius, nor by any other ancient author; unless, indeed (as has been pointed out to the writer of this article by a friend,) we except a proposition (Theor. 22, Prop. 238.) in the seventh book of the "Collectiones Mathematicæ," where Pappus delivers, in the form of a Locus, that beautiful property of the focus, and the corresponding directrix of any conic section, which some modern writers, considering it as characteristic, have made the basis of a definition of the curves in plano. Mydorgius, contemporary with Des Cartes, is the first who treated generally of the foci, of all the conic sections. Since his time the properties of these points have been gradually and fully developed.

Before Dr. Wallis, all the writers on conic sections followed the ancient geometricians in making the cone the common origin and foundation of their theories. That mathematician first entertained the idea of using the cone as little as possible in delivering the elements of the conic geometry; and this plan is pursued in his treatise, published at Oxford in 1655. In support of this innovation, Dr. Wallis urges the prolixity of Apollonius's work, and the difficulty and perplexed nature of the demonstrations. On the old plan, many propositions respecting the generating of the cone, and the properties of that solid, are to be previously gone through; and the diagrams are rendered confused by many lines drawn in different planes. On these accounts, he asserts, that the study of the conic sections was generally neglected: "unde

et nimis neglecta fuit (conicorum doctrina), tanquam infuperabilis difficultatis plena." It must be allowed that the objections of Dr. Wallis are not without foundation. On the other hand, it has been the opinion of some later mathematicians, that the defects of the treatise of Apollonius arise, not from his having made too much use of the cone, but from his having availed himself too little of the assistance to be derived from that solid. They contend that the most general and characteristic properties are first to be sought for in the cone itself; whence they are to be transferred to its sections, as particular cases of more general propositions. The latest, and most approved writers, who have adopted this opinion, are Dr. Hamilton and professor Robertson of Oxford. Although Dr. Wallis proposed to introduce the cone as little as possible in delivering the elements of the conic geometry; yet it is to be remarked that he still imitated his predecessors in deriving, from that solid, the fundamental property which he afterwards made the basis of all his reasoning. But the idea, which he introduced, was soon carried farther; and treatises on the conic sections were written, in which the cone was entirely laid aside, and the curves were defined from descriptions in plano. De la Hire, in his "Nouveaux Elements des Sections Coniques," published at Paris in 1679, is the first author who successfully treated on the conic sections in this new view of the subject. He derives the description of the parabola from the equality that subsists between two lines meeting in any point of the curve, one of which is drawn to the focus, and the other is perpendicular to the directrix; and he describes the ellipse and hyperbola from the analogous properties, that, in the one, the sum of two lines drawn from any point in the curve to the two foci, and, in the other, the difference of two such lines, are equal to the transverse axes. In these fundamental points De la Hire is followed by most of the later writers, who have treated of the conic sections independently of the cone; and, in particular, by Dr. Simson of Glasgow, who has published an extensive and accurate treatise on this subject. Besides the method of De la Hire, another way of defining the curves in plano has been proposed. It is founded on that general property of the directrix first given by Pappus Alexanderinus, as we have already noticed above. The learned abbé Bossovich, an excellent Italian mathematician, has drawn his definitions of the curves from this fundamental property in the ingenious treatise on conic sections, published in his "Elementa Mathematicæ Universæ;" and we have two works in our own language, which are founded on the same primary definitions; that of Mr. Newton of Cambridge, and that of Mr. Walker of Nottingham.

The doctrine of the conic sections is of great use in physical and geometrical astronomy, and the physico-mathematical sciences. This doctrine has been much cultivated by geometers ancient and modern: and we have many good treatises on the subject; but that published by Mr. Simson, professor of mathematics at Glasgow, deserves to be particularly mentioned, not only for its elegance, but for its geometrical accuracy, which, as he justly remarks in his preface, has not always been so well observed in treatises of this kind, as it ought to be. See also Gregorii a St. Vincenti Opus de Quadratura Circuli, & Sectionum Coni; Mydorgius de Sectionibus Conicis; De la Hire de Sectionibus Conicis; Trevisar Elem. Section. Con.; Hamilton's Tract. Geom. de Section. Con.; De l'Hopital's Anal. Treat. of Conic Sections; Muller's Treatise, &c.; Hutton's; and Halley's edition of Apollonius, &c. Oxon. 1710. fol.

To the properties of the conic sections, mentioned

above, it may be proper to add the properties of their osculatory circles, or circles of curvature. See CURVATURE.

Conic sections, similar. See SIMILAR.

Conic Form of Mountains and Hills. Too many naturalists have fallen into the mistake, of denominating mountains or hills which have a conical top, to be of volcanic origin; because, granite sometimes, as Aelterman mountain in the Hartz, assumes a conic form, Lafius 17; and porphyry frequently takes this shape. In some rare instances, the rupture of the strata has produced conical hills. See ELEVATION of Strata and VOLCANO.

CONICA, in *Ancient Geography*, a town of Asia, in Paphlagonia. Ptolemy.

CONICS, that part of the higher geometry, or geometry of curves, which considers the cone, and the several curve lines arising from the sections thereof.

CONICHYDONTES, or *Plesronites*, in *Natural History*, one of the three names by which the fossil teeth of fish are known; so called, from their supposed resemblance to the spur of a fighting cock.

Though authors assure us that these are the teeth of a fish, the jaws having been found with these bodies in them; yet they do not pretend to know to what fish they belong. They are generally of an oblong conic figure, broad at the base, and narrow at the point, where they are usually a little crooked: they are hollowed at the root, and are from the tenth of an inch to two inches long, commonly of a chestnut colour, and are found in the strata of clay, but most usually in those of stone; and are seen more frequently in England than in any other part of the world. Hill's *Fossils*, p. 645.

CONJECTURE, in the *Philosophy of the Mind*, expresses a degree of belief founded upon slight evidence. In some cases, a disposition to conjecture, indiscreetly indulged, may be productive of many extravagancies. It may prompt us to build favourite hypotheses on very weak foundations, and to ascribe the conduct of others to wrong motives, according to our prejudices for or against them. When indulged with discretion, a conjecture affords some relief to the mind from the inquietude of ignorance and uncertainty. It provides a temporary substitute for knowledge; and it frequently suggests ideas which lead to the discovery of truth.

Conjectural criticism, and consequent emendations of ancient authors, classical and scriptural, should be exercised with great caution; otherwise, the imagination will be apt to mislead persons most eminent for their genius and learning.

It is one of the most important, and at the same time one of the most disputed points in sound criticism, says Michaelis, whether what is called "conjectura critica," may be applied to the New Testament; or, in other words, whether in certain cases, and under certain restrictions, provided we use all due care and caution, we may reject the readings of all the MSS., versions, and fathers, and merely on a probable supposition, admit a reading that is supported by no written authority; and whether, if we proceed on these principles, we have any reason to expect, that we shall ever arrive at the truth. Many learned men, deservedly esteemed critics, are of opinion, that conjectures are as allowable at present in the New Testament, as in the classic authors. Nevertheless, the majority of divines formerly considered them as presumptuous, if not impious; but those persons who are so strenuously attached to the printed text, are not aware, as Wetstein observes, in his *Prolegomena*, that a very great number of readings, which they so zealously support, are merely critical conjectures, advanced either by the ancient fathers,

or by the modern editors of the Greek Testament, in the 16th and 17th centuries. These readings must therefore be immediately rejected, if critical conjecture is wholly inadmissible. As this question is purely critical, it should be argued, not on theological, but on critical grounds. The argument which is drawn from the hypothesis, that Divine Providence would not permit the true reading in any text of the New Testament to be lost, seems to be very extraordinary, when it is urged by persons who tacitly acknowledge that the same providence has not guarded against the necessity of conjecture in the Old Testament. Besides, no man can assert, that, because the true reading of any passage is no longer to be found, it is therefore totally lost, since the number of MSS. of the Greek Testament (together with other original documents) which have been actually collated, are trifling in comparison with the whole number that have been written; and a reading, which is now supported only by probable conjecture, may, in process of time, be confirmed by good authority. Moreover, if by no means diminishes the certainty of our faith, that some few passages of the New Testament have certain internal marks, which discover them to be not genuine, and which render it necessary to restore the true reading by critical conjecture. Our faith would only be in danger, if the number of these passages was so very great, as to render the whole New Testament suspicious; or, if the principal and distinguishing doctrines of Christianity must be either added to, or taken from, the sacred text, on no other authority than that of mere conjecture. But if, without assuming to ourselves the power of altering articles of religion, and confining our emendations to mere matters of criticism, we alter some words or sentences, the grounds of our faith are by no means affected, nor need we apprehend any evil consequences. In ancient writings, of which only one copy is extant, critical conjecture is indispensable. The necessity remains the same, even where there are several MSS. if those MSS. are only copies of one and the same more ancient MS. If we have more than a single copy of any work, and those copies are transcripts of different and distinct MSS., the necessity of critical conjecture decreases in proportion to the number of copies; but it does not entirely vanish, unless the number of the MSS. is very considerable. We have, therefore, no reason for censuring the critics of the 16th century, if, in their editions of the Greek Testament, they have sometimes, departed from the reading of their MSS., and substituted such as were agreeable to probable conjecture. The probability, however, that critical conjecture alone can restore the true reading, decreases in the same proportion, as our materials of criticism, or collections of various readings increase. And since so many MSS., works of the fathers, and ancient versions made in distant countries, and in different periods, have been carefully collated; and since also those very ancient Latin versions that vary so considerably from each other, and were translated from very different Greek MSS. have been made known to the public, we might even doubt whether critical conjecture ought not at present to be entirely rejected. It has, however, its learned and zealous advocates. It deserves to be considered, in reply to the plausible objection above suggested, that we have not a single MS. now extant, that was written in the four first centuries, and that the ancient versions have not descended to us without alterations. It is likewise evident, from the writings of the fathers, that many readings were in those times in the Greek MSS., which are not now found in any, or only in a very few; having been altered either by accident, or because they appeared to the transcribers to be obscure, or exceptionable.

ceptionable. It is therefore not impossible, that other readings, which have not been preferred in the works of the fathers, or in the Greek MSS., may have been equally left; and among them, perhaps, some that were genuine. Besides, it is not impossible that there are many important MSS. of which we have no knowledge; and that a collation of those MSS. might confirm the critical conjectures of the 18th century, in the same manner as many conjectures of the 16th century have been confirmed in the 18th, by the authority of MSS., and ancient versions. It might further be added, and it deserves consideration, that all our MSS., and versions of the New Testament, were probably taken, not from the single copies of the Gospels and Epistles, which proceeded from the hands of the Apostles themselves, but from the collection that was formed of the several parts of the New Testament. If, instead of 292 MSS. enumerated by Michaelis, we had above 1000, they would still be transcripts of one and the same copy; and if this copy had any errors, which it would be the highest presumption to deny, these errors must have been transmitted into every MS. of the Greek Testament, whatsoever; and these errors can be remedied only by the aid of critical conjecture. Upon the whole, it appears, that a collection of critical conjectures may be of great use in establishing the genuine text of the Greek Testament; and it is likewise attended with this particular advantage, that we are led by it to examine MSS., and other original documents, with greater accuracy, in order to see whether those readings, which had no other support than conjecture, may not be established by written authority. Such a collection has been published by Bowyer, a learned bookseller in London, the third edition of which, with improvements, was published in London in 1782. Of several hundred conjectures, which Bowyer has produced, there is hardly one, says Michaelis, which, after impartial examination, will be found probable. On the other hand, it cannot be denied, that there are some few, which bear on them the marks of probability. Several of these are examined by Michaelis, and he has added a variety of his own conjectures, for which we must refer to his work, cited at the close of this article. Besides the critical conjectures already mentioned, there is another kind of conjecture, denominated by Michaelis "theological conjecture," which consists in altering the text of the sacred writings, according to the maxims adopted by any particular party, whether it be the ruling, or the persecuted party, in the church. Although it is allowable to venture a conjecture in matters relating to history, to dates, or to names, as in these cases the Bible is not our only "principium cognoscendi," yet whoever alters the text in subjects which relate to points of divinity, evidently presupposes a "principium cognoscendi," that is prior to the Bible itself; and this is frequently nothing more than a set of principles, which this or that particular person has thought proper to adopt. It has been urged by those who defend theological conjecture, that we ought never to lose sight of the "auro in fidei," or analogy of faith. Thus, if two passages in the Bible contradict each other in matters of faith, the one must be altered. But the question recurs, how shall we determine which of the two is to be altered? "In my opinion," says Michaelis, "we should alter neither, but reject the whole, as not coming from the Deity, if it be true that there are real contradictions, for it is upon this ground, that we condemn the Koran." But every apparent contradiction is not a contradiction in reality; and passages that are seemingly at variance may, with skill and patience, be reconciled. Such is the case with respect to Rom. iii. 28. and James, ii. 24. the whole contradiction vanishing, as soon as we reflect that St. Paul understands

faith in Christ, St. James faith in the unity of the Godhead. For other observations on this subject, we refer to the author. Michaelis's Introduction to the New Testament by Murh, vol. ii. part. 1. See CARRICISM.

CONIFERÆ in *Botany*, the fifteenth natural order in the Philoſophia Botanica of Linnaeus, and the fifty-first of the Prælections. In the Philoſophia Botanica the genera included in it are abies, pinus, cupressus, thuja, juniperus, taxus, cædria. These are all retained in the Prælections, pinus and abies being united, and equisetum added with a mark of doubt, and an observation that it has the pollen of flax. The order derives its name from the cones or strobiles in which the seeds are contained. The fruit of juniperus, indeed, seems to be a berry, but it is properly a strobile, with pulpy scales, which do not open; for it has six fleshy connate scales, each containing a single seed. Taxus also apparently bears a berry; but this fleshy berry is only the fleshy receptacle almost covering the seed. All the coniferæ yield a resin, which renders most of them evergreen. The fruit in all is biennial, produced in the spring, but not ripening and dropping its seeds until the spring after.

The coniferæ compose also one of the natural orders of Jussieu, the fifth of his fifteenth class, with the following character: *Flowers* monoicous or dioicous. *Males* most frequently in a catkin, or heaped together upon a catkin, each furnished with a scale, with or without a calyx: the stamens attached either to the calyx, or to the scale. *Stamens* definite or indefinite in number: filaments sometimes distinct, sometimes united into a simple or branched stipe. *Females* either solitary, or capitate, or disposed in a strobile or cone, densely imbricated with scales that separate the flowers; furnished either with a calyx or with a scale discharging the office of a calyx. *Germ* superior, cortical, either double or manifold, with as many styles and stigmas, and either as many seeds, or as many one-seeded capsules. *Coraculum* cylindrical, central, in a fleshy perisperm, two-lobed; the lobes sometimes, but rarely, divided or palmate, thence appearing many-lobed. *Stem* a tree or shrub. It contains the following genera: I. With a stamiferous calyx; cædria, castanea, taxus. II. With only a stamiferous scale, the true coniferæ: Juniperus, cupressus, thuja, araucaria (Dom. beya: Lam.), pinus, abies.

Ventana has the same division and genera, except that he omits araucaria.

CONIGLIANO, in *Geography*, a small, but populous, town, in the district of Treviso, in the territory of Venice, which now forms part of the kingdom of Italy.

CONIL, a small town of Spain, in the kingdom of Seville, in Andalusia, on a bay to which it gives name; 15 miles S. E. from Cadiz, with a strong castle. Its inhabitants subsist chiefly by fishing. N. lat. 36° 16'. W. long. 6° 8'.

CONIMBRIGA, or COMBRICIA, in *Ancient Geography*, Coimbra, a town of Spain, in Lusitania, on the Munda.

CONIN, or KONIN, in *Geography*, a town of Poland, in the palatinate of Kalisz; 18 miles S. E. of Gnesen.

CONJOINED, or CONJUNCT, in *Heraldry*, a term used for charges in arms when linked together.

CONJOINT, or CONJUNCT, is applied in *Ancient Music*, in the same sense as *consonant*, to two or more sounds heard at the same time. See CONSONANCE.

CONJOINT *degrees*, two notes which immediately follow each other in the order of the scale; as *ut* and *re*.

CONJOINT *tetrachords*, are two tetrachords, where the same *chord* is the highest of the one, and the lowest of the other.

CONIQUE,

CONIQUE, *Fr.* This term is applied to a piece of artillery, of which the bore is wider towards the muzzle than it is towards the breech.

CONIRA, in *Botany*, a name used by some authors for the *myrrhis*. *G-r. Emac. Ind. 2.*

CONISALUS, in *Mythology*, a god of the Athenians mentioned by Strabo, and supposed to be the same with Priapus.

CONISBERG, in *Geography*. See **KONIGSBERG**.

CONISCI, in *Ancient Geography*, a people of Spain, who formed a part of the Cantabri, and in their dress resembled the Gauls, according to Strabo.

CONISIUM, a town of Asia, in Mysia, according to Pliny. Hercules calls it *Ciniosine*, and makes it an episcopal city in the province of the Hellespont.

CONISOR. See **COGNISOR**.

CONISSALÆ, in *Natural History*, the name of a class of fossil bodies; the word is derived from *κωνισσάλος*, powder; all the species of bodies of this class being found like common sand, in form of powder, have been usually considered together, under the common name of *fanula*. The conissalæ are defined to be stones of a differently defaced, crystalline, or sparry matter, but always found in form of small and disunited particles, great numbers of which, being amassed together, form a kind of powder.

Of this class of bodies there are two distinct and large genera. 1. The fanula properly so called, which are composed of particles all appearing to have a tendency to the same regular figures, transparent, vitrifiable by a strong fire, and not soluble in, or effervescing with acids. 2. The *faburra*, or *grit*, of stone found loose; these are found in form of powder, the particles of which, in general, have no tendency to any particular figure, but appear to be rudely broken fragments of larger masses. Hill's *Hist. of Foss. p. 543.*

CONISTERIUM, a room in the ancient *Gymnasia* or *Palaestra*, in which was kept the sand for the use of the wrestlers, who were accustomed, after anointing their bodies with oil, to sprinkle themselves with sand to afford a firmer grasp in their encounters.

CONISTON, in *Geography*, a village in the northern part of Lancashire, in the hundred of Loynfdale. Latitude about $54^{\circ} 29'$, and longitude $2^{\circ} 44'$ W. It is situate on the steep ascent of a mountain of blue argillaceous schistus, near the northern end of a romantic lake, of six miles in length, and one in breadth, called after its name; near this town some copper-mines are worked, but to no considerable extent, and some veins of lead-ore: slate quarries are also to be found near this place. There is a torrent or mountain stream of water which precipitates itself into the lake near this place.

CONISTORSIS, in *Ancient Geography*, a town of Spain in Celtiberia. Strabo mentions it as a very famous town.

CONITZ, or **CHOINITZ**, in *Geography*, a town of Prussia, in Pomerania; 40 miles S. of Dantzick.

CONJUGAL RIGHTS, in *Law*. The suit for "restitution of conjugal rights" is one species of matrimonial causes; which is brought whenever the husband or wife is guilty of "subtraction;" or lives separate from the other without any sufficient reason: in which case the ecclesiastical jurisdiction will compel them to come together again, if either party be weak enough to desire it, contrary to the inclination of the other.

CONJUGATE Asia, &c. in Conics. See **CONIC Sections**.

CONJUGATE Point, in *Geometry*. See **POINT**.
CONJUGATES, in *Rhetoric*, denote words deduced from the same origin with that of the subject: e. g. *He who does justly, is just*.

CONJUGATION, in *Anatomy*, a term applied by the older anatomists to the nerves coming from the brain, in the same sense that we employ the expression, pair of nerves.

CONJUGATION, in *Grammar*, an orderly distribution of the several parts or inflexions of verbs, in their different moods and tenses, to distinguish them from each other: or, the manner in which the personal terminations of verbs are changed to express the several moods and tenses.

The Latins have four conjugations distinguished by the terminations of the infinitive, *are, ere, ire, ire*; and most of the French grammarians reduce the conjugations of their language to the same number, ending in *er, re, ir, and oir*. Some have added a fifth Latin conjugation called the *mixt*, because it is composed of the third and fourth, as *accipere, accipio*.

The Greeks have three kinds of verbs; the first called *barytons*, because the last syllable is pronounced with a grave accent; (see **PARYTONUM**); such are *τινω, τεινω*, and *πρωτω, προτω*; the second are circumflex verbs, which admit a contraction in their termination, and are then marked with a circumflex accent; such is *αγαπαω, αγαπαω*, the third kind comprehends the verbs in *μι, αμι, σμι*. Of the first sort there are six conjugations; divided according to their characteristic, i. e. the letter preceding the termination. Accordingly verbs having the labials π, β, φ, or πτ, form the first conjugation of barytons; those having the gutturals κ, γ, χ, or κτ, the second; those having the dentals τ, θ, θ form the third; verbs in ζα, σσα, or τσα, comprehend the fourth conjugation; the liquids λ, μ, ν, ς, mark the fifth; while those in α pure, such as *τινω, λνω*, distinguish the sixth conjugation. Of the second there are three, viz. those in *αω, εω, οω*: but all these and the barytonous verbs are conjugated, that is, are varied in the same way to express mood, time, number, and person. Of the third, there are four. But Messrs. de Port Royal reduce these 13 conjugations to two: viz. one in α, comprehending the barytons and circumflex verbs; and the other those in μι.

Mr. I. Jones, in his "Grammar of the Greek Tongue, on a new and improved Plan," has judiciously rejected the fore-mentioned distinctions as unnecessary, because they are useless and unmeaning; and distributed the Greek conjugations into four; viz. the active α, its passive εαα, the active μι, and its passive μαι.

In the Hebrew language there are four conjugations, viz. *kal* with its passive *niphal*, *piel* with its passive *pyhal*, to which also may be referred *poel*, *hiphil* with its passive *hophal*, and *hitpael*. The third person singular masculine of the first conjugation is the preterite of the theme; the second conjugation has a *dagesh forte* in the second radical; the third has the prefix letter ה; and the fourth, the syllable הן.

In English, where the verbs have scarce any natural inflexions, but derive all their variations from additional particles, pronouns, &c. we have hardly any such thing as strict conjugations.

Some grammarians, however, distribute English verbs into three conjugations, or classes, distinguished from one another by a peculiar formation in some principal part belonging to each: and they observe that the three different terminations of the participles, viz. *ed*, or its contraction *t*, *ght*, and *en*, may be considered as the characteristics of the conjugations.

conjugations. But as the verbs of the first conjugation would far greatly exceed in number those of both the others; and as those of the third conjugation are so various in their form, and incapable of being reduced to one plain rule; it seems better in practice, as bishop Lowth justly observes, to consider the first in *ed* as the only regular form, and the others as deviations from it: after the example of the Saxon and German grammarians. Lowth's *Introd. to English Grammar*, p. 104, 1772. Murray's *Eng. Gram.* p. 96. ed. 8. Others again distinguish them by the different inflexion of the first tense in each root, and thus make four conjugations in the active voice: the first has three radicals alike: as *I do read; I read; i. e. yesterday; I have read, i. e. just now.* The second has the first and third radical alike: as *I run, I ran, I have run.* The third conjugation has the second and third radical alike: as *I grieve, I grieved, I have grieved.* The fourth has the three radicals different; as *I write, I wrote, I have written or writ.* The passive voice, being made up of the third radical and the auxiliary verb *am*, admits of no difference of conjugations. Ward's *Essays on the English Language*, p. 87.

CONIUM, in *Botany*, (*Conium*), Theophrast. Dioscorid. derived by Henry Stephens from *κονίον*, the cone of the mathematicians, a name given also, on account of its form, to that well-known children's toy, a top. From this latter sense came the verb *κονίζω*, which Hesychius explains by *περὶ δυνάμει* implying a capacity to produce a whirling motion; and thence the poisonous herb employed by the Greeks as the means of inflicting a capital punishment, was called *κονίον*, because it occasioned a sensation of giddiness in the sufferer. Linnæus unaccountably derives the word from *κονίον*, (*diff.*) Linn. Gen. 336. Schreb. 469. Willd. 53. (Cicut. *Tourn.* 160. Hall. 766. Gert. 117. Lam. III. 503. Juss. 223. Vent. 3. 28. Cicut. Lam. Enc.) Class and order, *pentandria digynia*. Nat. Ord. *Umbellatæ*; Linn. *Umbellifera*; Juss. Vent.

Gen. Ch. *Umbel* partial, and universal with many spreading rays. *Involucere universal*, three or many-leaved, short, unequal, membranous towards the base: *partial* with about three leaves, only half enclosing the pedicels. *Cal.* scarcely perceptible. *Cor.* Petals five, inflexed, heart-shaped, unequal. *Stam.* Filaments five, about the length of the petals; anthers roundish. *Pist.* Germ inferior; styles two, short, reflexed; stigmas obtuse. *Peric.* none. *Fruit* nearly globular, with five crenulate ridges; composed of two seeds, which are convex, almost hemispherical, striated on one side, flat on the other, separating as they become ripe.

Eff. Ch. *Partial involucre* only on one side, about three-leaved. *Fruit* nearly globular, with five crenulate ridges.

Sp. 1. *C. maculatum*. Common hemlock. Linn. Sp. Pl. 1. Mart. 1. Willd. 1. Jacq. Aust. 2. tab. 156. Curt. Flor. Lond. 1. tab. 17. Eng. Bot. 1191. Woodv. Med. Bot. tab. 22. (Cicut. major; Lam. II. tab. 195. fig. 1. Bauh. Pin. 160. Rai. Syn. Cicut. domestica. Morif. Umb. 18 c. l. § 9. tab. 6. fig. 1. Coriandrum. Roth Cranz.) "Seeds striated." Linn. "Stem spotted at the base; furrows of the seeds crenate." Lam. "Seeds without prickles; stem much branched, shining, striated." Dr. Smith. *Root* biennial, spindle-shaped, often branched, white, fleshy. *Stem* three or four feet high, erect, cylindrical, hollow, furrowed, smooth, shining, marked with purple spots, much branched, especially towards the top, leafy. *Leaves* supra decomposed, or several times pinnated; bottom ones very large, sometimes two feet long; leaflets oblong, acutely notched, dark green above, paler underneath. *Rays* of the *umbel* from ten to twelve; of the *umbellule* fifteen or

sixteen. General involucre commonly many-leaved, reflexed. *Petals* white, heart-shaped, inflexed, nearly equal. The whole plant is narcotic, with a disagreeable smell and nauseous taste. Very different opinions have been entertained with respect to its active qualities, but it may be doubted whether authors have always intended the same plant. Haller was inclined to think, that the plant which was fatal to Socrates and Phocion, was not that now before us, but the *cicut. virosa* of Linnæus, which the French writers have called *cicutaria*. La Marck, on the other hand, asserts that the *conium maculatum* of Linnæus, his *cicut. magna*, is the *cicut.* of ancient authors, the very plant by which Socrates was poisoned; and severely censures Linnæus for changing its name to *conium*. But if this great botanist had looked into the Greek authors, he would have found that Linnæus only restored the most ancient name, and that the word *cicut.* is entirely of Latin origin, unknown to the Greek language. Whether Linnæus would not have done better, if he had retained the term *cicut.*, which had been adopted by all the modern botanists before him, is a question to which an affirmative answer may perhaps be given. His *cicut. virosa* might then, in concurrence with Haller's opinion, have been called *conium*. But when the change was made and had, through the extensive circulation of the works of Linnæus, obtained general currency, a revival of the ancient name, instead of removing, has, in fact, increased the confusion. Whatever may have been the plant by which Socrates was judicially murdered, our *conium maculatum* unquestionably possesses deleterious qualities; but, as Dr. Smith observes, it is happily too nauseous to be incautiously swallowed in any dangerous quantity. See *CICUTA* in the *Materia Medica*, where it should have been observed that Plato does not call the plant, by which Socrates perished, *cicut.*, a word which he had never heard; nor does he give it any Greek name peculiar to it; but constantly uses the very general term *φάρμακον*, which denotes a strong poison either poisonous or medicinal. 2. *C. rugosum*. Willd. 2. Thunb. prod. 50. (C. *sulfuricosum*; Berg. cap. 77.) "Seeds wrinkled." *Stem* somewhat shrubby. A native of the Cape of Good Hope. 3. *C. rigens*. Linn. Mant. 56. Mart. 2. Lam. 2. Willd. 3. Thunb. prod. 50. "Seeds somewhat muricated; peduncles furrowed; leaflets channelled, obtuse." *Root* perennial. *Stem* purplish, rigid, striated, erect, diffuse, branched. *Leaves* twice-winged, somewhat fleshy, divided, obtuse, crenulate, hard, the colour of rue; petioles longitudinally channelled. *Florets* all fertile, white; leaflets of the general involucre five, shorter than the rays of the umbel; one or two divided; those of the little umbels seven; a few of them crenate; petals equal, lanceolate, rolled inwards. *Seeds* reddish, striated and somewhat muricated. A native of the Cape of Good Hope, on the coast, introduced into England in 1787, by Masson. 4. *C. africana*. Linn. Sp. Pl. 2. Mart. 3. Willd. 4. Jacq. hort. tab. 194. (Cicut. africana; Lam. 3. Ill. tab. 195. fig. 2. *Caucalis africana*; Boerh. Lugd. b. 1. tab. 63. *Cappophyllum*; Gert. 2. tab. 85. fig. 6.) "Seeds prickly." Linn. "Seeds muricated; petioles and peduncles even-furrowed." Willd. "Leaves twice winged, glaucous; petioles and peduncles even, furrowed; seeds tooth-muricated." Lam. *Root* annual, *Stems* three or four inches long, herbaceous, cylindrical, smooth, glaucous; with a few leaves, and one or two short axillary branches. *Root-leaves* almost as long as the stem; leaflets flat, not channelled, small, gashed. *Flowers* white, almost regular, in small terminal umbels; leaflets of the general involucre from three to five, membranous towards the base;

bare; several of the florets barren. *Fruit* in the centre, sessile. Linn. *Fruit* elliptical, lenticularly compressed, solitary in the centre of the partial umbels, nearly sessile. *Seeds* slightly convex on one side, with three, sometimes only two, tubercled or tooth-muricated ribs; flat or a little concave on the other; marked with a longitudinal middle line, and two curved, nearly obsolete, lateral ones. Gært. A native of the Cape of Good Hope; cultivated in 1759 by Miller, who received the seeds from Boerhaave. 5. *C. tenuifolium*. Mart. 5. Vahl. Symb. 3. 49. "Root and stem-leaves simple, linear." *Stem* a foot high, herbaceous, upright, scarcely branched, slender, cylindrical, smooth, slightly striated. *Leaves* very narrow, a little broader at the base, somewhat sheathing, very smooth; lower ones about four inches long. *Peduncles* lateral and terminal, few, remote. *General involucre* five-leaved; leaflets awl-shaped, somewhat rigid, shorter than the umbel; *partial ones* the length of the little umbels. *General umbel* small, five-rayed; partial ones eight or ten-flowered. *Seeds* oblong, striated, small, smooth. A native of the Cape of Good Hope.

CONIUM Royenii. Linn. See *CAUCALIS arvensis*.

CONIUM dichotomum. Desfont. See *TORDYLIUM peregrinum*.

CONIUM, in *Ancient Geography*, a town of Asia Minor, in Pacatian Phrygia. It appears to have been founded by Cineas, king of Thessaly; and according to the notitia of Hierocles, it had been episcopal.

CONJUNCT. See **CONJOINT PAIR.**

CONJUNCT of an arch. See **SUPPLEMENT.**

CONJUNCT sentence. See **SENTENCE.**

CONJUNCTION, in *Astronomy*, the meeting of the stars or planets, in the same point or place of the heavens, and it is either *true* or *apparent*.

If the two bodies meet both in the same degree of longitude and latitude, a right line drawn from the centre of the earth through the centre of one of them, passes through that of the other; then the conjunction is said to be true and central: and if the lower hides the upper, the conjunction is said to be corporal.

If the line pass wide of the centre of the earth, the conjunction is said to be partite.

If the bodies do not meet precisely in the same degree, but are joined with some latitude, the conjunction is said to be apparent. Thus, when a right line, supposed to be drawn through the centres of two planets, does not pass through the centre of the earth, but through the eye of the spectator; it is said to be an apparent conjunction.

Some have also divided conjunctions into *great* and *great-est*: the former denoting those which occur at comparatively a shorter interval, such as the conjunctions of Jupiter and Saturn, and the latter happening after a longer interval, such as those of the three superior planets, Mars, Jupiter, and Saturn. But this division has little place in astronomy; being founded on the notion of the particular influences, &c. of the heavenly bodies in such and such aspects.

Astrologers maintain, that the deluge was owing to a conjunction of all the planets in Capricorn; and that the conflagration will be occasioned by their conjunction in Cancer: whence they pretend to foretel the end of the world.

The conjunction is the first, or the principal, of all the aspects; and that whence the other aspects commence; as opposition is the last, where they terminate. See **CHARACTER.**

The moon is in conjunction with the sun every month. Her conjunctions and oppositions are called by a general name, *syzygies*.

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Eclipses of the sun never happen, but when there is a conjunction of the sun and moon in or near the nodes of the ecliptic.

CONJUNCTION, in *Grammar*, a particle which expresses a relation or dependance between words and phrases; thus called, because it serves to join or connect the parts or members of a discourse, which is its common use, and also to connect words; so as to shew the relations which those words so united have to other parts of the sentence.

Conjunctions, however, often unite sentences, when they appear to unite only words: e.g. "Duty and interest forbid vicious indulgences;" which form of expression contains in reality two sentences. See Murray's Eng. Gram. p. 105, ed. 8.

Mr. Harris defines a conjunction to be a part of speech, void of signification itself, but so formed as to help signification, by making two or more significant sentences to be one significant sentence; and he distributes them into such as connect sentences and their meaning, and such as conjoin the sentences whilst they disjoin the sense. The former are *conjunctive*, and are either copulative or continuative, the former joining all sentences, however incongruous in signification, and the latter joining only those which have a natural connection; and the latter *disjunctive* some of which are simple, as, *either* it is day or it is night, and *adversative*, as, it is not day *but* it is night. Hermes, p. 240, &c. See **ADVERSATIVE** and **CONTINUATIVE.**

Mr. Horne Tooke, in his "Diversions of Purley," has made some remarks, in his usual manner, on the definition of a conjunction given by Mr. Harris, charging the author not only with self-contradiction, but with great want of perspicuity. Accordingly he thus states Mr. Harris's definition: "A sound significant devoid of signification, (referring to Mr. Harris's definition of a word), having at the same time a kind of *obscure* signification; and yet having neither signification nor no signification; but a *middle something* between signification and no signification, sharing the attributes both of signification and no signification; and linking signification and no signification together." This acute and ingenious writer denies conjunctions to be a separate sort of words or parts of speech by themselves. For they have not a separate manner of signification; although they are not devoid of signification. And the particular signification of each must be sought for from amongst the other parts of speech, by the help of the particular etymology of each respective language. By such means alone can we clear away the obscurity and errors in which grammarians and philosophers have been involved by the corruption of some common words, and the useful abbreviations of construction. (See **ABBREVIATION.**) And, at the same time, we shall get rid of that farago of useless distinctions into conjunctive, adjunctive, disjunctive, subdisjunctive, copulative, negative copulative, continuative, &c. &c. &c., which explain nothing; and (as most other technical terms are abused) serve only to throw a veil over the ignorance of those who employ them. In dismissing conjunctions from the rank which they have long held as distinct parts of speech, Mr. Tooke cites several authorities; and among others, bishop Wilkins, who, in his "Essay towards a real Character and a philosophical Language," (part iii. c. 4. p. 312.) says, "According to the true philology of speech, I cannot conceive this kind of words" (speaking of adverbs and conjunctions) "to be properly a distinct part of speech, as they are commonly called. But until they can be distributed into their proper places, I have so far complied with the grammars of initiated languages as to place them here together." Mr. Locke, who was much indebted to Wilkins, expresses his dissatisfaction

these are but medicines and ceremonial forms of words (commonly called *charms*) without apparition. Cowel.

Hawkins, in his "Pleas of the Crown," (l. i. c. 3.) says, that *conjurers* are those, who, by force of certain magic words, endeavour to raise the devil, and oblige him to execute their commands. *Witches* are such who, by way of conference, bargain with an evil spirit, to do what they desire of him; and *sovereigns* are those who, by the use of certain superstitious words, or by the means of images, &c. are said to produce strange effects, above the ordinary course of nature. All these were anciently punished in the same manner as *heretics*, by the writ "de heretico comburendo," after a sentence in the ecclesiastical court; and they might be condemned to the pillory, &c. upon an indictment at common law. 3 Inst. 44. H. P. C. 38. The president Montefquieu also (Sp. Laws, b. xii. c. 5.) ranks sorcery and heresy together; laying it down, at the same time, as an important maxim, that we ought to be very circumspect in the prosecution of magic and heresy; because the most unexceptionable conduct, the purest morals, and the constant practice of every duty in life, are not a sufficient security against the suspicion of crimes like these. See *Witchcraft*.

Our fore-fathers were stronger believers in the ridiculous stories that have been generally told concerning witchcraft and sorcery than any who live in these more enlightened times, when they enacted by stat. 33 Hen. VIII. c. 8. all witchcraft and sorcery to be felony without benefit of clergy; and again by stat. 1 Jac. I. c. 12. that all persons invoking any evil spirit, or consulting, covenanting with, entertaining, employing, feeding, or rewarding any evil spirit; or taking up dead bodies from their graves to be used in any witchcraft, sorcery, charm, or enchantment; or killing or otherwise hurting any person by such infernal acts; should be guilty of felony without benefit of clergy, and suffer death. And if any person should attempt by sorcery to discover hidden treasure, or to restore stolen goods, or to provoke unlawful love, or to hurt any man or beast, though the same were not effected, he or she should suffer imprisonment and pillory for the first offence, and death for the second. These acts continued in force till lately, to the terror of all ancient females in the kingdom; and many poor wretches were thus sacrificed to the prejudice of their neighbours, and their own illusions: not a few having, by some means or other, confessed the fact at the gallows. But though some of the tales that led to these penal statutes still exist among the uninformed vulgar, as the triumph of imposture over credulity, and as bugbears to children, inexcusably employed for this purpose; all executions for this dubious crime are now at an end:—our legislature having at length followed the wise example of Louis XIV. in France, who thought proper by an edict to restrain the tribunals of justice from receiving informations of witchcraft. (See Voltaire's Age of Lewis XIV. c. 29. Mod. Un. Hist. vol. xxv. p. 215.) Yet Voughlans (De Droit Criminel, 353. 459.) still reckons up sorcery and witchcraft among the crimes punishable in France. With us the above recited statutes against conjuration and witchcraft are repealed; and no prosecution shall be carried on for the future against any person for conjuration, witchcraft, sorcery, or enchantment: but where persons pretend to exercise any kind of witchcraft or conjuration, &c. or undertake to tell fortunes, or, from their skill in any occult science, to discover where goods stolen or lost may be found; they shall upon conviction be imprisoned a year, and stand in the pillory once in every quarter, in some market-

town, and may be ordered to give security for their good behaviour, by stat. 9 Geo. II. c. 5.

CONKAIR, in *Geography*, a town of Hindoostan, in the province of Berar, situated between a high rocky hill and the south bank of the Mahanuddoe river, which rises at a place called Sehawah, about 7 cois S. of Conkair. The rajah of Conkair has built a fortress on the summit of the hill, and mounted it with two guns.

CONKERE, a post of Chinese Tartary. N. lat. 44° 56'. E. long. 101° 49'.

CONLIE, a small town of France, in the department of the Sarthe, and chief place of a canton, in the district of Le Mans, 12 miles N.W. from Le Mans. It has 1405 inhabitants. The canton reckons 16 communes, with 13,055 inhabitants upon a territorial extent of 220 kilometers.

CONLIEGE, a small town of France, in the department of Jura, and chief place of a canton in the district of Lons le Saulnier, with 1201 inhabitants. The canton itself reckons 20 communes and 9089 inhabitants upon an extent of 142½ kilometers.

CONLOBONGI, a town of the island of Borneo; 120 miles N. of *Banjer-Massing*.

CONN, in *Sea Language*. See *COND*.

CONN, *Lough*, in *Geography*, a lake of the county of Mayo, Ireland, which is at the foot of mount Neptune, and extends 9 miles in length, but not more than two in breadth. There is a great number of islands in this lake, some of which are well planted, and being very fertile in fine grass, serve for pastures to sheep and other cattle. That kind of trout called *Gillaroo*, is also found here in abundance. Dr. Shaw observes of these, that they do not appear to be specifically different from the common trout, but by living much on shell-fish, and swallowing small stones at the same time, their romachs acquire a much greater degree of thickness, and a kind of muscular appearance, so as to resemble a sort of gizzard. Lough Conn stretches from N.W. to S.E. between the Killalla and Castlebar.

CONNA, in *Botany*, Rheed. See *CASSIA Fistula*.

CONNA, in *Ancient Geography*, a town of Asia Minor, in the Greater Phrygia. Ptolemy. The 6th council of Constantinople places it in Pamphylia.

CONNAC, denotes in Arabia, Palestine, Barbary, &c. the place, whether covered or not, where travellers or caravans halt or break off their journey for a time, in order to rest and refresh themselves and their beasts of burthen. Similar to this was the "malon," or inn (Gen. xlii. 27. xliiii. 21, &c.) where the sons of Jacob opened their flocks to give their asses provender. The appellation Connac in the East corresponds with the *πανδοχειον* and *καταφυγια* in the Old or New Testament, which are rendered inns or hospitia. But excepting the caravanaries which may in some measure answer to the *πανδοχεια* and *καταφυγια*, there are, properly speaking, no houses of entertainment in Barbary; at least, in the sense usually applied to inns or hospitia, *i. e.* where travellers can be provided with lodgings, provisions, and other necessaries for their money.

CONNAMARA, the name of a district, in the county of Galway, Ireland, noted for the woollen stockings knit there, and for the wild state of the country. It is in the barony of Ballinahinch, and an account of it will be found under that name. See *BALLINAHINCH*.

CONNARUS, in *Botany*, (*Κωνάρος*, the name of a tree described by Athenæus), Linn. Gen. 830. Schreb. 1116. Willd. 1268. Juss. 399. 452. 453. Clals and order, *monadelphica decandria*. Nat. Ord. *Dumoseæ*, Linn. *Terr. Indivææ*, Juss.

Gen. Ch. *Cal.* one-leaved, with five segments; or five-leaved. *Cor.* petals five, lanceolate, erect, equal. *Stam.* filaments ten, awl-shaped, connected at the base, (in pairs, Lam.), alternately larger and smaller; anthers roundish. *Pist.* germ single (except in one species), oblong, villous; style cylindrical; stigma obtuse. *Peric.* capsules gibbous, one-celled, either two-valved or dehiscent on one side. *Seed* single, large.

Eff. Ch. *Cal.* five-cleft or five-leaved. *Cor.* five-petalled. *Capf.* one-celled. *Seed* single.

Species, 1. *C. asiaticus*. Ceylon Sumach. Willd. 2. (*C. monocarpus*. Linn. Mart. 1. Rhas zeylanica trifoliata phaeocol facie, floribus copiosis spicatis; Burm. Zeyl. 199, tab. 89. Phaeocolus arborifcens zeylanica monocarpus; Rai. Supp. 438.) "Leaves ternate; leaflets roundish, egg-shaped, one-nerved, veined." A tree. *Leaves* alternate, petioled; leaflets acuminate, quite entire, smooth, equal, petioled. *Racemes* erect, terminal. A native of the East Indies. 2. *C. pentagynus*. Lam. 1. Willd. 3. (Cavan. Diff. 7. 376, tab. 223.) "Leaves ternate; leaflets roundish, egg-shaped, three-nerved; flowers pentagynous." A tree. *Branches* cylindrical, smooth, leafy. *Leaves* alternate, acute, entire, smooth, somewhat coriaceous, finely veined underneath. *Flowers* small, numerous, in axillary and terminal spikes, forming a kind of panicle; calyx villous on the outside; pistils from three to five, villous, short, appearing united at the base; styles shorter than the filaments; stigmas flat or truncated. Described by La Marek from dried specimens without fruit, communicated by Sonnerat. A native of Madagascar and Guinea. 3. *C. africanus*. Mart. 2. Lam. 3. Willd. 1. Vahl. Symb. 3. 86. Cavan. Diff. 7. 375, tab. 221. (Omphalobium indicum; Gaert. vol. i. 253, tab. 46, fig. 3, and vol. ii. præf. p. 33.) "Leaves ternate; leaflets oblong, veined, acuminate." Willd. "Leaves ternate, leaflets egg-shaped, acute at both ends, nerved underneath; flowers paniced, monogynous." Lam. A shrub. *Branches* cylindrical, smooth. *Leaves* alternate, petioled; leaflets four or five inches long, smooth, even-surfaced above, nerved and veined underneath. *Flowers* small, numerous; panicle compound, oblong, terminal. *Capsules* oblong, almost cylindrical, gibbous on one side, pointed at both ends, pedicelled, two-valved. Lam. *Capsule* valveless, dehiscent on the gibbous or outer side. *Seed* large, somewhat kidney-shaped, smooth, shining, dark chestnut-coloured, with an oblong pit on each side; aril incomplete, fleshy-glandular, variously lobed, so as to appear curled, its whole length closely adhering to the lower and exterior part of the seed. Gaert. 4. *C. pinnatus*. Lam. 2. Willd. tab. 572. Willd. 5. Cavan. Diff. 7. 375, tab. 222. (Perimeurigi; Rheed. Mal. 6. 43, tab. 24.) "Leaves ternate and pinnated; leaflets oblong, veined; petals with two bristles at the base." Willd. A tree. *Root* perennial. *Leaflets* of the same consistence, and similarly veined with those of *C. pentagynus*. *Flowers* white, in terminal and axillary panicles; calyx villous on the outside; petals lanceolate, with two remarkable bristles a little above the base, one on each side, pointing downwards, acute and somewhat divaricating; germ single, villous. *Capsules* oblong, gibbous one side, suddenly narrowed at the base, ending rather abruptly in a point, one-celled. *Seed* one. A native of the East Indies; described from specimens communicated to La Marek by Sonnerat. 5. *C. Santaloides*. Mart. 3. Willd. 4. Vahl. Symb. 3. 87. (Santaloides; Flor. Zeyl. 408.) "Leaves pinnated; leaflets egg-shaped, acuminate; peduncles axillary, aggregate; flowers in racemes." A tree. *Branches* cylindrical, smooth. *Leaves* unequally pinnated, scattered, remote, petioled; leaflets sometimes an inch and half long, quite entire, perfectly smooth, shining above, re-

ticularly veined underneath, on very short channelled petioles. *Peduncles* from four to six together, half the length of the leaf, smooth; partial ones scattered, with three or four pedicelled flowers towards the top. A native of the East Indies. 6. *C. mimifolius*. Mart. 4. Willd. 7. Vahl. Symb. 387. "Leaves pinnated; leaflets about twenty-one, oval-oblong, emarginate; racemes axillary." A tree. *Branches* cylindrical, villous towards the top. *Leaves* growing near the ends of the branches, alternate, approximate, on slightly villous petioles; leaflets opposite or alternate, on very short petioles, inner ones smaller, obtuse, smooth, finely veined on the upper surface, paler underneath. *Peduncles* axillary, usually three together, the length of the leaves, slightly hoary; pedicels scattered, filiform, the lowest commonly two-flowered. *Flowers* small, with a minute bracte at the base of each pedicel. A native of the islands of Nicobar.

CONNARUS decumbens; Willd. Vahl. See HERMANNIA triphylla.

Propagation and Culture. *C. asiaticus* is usually propagated in this country by laying down the young branches, which, if tongued in the manner practised for carnations, and duly watered, will put out roots in twelve months. They may then be cut off from the old plants, and planted in separate small pots, which should be filled with light fresh earth and plunged into a moderate hot-bed. They should afterwards be placed in a dry stove; but for about three months in summer they will bear the open air in a sheltered situation. The cuttings of this plant will sometimes take root, but without great care seldom succeed.

CONNATA FOLIA. See LEAF.

CONNAUGHT, in *Geography*, the name of the western province of Ireland, which contains the counties of Galway, Mayo, Sligo, Leitrim, and Roscommon. At the time of Strongbow's invasion, it was a distinct kingdom, and its king was monarch of Ireland. This dignity continued until the reign of Henry III.; after which time, the province was divided amongst petty chieftains, some of whom were of English extraction, until the reign of queen Elizabeth, when the earl of Sussex, lord deputy, divided it into counties, A. D. 1562; and sir H. Sidney, lord deputy, established a lord president of Connaught, A. D. 1567. In 1604, sir Arthur Chichester, lord deputy, established a circuit for judges of assize in Connaught. At present, the distinction of provinces is not attended to in any public acts; and indeed, as calculated to keep up a provincial spirit, which has often led to bitter animosities, it ought to be as much as possible discountenanced.

CONNAUGHT Worms. See WORM.

CONNAUX, in *Geography*, a town of France, in the department of the Gard, and district of Uzès; three leagues N.E. of Uzès.

CONNE, CONE, or COYNE LOUGH, in the county of Down, Ireland. See STRANGFORD.

CONNEAUT, and also ASHTABULA, are small rivers of America, in the state of Ohio, which form good harbours for boats and small craft on the borders of lake Erie.

CONNECTICUT, one of the United States of America, called by the ancient nations *Quinnibicut*, lying between 41° and 42° 2' N lat., and between 71° 20' and 73° 15' W. long.; extending in its greatest length 100 miles, and greatest breadth 72 miles; and comprehending about 4674 miles, or about 2,640,000 acres. It is bounded on the north by Massachusetts; on the east by Rhode island; on the south by the Sound, which separates it from Long island; and on the west by the state of New York. Connecticut is divided into eight counties, viz. Fairfield, the chief towns of which are

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are Fairfield and Danbury; New Haven, with a capital of the same name; Middletown, the chief towns of which are Middletown and Haddam; and New London, the chief towns of which are New London and Norwich; which four counties extend along the Sound from W. to E.: Litchfield, Hartford, Tolland, and Windham, each having a capital of the same name respectively, which four counties extend in the same direction with the former on the border of the state of Massachusetts. These counties contain about 100 townships, which are subdivided into parishes, each of which has one or more places of public worship, school-houses at convenient distances, and a college at New Haven. See COLLEGE. Each township is a corporation, invested with sufficient powers for its own regulation. The number of representatives is sometimes 180; but more commonly about 160. The principal rivers in this state are Connecticut, Housatonic, and the Thames, with their branches; which see respectively. The whole sea-coast is indented with harbours, which are safe and commodious; but the principal are those of New Haven and New London. This state sends seven representatives to Congress. The inhabitants are almost wholly of English descent, besides whom they have no Dutch, French, or Germans, and few Scots or Irish. The original rock, from which have sprung all the present occupiers of Connecticut, and the numerous emigrants from hence to every part of the United States, consisted of 3000 persons, who settled in the towns of Hartford, New Haven, Windsor, Guilford, Milford, and Weathersfield, about the years 1635 and 1636. In 1756 the population amounted to 130,611 persons; in 1774 to 197,356; in 1782 to 202,877 whites, and 6273 Indians and negroes; in 1790 to 237,946, of whom 2764 were slaves; and by the census in 1800, to 251,002, of whom 121,113 were free white males, 123,528 free white females, 5300 free persons, except Indians, not taxed, and 951 slaves.

Connecticut, notwithstanding the changes of temperature to which it is subject, is very healthful. The surface of the country exhibits mountains, hills, and vallies; and though it is very well watered, some small parts of it are barren. Its chief productions are Indian corn, rye, wheat, oats, barley, and buck-wheat; flax in abundance, some hemp, potatoes of several kinds, pumpkins, turnips, peas, beans, &c., together with fruits of all kinds which are common to the climate. The soil is well adapted for pasturage and mowing, so that the farmers are enabled to feed a great number of neat cattle and horses. This state carries on its chief trade with the West India islands, in vessels from 60 to 140 tons. Its exports consist of horses, mules, oxen, oak-slaves, hoops, pine-boards, oak-planks, beans, Indian corn, fish, beef, pork, &c.; and a large number of coasting vessels is employed in carrying the produce of Connecticut to the other states; from which they receive in return, rice, indigo, and money. But as New York is nearer, much of its produce, particularly that of the western parts, is carried thither; such as pot and pearl-ashes, flax-seed, beef, pork, cheese, and butter, in large quantities. The value of the whole exported produce and commodities from this state, before the year 1774, was then estimated at about 200,000*l.* lawful money, annually. In the year ending September 30, 1791, the amount of foreign exports was 710,340 dollars, besides articles carried to different parts of the United States to a great amount; in 1792 it was 749,025 dollars; in 1793, 770,239 dollars; in 1794, 806,746 dollars; and in 1804, 1,516,110 dollars, comprehending 1,486,862 domestic and 29,228 foreign. This state owns and employs in the foreign and coasting trade more than 32,897 tons of shipping. The farmers in Connecticut are generally clothed

in plain, decent, homespun cloth; and both their linens and woollens are domestic manufactures, strong though coarse; and many of their cloths are fine and handsome. This state has large orchards of mulberry trees, and silkworms have been reared with such success, that they promise a supply of silk, not only to the inhabitants, but also for exportation. New Haven has linen and button manufactories; they have established a woollen manufactory at Hartford, besides glass works, a snuff and powder mill, iron works, and a slitting mill. Iron works are also established at Salisbury and Norwich, and in other parts of the state. Stafford has a furnace, at which are made large quantities of hollow ware, and other ironmongery, sufficient for the supply of the whole state. Paper is manufactured at Norwich, Hartford, New Haven, and in Litchfield county. Ironmongery, hats, candles, leather, shoes and boots are manufactured in this state.

Connecticut is laid out in small farms, from 50 to 300 and 400 acres each, which are held by the farmers in fee-simple, and are generally well cultivated. The state is chequered with innumerable roads or highways, crossing each other in every direction; nor can a traveller pass more than two or three miles, even in the most unsettled parts, without finding a house, or cottage, and a farm in such a condition of improvement as to afford necessaries for the support of a family. The whole state, it is said, resembles a well-cultivated garden, which by industry produces the necessaries and conveniences of life in great plenty, without its luxuries. To the agricultural mode of life prevailing in this state, which is favourable to temperance and health, and to the ease with which a comfortable subsistence may be obtained, so encouraging to early marriage, and also to the religious liberty that is maintained, we may ascribe the rapid advance of this state in population. Luxury has not yet found its way into this state, nor contaminated the manners of the people. The common mode of travelling, both for men and women, is on horseback; in this state there are few coaches, but many chaises and whistkeys. In the winter is used the sleigh, which is a vehicle drawn by two horses, and carrying six persons in its box, which hangs on four posts standing on two steel sliders, or large skates. Dancing, fishing, hunting, skating, and riding in sleighs on the ice, are the chief amusements in this state. The men, in general, throughout this province, are tall, stout, and robust; the women are fair, handsome, and genteel; strictly virtuous, and well-informed. We may observe, in general, that there is no part of the world in which the education of all ranks of people is more an object of attention than in this state. Almost every town is divided into districts, each of which has a public school kept in it during a great part of the year. Somewhat more than one-third of the money arising from a tax on the polls and rateable estate of the inhabitants, is appropriated to the support of schools in the several towns, for the education of children and youth. The law enjoins that a grammar-school shall be kept in every county-town throughout the state. A certain gravity and seriousness of deportment, accompanied with a degree of shyness and reserve, appear in the first intercourse of the inhabitants with strangers; but after a short acquaintance, they become very familiar and inquisitive. Their hospitality is exemplary and laudable. In their character there is a certain trait, which renders them less amiable; and that is their fondness for settling even their trivial disputes "according to law;" and the prevalence of this litigious spirit affords employment for a numerous body of lawyers. This party spirit is, however, subsiding; their public proceedings are conducted with calmness and candour; and as they are well informed

with

with regard to their rights, and judicious in the methods they adopt for securing them, the state enjoys a great share of political tranquillity. Another circumstance, favourable to internal peace and harmony, is the abatement of that rage for theological disputation which formerly prevailed. The religion, or at least the church government and discipline, of this state, is such as seems to be peculiarly adapted to a republican government. Each church has a separate jurisdiction, and claims authority to chuse its own minister, to exercise judgment, and to enjoy religious institutions, within itself. The churches, however, amounting, says Morse, to about 200, of the congregational denomination, in which are about 20,000 communicants and 170 pastors, are not strictly independent of each other; they associate for mutual convenience and benefit. The associations have power to licence candidates for the ministry, to consult for the general welfare, and to recommend the adoption of measures by the churches, but have no authority to enforce them. Of these associations there are eleven in the state, and they meet twice in a year. All these are combined in one general association formed in 1709, consisting of delegates from the several associations which meet annually. All forms of religion that are consistent with the peace of society are tolerated in Connecticut; and a spirit of liberality and catholicism is said to be increasing. In this state there are few religious sects; the majority of the people consist of congregationalists. Besides these there are episcopalians and baptists; the episcopal churches are respectable, and are under the superintendance of a bishop.

The constitution of Connecticut is founded on its charter, which was granted by Charles II. in 1662, and on a law of the state. Agreeably to this charter, the supreme legislative authority of the state is vested in a governor, deputy-governor, 12 assistants or counsellors, and the representatives of the people, styled the General Assembly. The governor, deputy-governor, and assistants, are annually chosen by the freemen in the month of May. The representatives (whose number is not to exceed two from each town) are chosen by the freemen twice a year, to attend the two annual sessions, on the second Tuesday of May and October. The general assembly is divided into two branches, called the upper and lower houses: the former is composed of the governor, deputy-governor, and assistants; and the latter consists of the representatives of the people. No law can pass without the concurrence of both houses. They have several law courts, of which the superior consists of five judges. The general assembly only have power to grant pardons and reprieves; to issue commissions of bankruptcy; or to protect the persons and estates of unfortunate debtors. The feudal system of descents was never adopted in this state: the whole real estate of intestates is divided equally among the children, males and females; and all estates given in tail must be given to some person then in being, or to their immediate issue, and shall become fee-simple estates to the issue of the first donee in tail. The widow of an intestate is entitled to a third part of the personal estate for ever, and to her dower, or third part of the houses and lands belonging to the intestate at the time of his death, during her life. Attornies are admitted and qualified by the county courts. Before their admission to the bar, they must study two years with a practising attorney in the state, if they have had a college education, and three years if they have not: their morals must be unblemished, and they must be examined by the attorneys of the court of the county where they are admitted, and be by them recommended to the court. There are, upon an average, about 15 attornies to each county, and 120 in the whole state.

The American revolution, which so essentially affected the government of most of the colonies, produced no very perceptible alteration in the government of Connecticut. While under the jurisdiction of Great Britain, they elected their own governors, and all subordinate civil officers, and made their own laws, in the same manner, and with as little controul, as they now do.

The present territory of Connecticut, at the time of the first arrival of the English, was possessed by the Pequot, the Mohegan, Podunk, and many other smaller tribes of Indians. The Pequots were numerous and warlike; and their country extended along the sea-coast from Pautucket to Connecticut river: and about the year 1630, this powerful tribe extended its conquests over a considerable part of Connecticut, Long Island, and a part of Narraganset, the ancient Indian name of New London; the seat of the sovereignty of the whole nation was Pequot. The Mohegans were numerous, and their territory extensive; it comprehended most of New London county, almost the whole county of Windham, and a part of the counties of Tolland and Hartford. The Pedunks inhabited East Hartford, and the circumjacent country. In 1774, there remained of the descendants of the ancient nations only 1363 persons; most of whom lived at Mohegan, between Norwich and New London. From the rapid decrease of the Indians, it is concluded that their number in this state does not now exceed 400.

The first grant of Connecticut was made by the Plymouth council to the earl of Warwick in 1630; and, in the following year, he assigned this grant to lord Say or Seal, lord Brook, and others. In 1632, an attempt was made on the English settlements by a number of Indian traders, who settled at Windsor. In the same year, a little before the arrival of the English, some Dutch traders settled at Hartford, the remains of whose settlements are still visible on the banks of Connecticut river. In 1634, lord Say and Seal, &c. sent over a small number of persons, who built a fort at Saybrook, and made a treaty with the Pequot Indians for the lands on Connecticut river. A number of adventurers afterwards settled in this province; and in 1644, they purchased of the agent of lord Say and Seal, and lord Brook, their right in the colony of Connecticut for 1600 l. Connecticut and New Haven continued two distinct governments for many years; they extended their territories and rapidly increased. At length, John Winthrop, esq., who had been chosen governor of Connecticut, was employed to solicit a charter, which was obtained from Charles II. in 1662. Some jealousy subsisted for a little while between this colony and that of New Haven; but in 1695 these two colonies formed an union, which has ever since amicably subsisted; and the charter of king Charles continues to be the basis of their government. At the close of the revolution, Connecticut ceded all her charter claims west of Pennsylvania to Congress, reserving only a tract of land as wide as the state of Connecticut, and 120 miles in length; bounded east on the western line of Pennsylvania, and north by lake Erie, containing nearly four millions of acres. The cession was accepted by Congress, which establishes to Connecticut her title to these lands. Morse's Geog.

CONNECTICUT, the most considerable river in the eastern part of the United States, which rises in the highlands which separate the states of Vermont and New Hampshire from Lower Canada. This river has been surveyed about 25 miles beyond the 45th degree of latitude to the head spring of its northern branch; from which to its mouth it is upwards of 300 miles, pursuing its course through a settled country, and having on its banks a great number of the most flourishing and pleasant towns in the United States.

It is from 80 to 100 rods wide, at the distance of 130 miles from its mouth. Its course between Vermont and New Hampshire is generally S.S.W., and also through Massachusetts, and part of Connecticut, until it reaches the city of Middleton; after which it runs in a S.E. direction to its mouth, fertilizing the lands through which it flows, though its navigation is much obstructed by a great variety of falls. At its mouth also is a bar of sand, which very much impedes its navigation; however this river is navigable to Hartford city, upwards of 50 miles from its mouth; and the produce of the country for 200 miles above it, is brought thither in boats, which are flat-bottomed, long and narrow, and so light as to be portable in carts. Before the construction of locks and canals on this river, they were taken out at three different carrying places, all of which made 15 miles; but these obstructions will, probably, be soon wholly removed. Sturgeon, salmon, and shad, are caught in plenty in their season, from the mouth of the river upwards, excepting sturgeon, which do not ascend the upper falls; besides a variety of small fish, such as pike, carp, perch, &c.

CONNECTICUT is also the name of a stream in Long Island, in the state of New York, which falls into a bay at the S. side of the island.

CONNECTING *Oil*. See OIL.

CONNECTION, or CONNEXION, a relation whereby one thing adheres to, or depends on another.

Euclid's propositions have such a connection among themselves, that the latter cannot subsist without the former.

CONNECTION, or continuity, in the *Drama*, consists in the joining of the several scenes together.

When the scenes of an act succeed one another immediately, and are so joined as that the stage is never left empty, the connection is said to be observed.

CONNECTIVES, in *Grammar*, one of the four species under which, according to Mr. Harris, all words may be included. They are of two kinds, and as they connect sentences or words, are called by the different names of CONJUNCTIONS and PREPOSITIONS. *Hermes*, p. 31, and 237.

CONNELLSVILLE, in *Geography*, a town of America, in the county of Washington and state of Pennsylvania, pleasantly situated on the Yohiogany, settled about ten years, and containing about 80 houses and 400 inhabitants.

CONNER, ALE. See ALE-*Conner*.

CONNERE', in *Geography*, a town of France, in the department of the Sarthe; 4 leagues E.N.E. of Le Mans.

CONNETABLE, or Connétable de France, countable of France. In the origin of this title, the connetable, who succeeded the grand sénéchal of France, was considered as one of the first domestics of the French kings, in short as master of the horse. Afterwards he became the first officer of the crown, chief and conductor of the armies, first sergeant of the king for executing his orders and commands; for laying hands on the grandees, imprisoning them, and representing them in justice. This employment became by degrees so eminent, that the marshals of France were only lieutenants. This office was abolished in the reign of Louis XIII. Anne de Montmorency, who lost his head on a scaffold, was the last who filled it.

CONNETABIE de France. This was a particular corps under the orders of the feigniors marshals of France, and consisted of 48 guards on horseback.

CONNIE, in *Geography*, a small river of France, in the department of Eure and Loir, remarkable for being so completely dried up in winter, that the fish are obliged to hide themselves in the cavities where there is a little water re-

maining; in summer, on the contrary, its stream is always copious.

CONNIVENTES VALVULÆ, in *Anatomy*, are folds of the internal, or villous coat, of the small intestine. See INTESTINE.

CONNOIE BAY, in *Geography*, a bay on the S. coast of Newfoundland; 50 miles E. of Cape Ray.

CONNOISSEUR, a French term, of late use in English: it literally denotes a person well versed in any thing; being formed of the verb *connoître*, to know, understand. Hence it comes to be used in our language for a critic, or person who is a thorough judge, or master in any way; particularly in matters of painting and sculpture.

CONNON, in *Geography*, a river of France, called also *Aa*, which runs into the Beuvron, six miles S.E. of Beuvron.

CONNOR, BERNARD, in *Biography*, a native of Dublin, in Ireland, where he was born in 1666, received his education at an academy in France, and at a proper age was sent to Montpellier, where he was made doctor in medicine in the year 1690. He was soon after engaged to superintend the education of two young Polish noblemen, with whom, after residing some time at Paris, he travelled over Italy, and the island of Sicily, and then went to Poland, where he was appointed physician to the king. This did not, however, detain him long in Poland, as we find him practising in London, and made fellow of the College of Physicians, and of the Royal Society, in the year 1696. He had published, the preceding year, "Dissertationes Medico-Physicæ de Antris lethiferis, de Montis Vesuvii incendio, de lupendo ossium coactis. Oxoni, 8vo." He had seen, while in Italy, an eruption of Mount Vesuvius, and had visited the Grotto del Cano, of both which he gives descriptions, and of a skeleton, in which the vertebrae, ribs, and ossa innominata, were all firmly united. "Tentamen Epistolare de Secretione Animali," in which he attempts to account for the difference in the colour, taste, and other sensible qualities of the humours, secreted from the blood. "Evangeliæ Medici, seu Medicinæ Mysticæ de suspensis Naturæ legibus, Lond. 1697, 8vo.," and in 1698, in the latter part of which year he died, "A compendious Plan of the Body of Phisic," apparently a text-book, from which he had given, or had proposed giving, a course of lectures. To this work he added, a short, but entertaining, account of Poland. *Heller. Bib. Med. Eloy. Dict. Hist.*

CONNOR, in *Geography*, a village in the county of Antrim, Ireland, that gives name to a bishopric which was united to that of Down in 1454, and which extends over most of the county of Antrim. It contains 395,000 Irish acres, which are divided into 76 parishes; but from unions, there are only 40 benefices and 43 churches. The church of Lisburn was, by letters patent of James I., made the cathedral, that of Connor is in ruins. Connor is 97 Irish miles N. from Dublin, and 17 N. from Belfast. *Beaufort*.

CONNOR, a river of the island of Jamaica, which runs into the sea, between Rocky point, and port Morant.

CONNTHAL. See CAVERIUM.

CONO, in *Commerce*, a Florence wine measure of 10 barrels, each barrel being about 12 gallons.

CONOBEA, in *Botany*, Aubl. See PROPEA.

CONOCARPODENDRON. See CONOPEA and PINUS.

CONOCARPUS, (from *κωνος*, a cone, and *καρπος*, fruit) *Linn. Gen.* 236. *Schreb.* 321. *Willd.* 366. *Lam. Ill.* 353. *Gart.* 1052. *Juss.* 75. *Conocarpe. Enc. Clafs and order, pentandria*

pentandria monogynia, Nat. Ord. *Aggregate*, Linn. *Elemi*. Juss.

Gen. Ch. *Cal.* one-leaved, superior, very small, five-cleft; segments acute, erect. *Cor.* none (or five-petalled?) *Stam.* Filaments five or ten, awl-shaped, erect; anthers globular. *Pist.* Germ inferior, compressed, obtuse; style simple, short; stigma obtuse. *Peric.* none; Linn. Schreb. Samara; Gaert. Capsule very small; rounded, compressed, convex and gibbous on the outside, concave within, with a membranous margin on each side, not deliquescent, one-celled. *Seed* solitary, inversely egg-shaped. Lam.

Eff. Ch. Corolla five-petalled or none. Seeds naked, solitary, inferior. Flowers aggregate. Willd.

Flowers aggregate. Calyx superior, five-cleft. Corolla none. Capsules many, one-seeded, affixed to a common axis, imbricated into a cone. Lam.

Sp. 1. *C. cresta*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Jacq. Amer. 78. tab. 22. fig. 1. Lam. Ill. tab. 126. fig. 1. Gaert. tab. 177. (*C. mangharica*; Cates. Car. 2. tab. 33. *C. foliis oblongis, floribus in caput conicum*. Brown. Jam. 159. *Alnus*; Pluk. Alm. 18. tab. 240. fig. 3. *Alni fructu laurifolia* aibor; Sloan. Jam. 135. hilt. 2. tab. 161. fig. 2. *Rudbeckia laurifolia maritima*; Amm. herb. 5St. Innominata; Plum. MSS. Burm. Amer. tab. 144. fig. 2.) "Erect; leaves lanceolate." Linn. "Erect; leaves lanceolate; cones panicled, pedicelled." Lam. A tree, about thirty feet high. Younger branches angular. Leaves alternate from two inches and a half, to three inches long, one inch broad, acute, quite entire, smooth, greasy to the touch, on short petioles, which have frequently two lateral glands near the base. Flowers greenish yellow, small, in globular heads, on shortish pedicels; common peduncles longer, axillary and terminal, branching into racemes which altogether form a kind of panicle. Capsules umbilicated, pubescent at their summit, closely imbricated into roundish cones, about the size of a pea. Jacquin attributes to his plant ten stamens, twice as long as the calyx; but other specimens have only five, about the length of the calyx. They are probably different species. A native of the West Indies, and the tropical coasts of America; where it is called button wood or button tree, by the English, and mangle saragoza by the Spaniards. It is used for fire wood, but is of little value for any other purpose. 2. *C. procumbens*. Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Willd. 2. Jacq. Amer. 79. tab. 52. fig. 2. Piet. 42. tab. 260. fig. 22. (*Rudbeckia lupina*; Amm. herb. 5St.) "Procumbent; leaves inversely egg-shaped." Linn. "Procumbent; leaves inversely egg-shaped; cones somewhat racemoid, sessile." Lam. A much branched shrub, almost entirely procumbent, following the irregularities of the rocks among which it grows. Leaves alternate, an inch or an inch and a half long, entire, shining, on short petioles; petioles with an oblong gland on the edge near the base, on each side. Flowers pentandrous and hexandrous, resembling those of the preceding species, but smaller, and producing cones of a looser texture. A native of the island of Cuba. 3. *C. racemosa*. Linn. Syst. Nat. 3. Mart. 3. Willd. 3. Jacq. Amer. 80. tab. 53. Piet. 42. tab. 79. Brown. Jam. 159. n. 1. "Leaves lanceolate; egg-shaped, somewhat obtuse; fruit not aggregate." A lofty branching tree, sometimes dividing into three or four trunks close to the ground. Younger branches opposite, red, shining. Leaves opposite, about three inches long, petioled, coriaceous, thickish, shining, greasy to the touch, deep green; petiole with two glands at the top. Flowers small, sessile, remote, in terminal panicles, composed generally of three simple, or somewhat branched, loose racemes, many of them

abortive; petals five; stamens ten, alternately shorter. Fruit separate; pericarp a coriaceous capsule, containing one or two seeds. Seeds composed of two greenish lamellæ, wrapped up into a round body, and involved in a very thin membrane. The lamellæ in the base of the pericarp become a round obtuse shining body, forming the axis of the seed, destined to put forth the roots; for when the capsule falls to the ground, it penetrates the crowned apex, and when the fibres take possession of the soil, it constitutes the rudiment of the future trunk; then the lamellæ increasing in bulk, burst the capsule, and become the radical leaves. A native of the Caribbee islands, and the neighbouring continent, on sandy and muddy shores; called by the English white mangrove, and by the Spaniards mangle bobo, or foolish mangle.

Obf. Jussieu, in his *Genera Plantarum*, questions whether this species be really a conocarpus. Gaertner observes, that Jussieu's doubt is well founded. La Marck, accordingly, in the *Encyclopedie Methodique*, excludes it from the genus, promising to describe it under manglier, one of the French names for the rhizophora of Linnæus. But Desfontaines, who, on the occasion of La Marck, afterwards wrote that article, instead of attending to his predecessor's reference, and misled by an ambiguity in the popular use of the French word, considers it as synonymous with conocarpus, and actually gives over again the character of that genus, with the description of La Marck's two acknowledged species; entirely omitting the conocarpus racemosa of Linnæus, and not making any further reference concerning it. This plant seems to be sui generis; for, although the account of the manner in which its seed germinates, which we have copied from professor Martyn's Miller, is obscurely expressed; it evidently belongs to Savigny's new natural order paleotierii, published in the *Encyclopedie Methodique*, but cannot be referred either to bruguiera or to rhizophora, the only two genera of that order, and both included in the rhizophora of Linnæus. See PALETURIER, BRUGUIERA, and RHIZOPHORA. La Marck's essential character of conocarpus is drawn up with a view to the exclusion of this species, and Willdenow's its admission; the latter, however, has very imperfectly succeeded, for his description of *C. racemosa*, which says expressly *flores remoti*, is obviously at variance with *flores aggregati* in his essential character.

CONOID, CONOIDES, in *Geometry*, a solid body, resembling a cone, except in this, that the slant sides from the base to the vertex are not straight lines, as in the cone, but curved.

The conoid is produced by the entire circumvolution of a conic section around its axis; and according to the denomination of the section from which it is generated, it is differently denominated; if, *et. gr.* the solid be produced by the motion of a parabola, it is called a *parabolic conoid*, or *paraboloid*; if by that of an hyperbola, an *hyperbolic conoid*, or *hyperboloid*; and an *elliptic conoid*, or a *spheroid*, when produced by the rotation of an ellipsis round one of its axes. See each of these articles; and for determining their superficies and solidity; see SUPERFICIES and SOLIDITY.

If a conchoid, *i. e.* any solid formed by the revolution of a conic section about its axis, such as a spheroid, paraboloid, or hyperboloid, be cut by a plane in any position; the section will be some conic section, and all the parallel sections will be like and similar figures.

Let ABC (*Plate I. Conics, fig. 10.*) be the generating section, or a section of the given solid through its axis ED, and perpendicular to the proposed section AFC,

their common intersection being AC; let GH be any other line meeting the generating section in G and H, and intersecting AC in E; and erect EF perpendicular to the plane ABC, and meeting the proposed plane in F. Then, if AC and GH be conceived to move continually parallel to themselves, will the rectangle $AE \times EC$ be to the rectangle $GE \times EH$, always in a constant ratio; but if GH be perpendicular to BD, the points G, F, H will be in the circumference of a circle whose diameter is GH, so that $GE \times EH$ will be $= EF^2$; consequently, $AE \times EC$ will be to EF^2 , always in a constant ratio; and therefore AFC is a conic section, and every section parallel to AFC will be of the same kind with, and similar to it. Hence.

1. The above constant ratio, which $AE \times EC$ has to EF^2 , is that of KI^2 to IN^2 , the squares of the diameters of the generating section respectively parallel to AC, GH; that is, the ratio of the square of the diameter parallel to the section to the square of the revolving axis of the generating plane. This will appear, by conceiving AC and GH to be moved into the positions KL, MN, intersecting in I, the centre of the generating section.

2. It appears also that the axis AC and 2 EF of the section, supposing E now to be the middle of AC, will be to each other, as the diameter KL is to the diameter MN of the generating section.

3. If the section of the solid return into itself, it will evidently be an ellipse. This always happens in the spheroid, except when it is perpendicular to the axis; which position is also to be excepted in the other solids, the section being then always a circle; in the paraboloid, the section is always an ellipse, excepting when it is parallel to the axis; and in the hyperboloid, the section is always an ellipse, when its axis makes with the axis of the solid an angle greater than that which the said axis of the solid makes with the asymptote of the generating hyperbola: the section being an hyperbola in all other cases, except when those angles are equal, and then it is a parabola.

4. If the section be parallel to the fixed axis BD, it will be of the same kind with, and similar to, the generating plane ABC; that is, the section parallel to the axis, in a spheroid, is an ellipse similar to the generating ellipse; in the paraboloid, the section is a parabola similar to the generating parabola; and in an hyperboloid, it is an hyperbola similar to the generating hyperbola of the solid.

5. In the spheroid, the section through the axis is the greatest of the parallel sections; in the hyperboloid, it is the least; and in the paraboloid, all the sections parallel to the axis are equal to one another. For the axis is the greatest parallel chord line in the ellipse, but the least in the opposite hyperbolas, and all the diameters are equal in a parabola.

6. If the extremities of the diameters, KL, MN, be joined by the line KN, and AO be drawn parallel to KN, and meeting GEH in O, E being the middle of AC, or AE the semi-axis, and GH parallel to MN: then will EO be equal to EF, the other semi-axis of the section. For, by similar triangles, $KI : IN :: AE : EO$. Or, upon GH as a diameter describe a circle meeting EQ, perpendicular to GH, in Q; and EQ is evidently equal to the semi-diameter EF.

7. If AP be drawn parallel to the axis BD of the solid, and meet the perpendicular GH in P, it will be evident that, in the spheroid, the semi-axis $EF = EO$ will be greater than EP; but in the hyperboloid, the semi-axis $EF = EO$, of the elliptic section, will be less than EP,

and in the paraboloid, $EF = EO$ is always equal to EP.

Scholium. The analogy of the sections of an hyperboloid to those of the cone, is very remarkable; all the three conic sections being formed by cutting an hyperboloid in the same positions as the cone is cut. Thus, let an hyperbola and its asymptote be revolved together about the transverse axis, the former describing an hyperboloid, and the latter a cone circumscribing it; then let them be supposed to be both cut by a plane in any position, and the two sections will be like, similar, and concentric figures: that is, if the plane cut both the sides of each, the sections will be concentric, similar ellipses; if the cutting plane be parallel to the asymptote, or to the side of the cone, the sections will be parabolas; and in all other positions the sections will be similar and concentric hyperbolas. That the sections are like figures appears from the foregoing corollaries. That they are concentric will be evident, when we consider that Cc is = Aa, producing AC both ways to meet the asymptotes in a and c. And that they are similar or have their transverse and conjugate axes proportional to each other, will appear thus:—Produce GH both ways to meet the asymptotes in g and h; and on the diameters GH, g h, describe the semi-circles GQH, g h b, meeting EQR, drawn perpendicular to GH, in Q and R; EQ and ER being then evidently the semi-conjugate axes, and EC, Ec, the semi-transverse axes of the sections. Now, if GH and AC be conceived to move parallel to themselves, $AE \times EC$ or CE^2 will be to $GE \times EH$ or EQ^2 in a constant ratio, or CE to EQ will be a constant ratio; and since cE is as Eg, and aE as Eh, $aE \times Ec$ or cE^2 will be to $gE \times Eh$ or ER^2 , in a constant ratio; but at an infinite distance from the vertex, C and c coincide, or $EC = Ec$, as also $EG = Eg$; consequently $EQ = ER$, and then CE to EQ will be = cE to ER ; but as these ratios are constant, it they be equal to each other in one place, they must be always so; and consequently $CE : cE :: QE : ER$. This analogy of the sections will not seem strange, when we consider that a cone is a species of the hyperboloid; or a triangle a species of the hyperbola, whose axes are infinitely little. See Hutton's Mensuration, part iii. § 4.

The famous solid of the least resistance, sir Isaac Newton, M. Fatio, and the Marquis De l'Hopital, have demonstrated to be a conoid.

CONON, in *Biography*, the son of Timotheus, and a celebrated general of Athens. He was one of those who succeeded Alcibiades, after that celebrated commander had fallen into disgrace with his countrymen, and distinguished himself in the Peloponnesian war. See PELOPONNESUS. In an engagement with Callicratidas, the Spartan general, he was defeated; but he afterwards obtained a complete victory, when his antagonist lost his life. About four hundred years before the Christian era, Conon and Philocles with their fleets were attacked and defeated by Lyfander, the leader of the Spartans. So complete was this victory that Conon barely escaped with his life, and sought refuge in the isle of Cyprus, while Athens itself was reduced to a state of servitude, and its constitution destroyed. In Cyprus, Conon used every means in his power to rescue his country from the state into which he had fallen; he applied to ARTAXERXES, the Persian monarch, for aid against the Spartans; obtained his desire, and was appointed admiral of a large Persian fleet, which Artaxerxes sent to succour the Athenians and other Greek states. He had not long been raised to this honourable situation, when the sailors mutinied for want of

pay: the general hatred to the court of Persia, but was not suffered to approach the sovereign, unless he submitted to a species of adoration very unworthy of a noble and dignified mind; this he refused, and though denied an audience with his majesty, his remonstrances produced the desired effect, and he was allowed to nominate his own treasurers to the fleet. Conon refused his command, attacked the Spartan admiral Pisander, whom he killed with his own hand; the Spartans were defeated with the loss of fifty ships, and the rest were glad to seek shelter in one of their own ports. Conon, having thus obtained the dominion of the seas, returned to Attica with plans for restoring his country to its former honours. Scarcely had he begun his operations when he was accused of a misapplication of the royal money, and was apprehended for that and other crimes, for which there appears to have been little or no foundation. He did not, however, survive the accusation; but the manner and particular time of his death are not known, though it was suspected that he was basely murdered in prison. Plutarch. Univer. Hist.

CONON, a mathematician of considerable celebrity at Samos, flourished about three centuries, and died about the year 223, B.C. He was a contemporary and friend of Archimedes, to whom he communicated his writings, and sent some problems, which Archimedes received with approbation, wishing them to be published during the lifetime of their author, in order that from him they might receive a just demonstration. Conon made many observations on the eclipses of the sun and moon, and gave the name to the constellation called Coma-Berenices. His death happened during the period when Archimedes flourished, whose eulogium for his friend has come down to the present times: speaking of his great genius, he asks: "How many theorems in geometry, which to others seemed impossible, would, had Conon lived, have been brought to perfection?" Conon invented a spiral, the properties of which having been demonstrated by Archimedes, it has obtained the name of Archimedes's spiral. He is referred to with respect in the writings of Propertius and Virgil. Hutton. Moreri. See CONIC SECTIONS.

CONON, POPE, was by birth a Thracian, and educated in Sicily; from this island he went to Rome, where he was ordained presbyter. Upon the death of pope John V., the disputes respecting a successor ran so high, that for three months the papacy was vacant: the clergy espousing the interests of one candidate, and the army declaring for another. At length Conon was fixed upon, who proved acceptable to all those in whom the appointment was vested. He ascended the pontifical throne in the year 686, and died in about a year, but left behind him a character rarely attained by those who have filled that high station. His pious, learning, integrity, and suavity of manners, were exemplary, and justly celebrated. There was also a cardinal of this name, a native of Germany, and advanced to his high rank in the church by pope Pascal II. He was the avowed and intrepid defender of the high claims of the Roman see, and, on this account, selected as a proper person to preside at the council of Jerusalem, in which Henry V., emperor of Germany, was excommunicated, for not submitting to the pope's assumed right to the investiture of bishops and abbots. He was afterwards legate at the council of Soissons, in the year 1121, when the treatise of the celebrated Adelard, on the Unity of God, was condemned to be burnt. Conon, it is believed, might have been elected to the popedom on the death of Gelasius, an honour which he declined for motives not now known. His own vote and

interest he gave to Guy, archbishop of Vienne, who was elected pope, and assumed the name Calixtus II. Moreri.

CONONIS ARAB, in *Ancient Geography*, a place of Ethiopia, upon the Arabic gulf, according to Strabo; near port Malin.

CONONITES, in *Ecclesiastical History*, the followers of Conon of Alexandria in the sixth century, resembling in their opinions the SEVERIANS, THEODOSIANS, and TRITHEISTS.

CONOPA, in *Ancient Geography*, a lake of Greece, in Etolia, afterwards called *Cygnæa*—Also, a town of Greece, in Acarnania, according to Steph. Byz. and Polybius. Strabo says, that the town of Arinoe, which he places in Etolia, had in former times been called *Conopa*.

CONOPEA, in *Botany*, (κωνοπέα, a veil or net to keep off gnats), Mart. (Conocæa; Willd. Juss. 97. Anbl. Guian. 2. 639. tab. 257.) Class and order, *didynamia angiospermia*. Nat. Ord. *Lythæacis*, Juss.

Gen. Ch. Cal. perianth one-leafed, five-angled, permanent, five-cleft; segments somewhat egg-shaped, acuminate, erect. Cor. one-petalled, ringent; tube oblong, gradually widening; border two-lipped; upper lip erect, emarginate; lower lip triid, the middle segment larger, concave. Stam. filaments four, attached, at the bottom, to the tube of the corolla; anthers arrow-shaped. Pisl. Germ. roundish; style filiform, hairy; stigma two-lobed. Peric. Capsule roundish, one-celled, four-valved. Seeds numerous, small, fixed to a roundish receptacle.

Ess. Ch. Calyx five-cleft. Corolla two-lipped. Capsule one-celled, four-valved, with many seeds.

Species. *C. aquaticæ*, a creeping plant, growing naturally near water, spreading over its surface, and the grass near the banks, throwing out small fibrous roots from the joints. Stems and branches square, each angle bordered by a very sharp ring. Leaves at each joint, opposite, embracing the stem, kidney-shaped, plaited at the nerves, undulated at the edge. Flowers blue, axillary, either solitary or in pairs; peduncle an inch long, slender; calyx with two long, narrow, pointed leaflets at the base. Capsule with four grooves, partly enclosed by the calyx. A native of Guiana.

CONOPEUM, in *Antiquity*, a sort of canopy of network, which hung about beds, and was designed to keep away gnats or flies; it comes from κωνοπέ, a fly. A piece of furniture of this kind is now used in the East; and Mr. Harmer (Obl. on Scripture, vol. iv. p. 405.) suggests, that if it obtained there at so early a period as the time of Saul, it may serve to illustrate a passage of Scripture, viz. 1 Sam. xix. 12—17. This writer supposes that the word translated "a pillow of goats-hair," meant a conopeum or guard against gnats. It is in one place translated a "thick cloth," and in another a "sieve;" and Harmer observes, that a cloth of a nature fit to be used as a sieve, is just such a thing as a conopeum, or fine network or gauze-like cloth. It appeared to be something "relating to the head;" but a conopeum relates to the head as well as a pillow, being a canopy suspended over the whole bed, or at least so far as to surround the head, and such upper part of the body as might be uncovered. That this kind of defence against gnats is now used in the East, Mr. Harmer has shewn, from the testimony of Maillet (Description de l'Egypte, lett. ix. p. 37.) The word occurs probably in the same sense in 2 Kings. viii. 15.

CONOPEUM, in *Ancient Geography*, a marsh of Asia, near the mouth of the river Halys, according to Arrian.—Also, a particular part of the Palus Mæotis. Steph. Byz. CONOPHORUS,

CONOPHORUS, in *Botany*, Petiv. Rai. See PROTEA Nana.

CONOPOLI, in *Geography*, a town of European Turkey, in the province of Livadia, 10 miles N.E. of Lepanto.

CONOPS, in *Entomology*, a genus of dipterous insects, the mouth of which is furnished with a projecting geniculate proboscis, and the antennæ clavated and pointed at the end.

The insects of this genus are remarkably active, and are found in gardens, where they subsist on the nectareous juices of flowers; their larvæ are unknown. In the true conops, the head is large and nearly hemispherical; the eyes large, and almost oval, and the antennæ formed of three articulations, the middle one of which is long and cylindrical, the last joint terminating in a little point.

The genus conops is divided in the Linnæan system into two families; the first of which includes those species which have the sheath of the sucker single-valved, abbreviated, and inclosing a single bristle; the other those with the sheath consisting of two equal valves, and which is geniculated both at the base and in the middle. The latter are the myzopæ Fabricius. In the Fabrician Suppl. Ent. Syst. the Linnæan conops subcoleoptriatus is described under the new genus, thereva.

Species.

* *First Section.*

VESICULARIS. Blackish; hind head vesicular, abdomen yellow with a black base. Fabr. Geoffr. Inhabits woods in Europe.

MACROCEPHALA. Black; four of the abdominal segments edged with yellow; antennæ and legs rufous. Linn. Like the last inhabits Europe, and is found in woods.

RUFIPES. Deep-black; abdomen at the base ferruginous; segments edged with white; legs ferruginous. Fabr.

This species is a native of Germany. The rib of the wing, and the antennæ are fuscous, front and poisers yellow.

ACULEATA. Deep-black; incisions of the abdomen yellow; thorax with two yellow dots on the anterior part. Linn. Fn. Succ. A native of the northern parts of Europe.

FLAVIPES. Glossy-black; abdomen cylindrical; three of the segments edged with yellow. Linn. Fn. Succ. This inhabits Europe, and has the legs fasciated with yellow, whence its name.

PICTA. Ferruginous; thorax black, varied with yellow, rib of the wing ferruginous. Fabr.

A native of the American islands, described from the cabinet of Smidt.

VITTATA. Abdomen cylindrical, hooked, and varied with ferruginous; an abbreviated sub-marginal black fillet on the wings. Fabr. Inhabits Kiel.

** *Second Section.*

FERRUGINEA. Ferruginous; abdomen cylindrical and incurved; front yellowish. Linn. *Sicus ferrugineus*, Scop. Inhabits woods of Europe.

PETIOLATA. Antennæ black, the club red; head yellow; abdomen petiolate. Fabr. A native of Siberia.

ATOMARIA. Grey; abdomen ovate; wings fuscous, with crowded dots of white. Gmel. An European species.

TESTACEA. Ferruginous; thorax black on the back. Fabr. *Stenomoxides*, Schæffer. Found in Germany.

ATEA. Abdomen cylindrical and incurved; body black. Fabr. Inhabits woods of Denmark.

CINCTA. Testaceous; abdomen hooked and fasciated with white. Fabr. A native of the East Indies. Koenig.

BUCCATA. Ferruginous; abdomen hooked, grey; face vesicular and white; wings clouded. Linn. Fn. Succ. *Sicus buccatus*, Scopoli. Inhabits woods of Europe.

ANNULATA. Thorax black; abdomen cylindrical, varied with yellow and black; base of the wings ferruginous; legs ferruginous and annulated with brown. Linn. A native of Europe.

FLAVA. Thorax black; base of the abdomen black on the back, with a black mark each side, and the two next segments with an oblique black spot in the middle and at the sides. Lesc. An European species.

CINEREA. Cinereous; mouth vesicular and white; tail black. Fabr. Described from a specimen in the cabinet of Dr. Alioni. It is a native of Italy.

DORSALIS. Ferruginous; thorax fuscous on the back; abdomen cylindrical and hooked; margin of the segments white. Fabr. *Myzopa testacea*, Mant. Inf. Inhabits Germany. Smidt.

CONOPONDIABASSIS, in *Ancient Geography*, a name given by Pliny to an island at the mouth of the Danube, which the ancients called *Pseudostoma*.

CONORIA, in *Botany*, Juss. 287. (Conori; Lam. Encyc. Conohoria; Aubl. Guian. its name in its native country). Class and order, *pentandria monogynia*. Nat. Ord. *Berberides*, Juss.

Gen. Ch. *Cal.* one-leaved, deeply five-cleft; segments lanceolate, acute. *Cor.* Petals five, ovate-oblong, erect, doubled, forming a tube, acute, expanding or reflexed at their summit, attached to the receptacle of the pistil; accompanied by five interior, smaller, erect, lanceolate, concave, petal-like bodies placed opposite to them. (Nectaries?) *Stam.* Filaments five, very short, attached to the base of the petal-like bodies; anthers erect, oblong. *Pist.* Germ superior, roundish; style slender, zig-zag; stigma capitate. *Peric.* unknown.

Sp. C. *flavescens*. Aubl. Guian. tab. 95. A shrub, three or four feet high, with numerous, scattered, knotty, compound branches near the top. *Leaves* opposite, on short petioles, egg-shaped, acute, entire, smooth, green above, reddish underneath, the largest of them six inches long, and near three inches broad. *Flowers* yellowish, alternate, in spikes terminating the branches, and surrounded with scales at the base; peduncles with two, small, opposite scales about the middle. A native of woods in Guiana.

CONOSPERMUM, in *Botany* (*κωνος*, a cone, and *σπέρμα*, seed, from the conical or top-shaped figure of the seed). Smith Tr. of Linn. Soc. v. 4. 213. Class and order, *tetrandria monogynia*. Nat. Ord. *Protea*; Juss. *Shuttkook* seed.

Gen. Char. *Cal.* none. *Cor.* monopetalous, ringent, four-cleft; tube swelling; upper tip vaulted, undivided; lower, in three equal, spreading segments. *Stam.* four. Anthers sessile, single-celled, two in the hollow of the upper lip; two, which often seem abortive, at the base of the lower, remote from each other. *Pist.* Germen superior, inversely conical, bearded at the summit. Style filiform, bent, shorter than the corolla. Stigma obtuse, curved. *Seed* solitary, naked, inversely conical, its upper edge fringed with numerous, spreading, shining bristles, about its own length.

Ess. Char. Calyx none. *Cor.* of one petal, ringent, bearing the stamens; its upper lip vaulted; under three-cleft. Stigma obtuse. Seed one, naked, crowned with bristles.

Observ. Considering the irregularity of the flower, and the inequality of position of the anthers, perhaps this genus might be placed in *dilyndia gymnospermia*, in which order

it would add one to the very few genera that have less than four seeds; but it has no affinity to any already classed there, being nearly allied to that tribe of *protea* whose flowers are simple, not aggregate: and as the anthers are all really fecile, it could not literally accord with the definition of the 14th class.

Sp. 1. *C. longifolium*. Smith Exot. Bot. v. 2. 45 t. 83. "Leaves linear, inclining to obovate, entire, smooth, with a marginal nerve, and numerous transverse veins." Sm. Stem shrubby, rigid, branched, about three feet high, with round leafy branches, which are silky when young. Leaves alternate, several inches long, entire, smooth, varying in breadth from a linear to a narrow obovate figure, tipped with a small point, and tapering at the base, into a longish slender foot-stalk. Their margin is marked with a fine nerve, connected by transverse veins with the midrib. Stipules none. Flower-stalks about the tops of the branches, axillary, much exceeding the leaves in length, each bearing a large bracteated downy corymbus, of white or bluish-coloured, sessile, clustered flowers. Bractees membranous, wedge-shaped, pointed, fringed. Corolla about a quarter of an inch long, externally downy. Seed inversely conical, or top-shaped, brown, downy, crowned with a marginal row of spreading reddish bristles, and altogether resembling a shuttlecock. A native of New South Wales, and other parts of New Holland; not yet brought to Europe. The flowers are ornamental, and the aspect of the whole shrub not inelegant. 2. *C. ellipticum*. "Leaves elliptical, rough, edged." Sm. MSS. A more humble and divaricated shrub than the former. Branches hairy when young, thickly clothed with leaves, which are about three quarters of an inch long, crowded, nearly sessile, elliptical, obtuse, entire, thick, and apparently succulent when fresh, concave when dry, single-ribbed, veinless, roughish underneath, especially at the edges, tipped with a minute point. Flower-stalks situated as in the foregoing, but shorter, and more crowded; very downy, as is likewise the outside of the corolla. Seed rather smaller than the last. Sent from New South Wales by John White, M.D. 3. *C. taxifolium*. "Leaves linear-lanceolate, oblique, somewhat downy." Sm. MSS. Branches long and wand-like, very leafy, silky. Leaves imbricated, scattered, sessile, nearly an inch long, linear-lanceolate, inclining to obovate, oblique, narrow, rigid, pointed, single-ribbed, veinless, thick-edged, entire, for the most part clothed with short silky hairs, rarely smooth. Flowers situated as in the two species just described, forming a dense leafy corymbus at the end of each branch, but their stalks are less compound. In general aspect and structure they seem, as well as the seeds, to agree precisely with those of *C. ellipticum*. Gathered also at New South Wales by Dr. White. 4. *C. ericifolium*. "Leaves awl-shaped, keeled, smooth." Sm. MSS. This has very much the habit of the last, and their flowers and seeds exactly accord. Both seem to be rather herbaceous than shrubby, though they have the hard rigid texture so frequent in New Holland plants. This is the smaller of the two. Its leaves are scarcely more than half an inch long, imbricated, awl-shaped, obtuse, keeled, and somewhat triangular, tipped as in the last with a small point, roughish occasionally to the touch, but, as far as we can discover, always destitute of pubescence, though the branches are silky. Gathered at New South Wales by Dr. White. 5. *C. reticulatum*. "Leaves wedge-shaped, jagged, reticulated on both sides." Sm. MSS. The stems appear to be herbaceous and procumbent, leafy, hairy, a few inches in length. Leaves about three inches long, alternate, erect, wedge-shaped, entire at the sides, dilated and jagged at the extremity, veiny, beautifully reticulated on both sides, tapering down at the base

into rigid, furrowed, hairy footstalks, about their own length, whose bases are dilated, and bordered with a membranous sheathing stipula. Flower-stalks terminal, two or three together, hairy, erect, scarcely so tall as the leaves, each bearing a loose, bracteated, simple spike of downy, apparently white, flowers, whose segments are more obtuse than in the other species. The most remarkable character of *C. reticulatum* consists in the exquisitely reticulated veins, prominent on both sides of the leaf, branching off from the main ribs and veins, and forming a fine regular uniform net-work over the whole surface, whose interstices are commonly pentagonal, and not more in diameter than grains of common sand. The veins themselves are finely hairy. For dried specimens of this most beautiful species we are indebted to Mr. A. Menzies, who discovered it at King George's Sound, on the west coast of New Holland, lat. 35. Its fruit we have not seen, but there can be no doubt of its genus.

CONOSTEIN—*Engers*, or *Engers*, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and electorate of Treves; 4 miles N. of Coblenz.

CONOTHATON, in *Ancient Geography*, an episcopal see of Asia, under the metropolis of Boitra.

CONOU, in *Geography*, a town of Persia, in the province of Laristan, on the coast of the Persian gulf; 66 miles E. S. E. of Lar.

CONOVUIM, in *Ancient Geography*, a town of the Isle of Albion, on the route from Segontium or Caernarvon to Deva or Chester, according to Antonine's Itinerary. It was distant 24 miles from Caernarvon, and is now called Caer-Rhyn.

CONQUASSATION, in *Pharmacy*, a species of comminution, or a particular operation, by which moist concreted substances, such as recent vegetables, their fruits, lactescent seeds, and the softer parts of animals, are contused and agitated in a mortar, until partly by their proper succulence, or the assuasion of some liquor, they are reduced to a soft pulp. Metalline instruments are not to be used for this purpose, because not only the manifest, but also the latent salts of the substances, subjected to this operation, acting on the instruments, may derive an adventitious virulent quality from them, which will not only render such substances unfit for the intended purposes, but also nauseous and hurtful when exhibited as medicines. James.

CONQUEROR, in French *Conquerant*. A captain or commander who has subdued several cities or entire countries by force of arms. Alexander the Great, Julius Cæsar, Tamerlane, Mahomet II., &c. were conquerors.

CONQUES, in *Geography*, a small town of France, in the department of Aude, and chief place of a canton in the district of Carcassonne, with a population of 1591 inhabitants. That of the canton amounts to 5635, in 10 communes, upon an extent of one hundred kilometres.—Also, a small town of France, in the department of Aveyron, in the district of Rhodéz, with 806 inhabitants, 15 miles N. from Rhodéz. The canton, of which it is the chief place, has 12 communes, with 6597 inhabitants, and measures 187 kilometres and a half.

CONQUEST, in French *Conquete*, the acquisition of a place, province, or entire country, by a superiority of arms, which compels the conquered to submit to the conqueror.

CONQUEST, in *Civil Jurisprudence*, is the acquisition of property in common by a number of persons.

In some countries, the most general acquisition with conquest; but, according to the best legal acceptation, acquisition is the gaining of unappropriated goods before the establishment

blishment of a community; whereas, by the term *conquest*, is ordinarily intended whatever is acquired by a number of persons in community; or by some one for all the others.

As it is more especially in the union of persons by marriage, that a community of property takes place; it is in reference to them that we frequently use the word *conquest*. There are, nevertheless, conquests also among other persons who are in a tacit community or society; such as obtain by particular local customs.

According to this sense of the word, it has been contended by several, that William I. claimed this kingdom; that is, not by right of arms, but by right of conquest or acquit; under promise of succession made by Edward the Confessor, and a contract entered into by Harold, to support his pretensions to that succession; and by old writers, conquests, acquisition, and perquisition, are frequently used as synonymous terms.

In consequence of the prodigious slaughter of the English nobility at the battle of Hastings, and the fruitless insurrections of those who survived, such numerous forfeitures had accrued, that king William was able to reward his Norman followers with very large and extensive possessions; which circumstance led the monkish historians, and such as have implicitly followed them, to represent him as having, by right of the sword, seized on all the lands of England, and distributed them among his own favourites. This supposition is grounded upon a mistaken sense of the word "conquell," which, in its feudal acceptation, signifies no more than "acquisition;" and hence many party writers have been led into a strange historical mistake, and one, says judge Blackstone, which upon the slightest examination, will be found to be most untrue. See *FEO DAL Tenure*.

What we call "purchase," *perquisitio*, the feudists called "conquell;" *conquisitio*, or *conquisitio*; both denoting any means of acquiring an estate out of the common course of inheritance. This is still the proper phrase in the law of Scotland; as it was among the Norman jurists, who styled the first purchaser (that is, the person who brought the estate into the family, which at present owns it) the conqueror or *conquereur*. This is all that seems to have been meant by the appellation that was given to William the Norman, when his manner of ascending the throne of England was in his own charter, and in those of his successors, and also by the historians of the times, entitled *conquestus*, and himself *conquestor* or *conquisitor*; signifying that he was the first of his family who acquired the crown of England, and from whom, therefore, all future claims by descent must be derived; though now, from our distaste of the feudal sense of the word, together with the reflection on his forcible method of acquisition, we are apt to annex the idea of "victory" to this name of "conquell," or "conquisitum," a title which, however just with regard to the crown, the conqueror never pretended with regard to the realm of England; nor, in fact, ever had. See *PURCHASE*.

William the Norman, as we have already observed, and as some have maintained, claimed the crown by virtue of a pretended grant from king Edward the Confessor; a grant which, if real, was in itself utterly invalid; because it was made, as Harold well observed, in his reply to William's demand, *absque generali senatus, et populi conventu et edicto*; and this also very plainly implies, that it was then generally understood, that the king, with consent of the general council, might dispose of the crown and change the line of succession. William's title, however, was altogether as good as Harold's,

who was a mere private subject, and an utter stranger to the royal blood. The conquest, then, by William of Normandy, was, like that of Canute before, a forcible transfer of the crown of England into a new family; but, the crown being so transferred, all the inherent properties of the crown were also transferred with it. For, the victory obtained at Hastings not being a victory over the nation collectively, but only over the person of Harold, the only right which the conqueror could pretend to acquire thereby, was the right to possess the crown of England, not to alter the nature of the government. And, therefore, as the English laws still remained in force, he must necessarily take the crown subject to those laws, and with all its inherent properties; the fit and principal of which was its descendibility. See *Right of Crown*.

Some writers have represented William's conquest as more extensive and complete than it has been above stated. Scarcely any of those revolutions, it is said, which, both in history and in common language, have been always denominated conquests, appear equally violent, or were attended with so sudden an alteration of power and property. The Roman state, which spread its dominion over Europe, left the rights of individuals in a great measure untouched; and those civilized conquerors, while they made their own country the seat of empire, found that they could derive the greatest advantage from the subjected provinces, by securing to the natives the free enjoyment of their own laws, and of their private possessions. The barbarians who subdued the Roman empire, though they settled in the conquered countries, yet being accustomed to a rude uncultivated life, found a part only of the land sufficient to supply all their wants; and they were not tempted to seize extensive possessions, which they knew how neither to cultivate nor to enjoy. But the Normans and other foreigners, who followed the standard of William, were so far advanced in the arts as to know the value of a large property; and therefore having made the vanquished kingdom the seat of government, and having totally subdued the natives, they pushed the rights of conquest, for the gratification both of their avarice and ambition, to the utmost extremity. Except the former conquest of England by the Saxons themselves, who were induced, by peculiar circumstances, to proceed even to the extermination of the natives, it would be difficult to find, in all history, a revolution more destructive, or attended with a more complete subjection of the ancient inhabitants. In the conduct of their conquerors, contumely was blended with oppression; and the natives were universally reduced to such a state of meanness and poverty, that the English name became a term of reproach, and several generations elapsed before one family of Saxon pedigree was raised to any considerable honours, or could so much as attain the rank of baron of the realm. "These facts," says Mr. Hume (*Hist.* vol. i. p. 283, 8vo.) "are so apparent from the whole tenor of the English history, that none would have been tempted to deny or elude them, were they not heated by the controversies of faction; while one party was absurdly afraid of those absurd consequences, which they saw the other party inclined to draw from this event. But it is evident that the present rights and privileges of the people, who are a mixture of English and Normans, can never be affected by a transaction which passed 700 years ago; and as all ancient authors, who lived nearest the time, and best knew the state of the country, unanimously speak of the Norman dominion as a conquest by war and arms, no reasonable man, from the fear of imaginary consequences, will even be tempted to reject their concurring and united testimony."

The Norman invasion, and conquest, as it has been usually denominated, were important events in the history of this country; and produced as great an alteration in our laws, as it did in our ancient line of kings—and though the alteration of the former was effected rather by the consent of the people, than by any right of conquest, yet that consent seems to have been partly extorted by fear, and partly given without any apprehension of the consequences which afterwards ensued. The alterations in our laws which then took place are enumerated by judge Blackstone; and we shall here subjoin a summary of them. The *first* of these was the separation of the ecclesiastical courts from the civil, which was effected in order to ingratiate the new king with the popish clergy, who had been for some time endeavouring, in every part of Europe, to exempt themselves from the secular power. This was the more easily accomplished, because, the disposal of all the episcopal sees being then in the breast of the king, he had taken care to fill them with Italian and Norman prelates. The *second* alteration of the English constitution was more violent, and consisted in the depopulation of whole countries, for the purposes of the king's royal diversion; and subjecting both them, and all the ancient forests of the kingdom, to the unreasonable severities of forell laws imposed from the continent, by which the slaughter of a beast was made almost as penal as the death of a man. (See FOREST and GAME.) A *third* alteration in the English law was effected by narrowing the remedial influence of the county courts, the great seats of Saxon justice, and extending the *original* jurisdiction of all the king's judicials to all kinds of causes arising in all parts of the kingdom. (See *AVLA regia*.) Hence all proceedings in the king's courts were ordained to be carried on in the Norman, instead of the English language; a badge of slavery as evident and signal as ever was imposed upon a conquered people, which lasted till king Edward III. obtained a double victory, over the armies of France in their own country, and their language in our courts here at home. A *fourth* innovation was the introduction of the trial by combat, for the decision of all civil and criminal questions of fact in the last resort. (See COMBAT.) The *last* and most important alteration, both in our civil and military polity, was the engraving on all landed estates, a few only excepted, the fiction of feudal tenure; which drew after it a numerous and oppressive train of servile fruits and appendages; aids, reliefs, primer feifins, wardships, marriages, escheats, and fines for alienation; the genuine consequences of the maxim then adopted, that all the lands in England were derived from, and holden, mediately or immediately, of, the crown. See each article respectively, and FEUDAL Tenure.

"The nation at this period," says judge Blackstone, "seems to have groaned under as absolute a slavery as was in the power of a warlike, an ambitious, and a politic prince to create. The consciences of men were enslaved by four ecclesiastics, devoted to a foreign power, and unconnected with the civil state under which they lived:—who now imported from Rome for the first time the whole *farrago* of superstitious novelties, which had been engendered by the blindness and corruption of the times, between the first mission of Augustin the monk, and the Norman conquest; such as transubstantiation, purgatory, communion in one kind, and the worship of saints and images; not forgetting the universal supremacy and dogmatical infallibility of the holy see. The laws too, as well as the prayers, were administered in an unknown tongue. The ancient trial by jury gave way to the impious decision by battle. The forest laws totally restrained all rural pleasures and manly recrea-

tions. And in cities and towns the safe was no better; all company being obliged to disperse, and fire and candle to be extinguished by eight at night, at the found of the melancholy *curfew*. The ultimate property of all lands, and a considerable share of the present profits, were vested in the king, or by him granted to his Norman favourites; who, by a gradual progression of slavery, were absolute vassals to the crown, and as absolute tyrants to the commons. Unheard of forfeitures, talliages, aids, and fines, were arbitrarily exacted from the pillaged landholders, in pursuance of the new system of tenure. And to crown all, as a consequence of the tenure by knight-service, the king had always ready at his command an army of 60,000 knights, or *milites*; who were bound, upon pain of confiscating their estates, to attend him in time of invasion, or to quell any domestic insurrection. Trade, or foreign merchandize, such as it then was, was carried on by the Jews and Lombards; and the very name of an English fleet, which king Edgar had rendered so formidable, was utterly unknown to Europe; the nation consisting wholly of the clergy, who were also the lawyers; the barons, or great lords of the land; the knights, or soldiery, who were the subordinate land-holders; and the burghers, or inferior tradesmen, who from their insignificance happily retained, in their usage and burgate tenure, some points of their ancient freedom. All the rest were vassals or bondmen."

"From so complete and well-concerted a scheme of servility, it has been the work of generations for our ancestors, to redeem themselves and their posterity into that state of liberty, which we now enjoy:—and which therefore is not to be looked upon as consisting of mere encroachments on the crown, and infringements on the prerogative, as some slavish and narrow-minded writers in the last century endeavoured to maintain:—but as, in general, a gradual restoration of that ancient constitution, whereof our Saxon forefathers had been unjustly deprived, partly by the policy, and partly by the force, of the Norman." Blackst. Com. Book iv. See CONSTITUTION.

CONQUEST, in the *Law of Nations*, is the acquisition of sovereignty by force of arms, by some foreign prince; who reduces the vanquished under his empire. The right of conquest is derived from the laws of war; and when a people is subjected, the conduct of the conqueror is regulated by four kinds of law. First, the law of nature, which dictates whatever tends to self-preservation; secondly, our reason, which teaches us to use others, as we would be treated ourselves; thirdly, the laws of political society, to which nature has not assigned any precise boundary; lastly, the law which is derived from the particular circumstances attending the conquest. Thus, a state conquered by another will be treated in one of the four methods following: Either the conqueror will continue it under its own laws, and will only claim the exercise of civil and ecclesiastical sovereignty; or he will impose a new form of government; or he will destroy the frame of their society, and incorporate the inhabitants with others; or he will exterminate them. Ancient and modern history will supply numerous instances of these different modes of treatment. See COLONY and PLANTATION.

The right of conquest is allowed by the law of nations, if not by that of nature; but in reason and civil policy it can mean nothing more than that, in order to terminate hostilities, a compact is either expressly or tacitly made between the conqueror and the conquered, that if they will acknowledge the victor for their master, he will treat them for the future as subjects, and not as enemies. *Puffend. Ls. of Nat. viii. b. 24.*

CONQUET, *LE*, in *Geography*, a pretty, rich, small town of France, in the department of Finistere, with a good harbour, and excellent roads; 15 miles west from Brest. It is one of the 84 maritime quarters into which modern France is divided, and the residence of a maritime syndic who superintends this place, besides Argenton, Lospoder, and Onefant.

CONQUISITORES. Among the Romans, these were commissaries or commissioners, charged by their functions with the raising of troops in the towns, and throughout the country; and obliged, at the same time, to make search for those who wished or attempted to withdraw themselves from the levy.

CONRAD, or CONRADS, ABRAHAM, in *Biography*, an engraver and designer of Holland, who was born about 1620. The works of this artist, for the greater part, consist of portraits, many of which are from his own drawings, and prove him to have possessed very considerable talents. His style of engraving is much varied in his different works: some of his prints very much resemble those of L. Voller-mans. Amongst his best works the following may be enumerated: "Christopher Love," *A. Conrad fecit*, in fol.; "Jacob Triglande, Professor of Theology to the University of Leyden," *Ab. Conradus fecit*, in fol.; "The Flagellation and the Crucifixion of Christ," two plates in folio, from Ab. Van Diepenbeck. Huber, Manuel des Arts.

CONRAD I., emperor of Germany, was, previously to his attaining that high honour, duke of Franconia and Hesse. On the death of Louis IV. king of Germany, A. D. 912, the nobility of the realm assembled at Worms, for the purpose of choosing a successor. They offered the crown to Otho, duke of Saxony, by whom, on account of his great age, it was not accepted. He requested them to turn their thoughts to the duke of Franconia, who was highly esteemed for his great talents and excellent character. Upon this recommendation he was called to the vacant throne, though not with that unanimity which is calculated to secure general homage. The people of Lorrain were attached to Charles the Simple, whom they wished to proclaim as their sovereign: Conrad marched thither with great expedition, and by his presence conciliated those who were disposed to resist his authority. While he was thus engaged, Henry, duke of Saxony, son of Otho, joined by the dukes of Suabia and Bavaria, excited a rebellion. This, after surmounting several difficulties, he crushed, and gained a complete victory over his enemies. The Hungarians now made a dreadful irruption into his dominions, and, after marking their progress with fire and sword, compelled him to purchase a peace on very disgraceful terms: but, notwithstanding all the exertions of his enemies, he retained the sceptre, and conducted the affairs of the empire with considerable prudence till the time of his death. His constitution being broken by the fatigues to which he had been exposed, and his health being much injured in consequence of a wound which he had received in battle, he assembled the princes and states of the empire, and seriously exhorted them to raise Henry, duke of Saxony, who had been his enemy, to the imperial throne. This is a rare instance, on the records of history, of a prince sacrificing his private resentment to the public good. He felt the crown, sceptre, and other regalia to his intended successor; and after an active and respectable reign of seven years, he died, A. D. 918, in peace, with the consciousness of quitting life under the influence of Christian principles.

CONRAD II., emperor of Germany, was likewise duke of Franconia: he was surnamed THE SALIC, on account

of his having been born on the banks of the river Sala, and was unanimously invested with supreme authority. He succeeded Henry II., and was crowned, according to ancient usage, at Thonza. During the first two years of his reign, Conrad was chiefly employed in regulating the police, and other affairs of administration; but in the third, receiving intelligence that the Lombards had shaken off their allegiance, he was obliged to march into Italy. The rebels were soon reduced to obedience, and the king proceeded to Rome, where he was solemnly crowned by pope John, in presence of Canute, king of England and Denmark, and Rodolphus, king of Burgundy. He was recalled to Germany, on account of an insurrection, raised by the dukes of Suabia, Carinthia, and Worms, which he readily suppressed, and brought the offenders to the lowest state of subjection. By a decree of the empire, they were deprived of their dominions. The seven succeeding years were occupied by wars between the emperor, Poland, Bohemia, and Hungary: the detail of these would be uninteresting to our readers. The imperial arms were in general successful; and on the demise of Rodolphus, Conrad acquired the peaceable possession of the sovereignty of Burgundy. A general revolt against the German dominions was planned in Italy, and fomented by many leading persons: the emperor passed suddenly into that country, and seizing some of the principal malcontents, sent them prisoners to Germany. He besieged Milan, but without success; and severely chastised Parma. Being urged by the monks of Cassino to protect them against the violence and oppression of Pandolph, prince of Capua, he marched to that place, expelled the prince, and seized his country. Returning to Germany, he was seized with the gout in his legs, and died suddenly at Utrecht, in 1039, in the fifteenth year of his reign. He was universally revered as a just and magnanimous prince; and all those who distinguished themselves in his service had no reason to be dissatisfied with the remunerations which they obtained. Among many instances of his munificence, it is said that one of his attendants, who had lost his leg in battle, received his boot-full of gold, which the emperor observed might defray the expence of his cure. He was interred in the cathedral church of Spire, which he had formerly founded and endowed.

CONRAD III., another duke of Franconia and emperor of Germany, was nephew of the emperor Henry V., and elected to the imperial throne at Coblenz in 1138-9, as successor to Lothaire II. This measure was warmly contested by Henry, duke of Bavaria, who positively refused to surrender the regalia, which had been deposited in his hands by Lotharius. He was, however, at length compelled to submit, with the loss of his own dominions; and the disappointment and chagrine which he suffered on the occasion brought him to an early grave. Upon the death of this prince, his brother Guelph, with the assistance of the king of Sicily, made vigorous exertions for the recovery of the confiscated duchies: a war ensued, and, after several indecisive engagements, the duke was closely besieged by the emperor in the castle of Weinsberg, celebrated for the conjugal fidelity and affection of the ladies; who, being permitted to leave the place with whatever they could carry, marched out, each with her husband on her back. This instance of kindness and regard so much affected the emperor, that he readily came into terms with Guelph and his partizans. In this war we must look for the origin of the designations of the Guelphs and Ghibellines, which are so often referred to on the page of history. The troubles in Germany were immediately succeeded by a revolt of several of

the town of Italy, which threw off the sovereignty of the empire, and formed themselves into independent republics. Conrad was now prevailed on to join a crusade against the Saracens, and took the cross from the hands of Bernard. He accordingly set out for Palestine, at the head of sixty thousand men. Under his banners a troop of females rode in the attitude and armour of men; and the chief of these Amazons, from her gut spurs and buskins, obtained the epithet of the "golden-footed dame." This expedition proved unfortunate: one half of his troops perished by sickness. occasioned, it is believed, through unwholesome provisions, furnished by the treachery of the Greek emperor, Manuel Comnenus. Conrad, with the remainder, joined Louis VII. king of France, in the siege of Damascus, exhibiting great prowess, but without any success. The siege was raised, and the emperor returned to Germany, where he was overwhelmed with public calamity and private affliction, by another revolt of Guelph, and by the death of his eldest son. This last event preyed on his mind, and evidently affected his health. Aware of his approaching end, he was anxious to provide for the succession, and recommended his nephew, Frederic Barbarossa, to the states of the empire, as a prince of known courage and tried talents. His recommendation was approved, and Conrad died in a short time after, at Bamberg, in the 14th year of his reign. He left one son by his empress Gertrude, whose tender age precluded him from taking any share in the government.

CONRAD IV., the last emperor of Germany of this name, was duke of Suabia, and son of the emperor Frederic II. He was declared successor to his father in 1250, but pope Innocent IV. refused to confirm the election. Conrad, notwithstanding the denunciations of the pontiff, marched into Italy, in order to take possession of the kingdom of the two Sicilies, which had been bequeathed to him by his father. He took the city of Naples after an eight months' siege: afterwards Capua and Aquino opened their gates to him. He did not long enjoy his success: in 1254, he fell sick, and died in the flower of youth, leaving one son, named Conradin, who, at the early age of fourteen, was beleagued by the orders of Charles of Anjou; and in him ended the line of Suabia. Moreri. Univer. Hist. Gibbon's Rom. Empire.

CONRAD is a name distinguished in literary history, as well as among the princes of the earth; but as none of that appellation have become very illustrious by their works, we shall briefly notice them and their writings in a single paragraph. The first was a German abbot of the Benedictine order, about the commencement of the tenth century: he wrote "A Continuation of the History of France;" and on that account has, by some biographical writers, been supposed a Frenchman; by others, he has been confounded with Conrad of Cologne, who was author of the life of S. Wolphemius. Towards the conclusion of the eleventh century, Conrad, bishop of Utrecht, flourished, to which office he had been raised by his pupil, the emperor Henry. He is chiefly known by a work, entitled, "Apologia de Unitate Ecclesie conservanda, et Schismate inter Henricum IV. Imp. ac Greg. VIII. Pont. Max." He wrote also a spirited defence of the imperial right on the subject of investitures. The bishop was assassinated in his palace, A. D. 1099, by a Friesland architect, in revenge for having instructed him in the method of erecting massy buildings on a swampy soil, and afterwards employing a rival in constructing the collegiate church of which the bishop was founder.—Conrad of Slein, a German monk, lived in the thirteenth

century, and was author of "A Chronicle," and of more than fifty volumes on different subjects, chiefly lost, of which John of Aventine made much use in compiling part of his annals. By his various writings, this monk obtained the honourable epithet of "philosopher."—Conrad of Lichtenau, abbot of Ursberg, in the thirteenth century, was author of "A Chronological History," extending from Belus, king of Assyria, to the year 1449, which was afterwards continued, by an anonymous writer, to the reign of Charles V. It was originally printed at Strasburg, in 1537, and afterwards, with the continuation, in 1569, at Basil. It created enemies, by some reflections on the wars carried on between the German emperors and the popes. The same author is said to have written the lives of the saints, in 12 books; but they have not come down to us, and probably were never published.—Conrad of Mentz flourished in the thirteenth century, and is known by a work, entitled, "Chronicum Rerum Moguntiarum," from the year 1140 to 1250, which was first published in 1535, and has undergone several different impressions.—About the same period lived Conrad of Marburg, who was the first prelate of Germany that received the infamous commission of inquisitor from the papal see; an office which he executed with so much cruelty, that at length he fell a sacrifice to the indignation of popular clamour. He wrote "The Life of the Princess Elizabeth of Thuringia," who has obtained a place among the saints.—Conrad is the name of two Dominican monks, natives of Saxony, in the fourteenth century. One was a member of the chapter of his order in that province, and the other appointed by the pope vicar-general of Saxony, in the year 1350. The former published, among many other things, "A Commentary on the Book of Job;" "A Concordance to the Bible;" "The Student's Dream;" and "A common-place Book for the Use of Preachers."—Conrad of Asti, a Piedmontese Dominican monk, was author of "Commentaria in Jus Canonium," and other pieces. He died in the year 1470.—In the sixteenth century appeared Conrad Leontinus, a learned German Cistercian monk, who appears to have been well acquainted with the best writers in profane and sacred literature, and to have maintained an intimate correspondence with the most learned men of his time. He published, in the year 1507, at Basil, "Nicholas de Lyra's Commentary on the Bible, with marginal Notes."—There were several others of this name, but it is needless to mention them all. Conrad of Mur, canon of the church of Zurich, lived in the thirteenth century, and is known for his treatise on the sacraments, and the lives of the popes: and Conrad of Saxony wrote "A Chronicle," and some historical works, to which no date is assigned. Moreri.

CONRI, FLORENCE, a Franciscan friar, was born in the province of Connaught, about the year 1560, and was sent at an early age into Spain, as a student in theology and the philosophy of the times. When he had finished his studies, he travelled into the Low Countries, where he acquired great reputation among the Catholics, by his assiduity and zeal in illustrating and defending the doctrines of St. Augustine. He was author of several tracts on theological subjects, among which were "The Mirror of the Christian Life;" an "Irish Catechism," printed at Louvain, in 1626; and "Tractatus de Statu parvulorum sine Baptismo decedentium ex hac Vita," Lovanii, 1624. As a politician, he was fixed on to conciliate his countrymen to the measures of the court of Spain, when Philip III. attempted the conquest of Ireland, during the reign of Elizabeth. On the failure of that enterprise he escaped from the

the country, and spent the remainder of his life in the Low Countries, and at Madrid, supported by a pension from Spain, in recompence for the services which he intended, but which proved ineffectual. He died at Madrid, in the year 1629. Moreri.

CONRINGIUS, HERMAN, a philosopher of great talents, and almost universal learning, born at Norden in East Friesland in November, 1606, received his education at Helmstadt, where he was made doctor in medicine in 1636, and soon after advanced to the chair of professor in that science. He was also, in succession, appointed professor in physics, law, and politics. For his profound knowledge in the laws of nations and politics, he was consulted, and made physician and aulic counsellor to Christina, queen of Sweden, to the king of Denmark, and to several of the German princes and electors. Of his capacity for these employments abundant proof may be found in his numerous works in philosophy, medicine, and history, which were long held in great repute, though now referred to rather from curiosity than for their utility. In all of them, however, there is a wonderful display of learning. In his philosophy he was a follower of the school of Aristotle, as he proclaims in the first of his publications, viz. "De Calido inuato, de Morte, et Vita, et de Origine Formarum, libri, omnia ad Aristotelis Sententiam elaborata," Lug. Bat. 1631, 8vo., republished with additions in 1640, 43, and 46; "De Germanicorum Corporum Habitus antiqui et novi Causis, Dissertatio," Helmst. 1645, 4to. This has been frequently reprinted. The author has some ingenious conjectures on the causes of the diminished stature, and altered complexion, and habit of body, of the Germans, which he shews from indisputable documents had taken place among these people. The ancient Germans were fair, with blue eyes, and abundant yellow hair, "robustis nato parentibus, sero veneri se dedisse, inque conjugio castis vixisse, et suas vires conservasse integritates, et plenioris silis impretuisse, &c. &c. An entire change in their mode of living, the use of fumes, of tobacco, &c. he conceives to have gradually undermined their constitutions, and to have produced the changes he states to have taken place. An edition of this work was printed at Francfort, with notes, by Philip Burgshaw, 8vo. 1727. "De Hermetica Ægyptiorum veteris, et Paracelsica nova Medicina," Helmst. 1648, 4to.; reprinted, with additions, 1669: a work abounding with ingenious and learned speculations, but little now attended to. "Introductio in universam Artem Medicam, ejuque singulas Partes," 1654; re-edited by Schelhammer, 1687; and again by Hoffman, 1726, 4to.; containing an history and bib. medica, with observations on the principal facts and writers in medicine, besides numerous dissertations on particular diseases, as dropsy, pleurisy, &c. Conringius is said to have been remarkably diminutive in stature, but of great vivacity, and enjoying a strong memory. He retained the situation of senior of the university of Helmstadt to the time of his death, which happened on the 12th of December, 1681. His character is contained in the following epitaph:

Hoc tumulo

Clauditor regum principumque consiliarius,
Juris naturalis gentium publici doctor,
Philosophicæ omnis peritissimus, practicæ et theoreticæ,
Philologus insignis, orator, poeta, historicus, medicus,
Theologus,

Multas putas lus conditas,

Unus est Hermannus Conringius, facili miraculum,
Posuit Henricus Meibomius.

Haller Bib. Eloy Dict. Hist.

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CONSABURUS, in *Ancient Geography*, a town of Spain, towards the south-west of Althæa Oicadam.

CONSANGUINEO, WRIT DE, in *Law*. See ASSISE de Mort d'Anceſtor.

CONSANGUINEUS FRATER. See CONSANGUINITY.

CONSANGUINITY, the relation of kinship, between persons of the same blood, or sprung from the same root; or, as it is defined by writers on these subjects, "*Vinculum personarum ab eadem stirpe descendendum*;" i. e. the connection or relation of persons descended from the same stock or common ancestor. This consanguinity is either *lineal*, when it subsists between persons, of whom one is descended in a direct line from the other; as between A. B. and his father, grandfather, great grandfather, and so upwards in the direct ascending line; or between A. B. and his son, grandson, great grandson, and so downwards in the direct descending line. Every generation, in this lineal direct consanguinity, constitutes a different degree, reckoning either upwards or downwards: thus, the father of A. B. is related to him in the first degree, and so likewise is his son; his grandfire and grandson in the second; his great grandfire and great grandson in the third. This is the only natural way of reckoning the degrees in the direct line, and therefore universally obtains, as well in the civil and canon, as in the common, law. Consanguinity is *collateral*, when relations descend from the same stock or ancestor, but do not descend one from the other. See COLLATERAL.

It is easy to compute, by the rules of progression, how many lineal ancestors any man has within a certain number of degrees. Thus, it would appear that a person, at the 20th degree, or the distance of 20 generations, hath above a million of ancestors: and if a similar calculation be made of collateral kindred at the distance of 20 degrees forward, on the supposition that each couple of ancestors leave, one with another, two children, the number will be 274877906944: as in the following tables:

TABLE I.

Lineal Degrees.	Number of Ancestors.
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512
10	1024
11	2048
12	4096
13	8192
14	16384
15	32768
16	65536
17	131072
18	262144
19	524288
20	1048576

In forming this table, it is evident that each person has two ancestors in the first degree, and that the number is doubled at every remove, because each of his ancestors has also two immediate ancestors of his own. In order to find the number of ancestors at any particular degree, we need

only to find a power of 2, the index of which is the number of degrees; *e. g.* 2^1 , 2^{10} , 2^{15} , &c. will give the corresponding number respectively. Or, the number of ancestors at any even degree may be had by squaring the number of ancestors at half that number of degrees: thus 16, the number of ancestors at 4 degrees, is the square of 4; the number of ancestors at two; 256 is the square of 16; 65536 of 256; and the number of ancestors at 40 degrees would be the square of 1048576, or upwards of a million of millions. These powers are easily found by means of logarithms. See PROGRESSION.

TABLE II.

Collateral Degrees.	Number of Kindred.
1	1
2	4
3	16
4	64
5	256
6	1024
7	4096
8	16384
9	65536
10	262144
11	1048576
12	4194304
13	16772176
14	67108864
15	268435456
16	1073741824
17	4294667926
18	17179869184
19	68719476736
20	274877969444

It is obvious that in this table the numbers in the progression increase much more rapidly than those of the former table; for though the first born is 1, the ratio of the progression is 4; that is, there is one kinsman (a brother) in the first degree, who makes, together with A. B., the *propogitus*, as he is called, the two descendants from the first couple of ancestors; and in every other degree, the number of kindred must be *quadruple* of those in the degree which immediately precedes it. For, since each couple of ancestors has two descendants, who increase in a duplicate ratio, it will follow that the ratio in which all the descendants increase downwards, must be double that in which the ancestors increase upwards; but the ancestors increase upwards in a duplicate ratio; therefore the descendants must increase downwards in a double duplicate; that is, in a quadruple ratio. This calculation may be formed by a more expeditious process, *viz.* by squaring the couples, or half the number of ancestors at any given degree, which will furnish the number of kindred we have in the same degree, at equal distance with ourselves from the common stock, besides those at unequal distances. Thus, in the 10th lineal degree, the number of ancestors is 1024; its half, or the couples, amount to 512; the number of kindred in the 10th collateral degree amounts, therefore, to 262144, or the square of 512. Or, it will be seen in the table that $2^3 = 8$, the number of kindred in the 3d collateral degree; $2^4 = 16$, the number in the 4th collateral degree; $2^5 = 32$, the number in the 5th degree; $2^{10} = 1024$, the number in the 6th degree, &c. and therefore if the number of degrees be denoted by *n*, 2^{n-1} , will be the number of kindred in the degree expressed by *n*; which is easily obtained by the aid of logarithms in any degree, however re-

note. If any one will be at the trouble of recollecting the state of the several families within his own knowledge, and of observing how far they agree with this account; that is, whether, on an average, every man has not one brother or sister, four first cousins, sixteen second cousins, and so on; he will find that the present calculation is very far from being overcharged.

From the records of scripture we learn, that there is one couple of ancestors belonging in common to us all, from whence the whole race of mankind is descended; and hence wedded, as an obvious and undeniable consequence, that all men are in some degree, however remote, related to each other. For, indeed, if we only suppose each couple of our ancestors to have left, one with another, two children; and each of those children on an average to have left two more; (and, without such a supposition, the human species must be daily diminishing) we shall find that all of us have now subsisting nearly 270 millions of kindred in the 15th degree, at the same distance from the several common ancestors as we ourselves are; besides those that are one or two descents nearer to or farther from the common stock, who may amount to as many more. And, if this calculation should appear incompatible with the number of inhabitants on the earth, it is because, by intermarriages among the several descendants from the same ancestor, a hundred or a thousand modes of consanguinity may be consolidated in one person, or he may be related to us a hundred or a thousand different ways.

The method of computing these degrees in the canon law (Decretal. 4. 14. 3 & 9.) which our law has adopted (Co. Litt. 23.) is as follows: We begin at the common ancestor, and reckon downwards; and in whatsoever degree the two persons, or the most remote of them, is distant from the common ancestor, that is the degree in which they are related to each other. Thus, Titius and his brother are related in the first degree; for, from the father to each of them is counted only one; Titius and his nephew are related in the second degree; for the nephew is two degrees removed from the common ancestor; *viz.* his own grandfather, the father of Titius. See Blackt. Comm. vol. ii.

Marriage is prohibited by the church to the fourth degree of consanguinity inclusive; but, by the law of nature, consanguinity is no obstacle to marriage, except it be in the direct line. See MARRIAGE.

Consanguinity terminates in the sixth and seventh degree, excepting in the succession to the crown; in which case, consanguinity is continued to infinity.

The civilians call *fratres consanguinei*, those born of the same father; in opposition to *fratres uterini*, who are only born of the same mother. See DESCENT.

According to the common opinion, those were not allowed to complain of an inefficient testament, *i. e.* of being disinherited without cause; excepting from the turpitude of the person appointed heir in their place. But Van Water endeavours to shew the contrary; and urges, that the *consanguinei* might plead inefficiency, even where the testament was not made in favour of a person incapable. See KINDRED.

CONSAIR, in *Geography*, a town of Persia, in the province of Irak; 52 miles N.W. of Ispahan.

CONSAIRBRUCK, or CONZ, a town of Germany, in the electorate of Treves, situated at the conflux of the Saar and the Moselle; 2 miles S. of Treves.

CONSBACH, a town of Sweden, in South Gothland; 32 miles N. of Wardberg.

CONSCIENCE, in *Ethics*, a secret testimony or judgment of the soul, or as some have defined it, a distinct faculty or power of the mind, by which it gives its approbation

tion to things it does that are naturally good; and reproaches itself for those that are evil. Or, conscience is a dictate of the understanding power, concerning moral actions; considered as it has the knowledge of laws; and consequently as conscious of what is to be done, or not done, with regard to the legislator.

In the more popular sense of the word, conscience is a judgment, either true or false, whereby we pronounce a thing good or evil. This makes what we call the inner forum, or tribunal. Accordingly, it should be considered, not as a mere intellectual light, or informing faculty, a dictate of the practical understanding (as the schools call it), which directs, admonishes, and influences us, in what we are to do; but as it acts back upon the soul by a reflection on what we have done; and is, by that means, the source and cause of all that joy, or dejection of mind, of those internal sensations of pleasure or pain, which attend the practice of great virtues or great vices.

Some divines maintain, that conscience is infallible; and hold it to be that immutable law whereby God will judge men: they deny that the understanding can be the source of errors, and lay them all at the door of the will. A man, say they, may secure himself from error, by forbearing to judge of things till he have a clear and distinct perception of them.

Some of the schoolmen distinguish between the conscience antecedent to an action, and that consequent to it: the first, called antecedent conscience, determines what is good, and what evil; and consequently prescribes what is to be done, and what avoided. Consequent conscience is a kind of secondary or reflex judgment, with regard to the goodness, &c. of things, already done or committed.

The rule of conscience is the will of God, so far as it is made known to us, either by the light of nature, or by that of revelation. With respect to the knowledge of this rule, conscience is said to be rightly informed, or mistaken; firm, or wavering, or scrupulous, &c. With respect to the conformity of our actions to this rule when known, conscience is said to be good, or evil, &c.

In a moral view, it is of the greatest importance that the understanding be well informed, in order to render the judgment or verdict of conscience a safe directory of conduct, and a proper source of satisfaction. Otherwise, the judgment of conscience may be pleaded, and it has actually been pleaded, as an apology for very unwarrantable conduct. Many atrocious acts of persecution have been perpetrated, and afterwards justified, under the sanction of an erroneous conscience. It is also of no small importance, that the sensibility of conscience be duly maintained and cherished; for want of which men have often been betrayed into criminal conduct without self-reproach, and have deluded themselves with false notions of their character and state.

Dr. Reid (See his "Essays on the active Powers of Man," p. 252, &c.) has made the following observations on that power of the mind, which we call conscience. 1. Like all our other powers, it comes to maturity by insensible degrees, and may be much aided in its strength and vigour by proper culture. 2. Conscience is peculiar to man. We see no vestige of it in brute animals; and it is therefore one of those prerogatives by which we are raised above them. Conscience is evidently intended by nature to be the immediate guide and director of our conduct, after we arrive at the years of understanding. Other principles may urge and impel; but this only authorises. Other principles ought to be controlled by this: this may be, but never ought to be controlled by any other, and never can be with innocence. From these observations it evidently follows, that the moral

faculty of conscience is both an active and an intellectual power of the mind. As an active principle, it sometimes concurs with other active principles, sometimes opposes them, and sometimes is the sole principle of action. As an intellectual principle, we have by it, and by it alone, the original conceptions of right and wrong in human conduct, in their different degrees and different species.

Philosophers in lieu of the word *conscience*, which seems appropriated to theological matters, frequently use that of *conscientiousness*; which see.

The power of conscience has been remarked in all ages of the world, and under all dispensations of religion; and history, both sacred and profane, furnishes innumerable examples, that are eminently instructive. One remarkable instance of this kind occurs in the history of Joseph and his brethren (See Gen. chap. xlii. and particularly v. 21.) Another is presented to us in the account which the evangelist Matthew has given us of the feelings and reflections of Herod the tetrarch, when he heard of the fame of Jesus, after he had occasioned the death of John the Baptist. (See Matth. xiv. 1, 2, 3.) Bishop Atterbury has admirably portrayed the state of Herod's mind, in his excellent sermon on this subject. (Sermons, vol. iv. Sermon 4.) Many instances of a similar kind occur in profane history. We shall content ourselves with selecting one, and shall give it in the words of the elegant preacher already cited. "Tiberius, that complete pattern of wickedness and tyranny, had taken as much pains to conquer these fears (referring to the fears of futurity before described) as any man, and had as many helps and advantages towards it, from great splendour and power, and a perpetual succession of new business, and new pleasures: and yet, as great a master of dissimulation as he was, he could not dissemble the inward sense of his guilt, nor prevent the open eruptions of it upon very improper occasions. Witness that letter which he wrote to the senate from his impure retreat at Capræ. Tacitus has preserved the first lines of it; and there cannot be a livelier image of a mind filled with distraction and despair than they afford us: *Quid, scribam vobis, P. C. aut quomodo scribam, aut quid omnino non scribam hoc tempore, Dei me Deaque pejus perdant, quam perire quotidie sentio, si scio!* that is, "What, or how, at this time, I shall write to you, fathers of the senate, or what indeed I shall not write to you, may all the powers of heaven confound me yet worse than they have already done, if I know or can imagine!" And his observation upon it is well worthy of ours, and very apposite to our present purpose: "In this manner (says he) was this emperor punished by a reflexion on his own infamous life and guilt; nor was it in vain that the greatest master of wisdom (he means Plato) affirmed, that were the hearts of tyrants once laid open to our view, we should see there nothing but ghastly wounds and bruises; the consciousness of their own cruelty, lewdness, and ill conduct, leaving as deep and bloody prints on their minds, as the strokes of the scourge do on the back of a slave. Tiberius (adds he) confessed as much, when he uttered these words; nor could his high station, or even privacy and retirement itself, hinder him from discovering to all the world the inward agonies and torments under which he laboured." Thus that excellent historian. We cannot forbear subjoining the following fact, related by Mr. Fordyce in his "Dialogues on Education" (vol. ii. p. 401), as a real occurrence which happened in a neighbouring state not many years ago. A jeweller, a man of good character and considerable wealth, having occasion, in the way of his business, to travel at some distance from the place of his abode, took along with him a servant, in order to take care of his portmanteau. He had with him some of his

best jewels, and a large sum of money, to which his servant was likewise privy. When the master had occasion to dismount on the road, the servant, watching his opportunity, took a pistol from his master's saddle and shot him dead on the spot; he then rifled him of his jewels and money, and hanging a large stone to his neck, threw him into the nearest canal. With this booty he made off to a distant part of the country, where he had reason to believe that neither he nor his master were known. There he began to trade in a low way at first, that his obscurity might screen him from observation, and in the course of several years seemed to rise, by the natural progress of business, into wealth and consideration; so that his good fortune appeared at once the effect and reward of industry and virtue. Of this he counterfeited the appearance so well, that he grew into great credit, married into a good family, and by laying out his hidden stores discreetly, as he saw occasion, and joining to all an universal affability, he was admitted to a share in the government of the town, and rose from one post to another, till at length he was chosen chief magistrate. In this office he maintained a fair character, and continued to fill it with no small applause, both as a governor and a judge; till one day as he sat on the bench with some of his brethren, a criminal was brought before him who was accused of murdering his master. The evidence came out full, the jury brought in their verdict that the prisoner was guilty, and the whole assembly waited the sentence of the president of the court (an office which that day belonged to him), with great suspense. In the mean while he manifested an unusual disorder and agitation of mind, and his colour often changed; at length he arose from his seat, and coming down from the bench, paced himself just by the unfortunate man at the bar. "You see before you (said he, addressing himself to those who had sat on the bench with him) a striking instance of the just retaliation of heaven, which this day, after 30 years' concealment, presents to you a greater criminal than the man just now found guilty." He then proceeded to make an ample confession of his guilt, and of all its aggravations. "Nor can I feel (continued he) any relief from the agencies of an awakened conscience, but by requiring that justice be forthwith done against me in the most public and solemn manner." We may easily suppose the amazement of the whole assembly, and especially of his fellow-judges. However, they proceeded, upon this confession, to pass sentence upon him, and he died with all the symptoms of a penitent mind.

CONSCIENCE, *Court of*. See COURT.

CONSCIOUSNESS, in *Logic* and *Metaphysics*, is the mind's perception of its own existence, faculties, and operations; and, in this view of it, it is one of the sources of judgment, and one species of evidence. Consciousness, says Dr. Reid, (*Essays on the Intellectual Powers of Man*, p. 578), is an operation of the understanding of its own kind, and cannot be logically defined. The objects of it are our present pains, our pleasures, our hopes, our fears, our desires, our doubts, our thoughts of every kind; in a word, all the passions, and all the actions and operations of our own minds, while they are present. We may remember them when they are past: we are conscious of them only while they are present. It is, therefore, a *first* principle that every thing exists of which we are conscious. When a man is conscious of pain, he is certain of its existence; when he is conscious that he doubts, or believes, he is certain of the existence of these operations. And his conviction of the reality of these operations is not the effect of reasoning: it is immediate and intuitive. The existence, therefore, of the passions and operations of our minds, of

which we are conscious, is a first principle, which nature requires us to believe upon her authority. Indeed, this is the only principle of common sense, which has never been directly called in question, and which retains its authority with the greatest sceptics. Mr. Hume, after annihilating body and mind, time and space, action and causation, and even his own mind, acknowledges the reality of the thoughts, sensations, and passions of which he is conscious. From this source of consciousness we derive all that we know, and indeed all that we can know, of the structure, and of the powers of our own minds; from which we may conclude, that no branch of knowledge stands upon a firmer foundation; for surely no kind of evidence can go beyond that of consciousness. Some have confounded consciousness and reflection, though they are essentially distinct. The former is common to men at all times, but is insufficient to give us clear and distinct notions of the operations of which we are conscious, and of their mutual relations, and minute distinctions. The second, or attentive reflection upon these operations, making them objects of thought, surveying them attentively, and examining them on all sides, is so far from being common to all men, that it pertains to very few.

Another first principle, in relation to the subject of this article is, that the thoughts of which any one is conscious are the thoughts of a being which he calls *himself*, his *mind*, his *person*. "If any man asks a proof of this," says Dr. Reid, "I confess I can give none; there is an evidence in the proposition itself, which I am unable to resist. Shall I think, that thought can stand by itself without a thinking being? or that ideas can feel pleasure or pain? My nature dictates to me that it is impossible. And that nature has dictated the same to all men, appears from the structure of all languages; for in all languages men have expressed thinking, reasoning, willing, loving, hating, by personal verbs, which from their nature require a person who thinks, reasons, wills, loves, or hates. From which it appears, that men have been taught by nature to believe that thought requires a thinker, and reason a reasoner, and love a lover."

"Here," continues Dr. Reid, "we must leave Mr. Hume, who conceives it to be a vulgar error, that besides the thoughts we are conscious of, there is a mind which is the subject of those thoughts." If the mind be any thing else than impressions and ideas, it must be a word without a meaning. The mind, therefore, according to this philosopher, is a word which signifies a bundle of perceptions; or when he defines it more accurately, "It is that succession of related ideas and impressions, of which we have an intimate memory and consciousness." Whence it follows that "I am; says our author, "that succession of related ideas and impressions, of which I have the intimate memory and consciousness. But who is the I that has this memory and consciousness of a succession of ideas and impressions? Why, it is nothing but that succession itself."

Identity of consciousness, according to Mr. Locke, constitutes identity of person. For a farther discussion of this subject, see IDENTITY.

CONSCRIPT, CONSCRIPTUS, a popular term in the Roman history, used in speaking of senators, who were called *conscript* fathers, *patres conscripti*; because their names were written in the register, or catalogue of the senate.

Livy, lib. i. cap. 1. tells us, that when Brutus filled up the places of the senators cut off by Tarquin, with others chosen out of the equestrian order, those new senators only had the appellation given them of *patres conscripti*.

CONSCRIPTS also denote men raised to recruit the Imperial and French armies. All men capable of bearing arms in Hungary and Bohemia, have been usually enregistered and obliged to march wherever their services were called for. The conscripts in France, during the last and present war, have been raised on similar principles.

The militia of Great Britain comes likewise in some measure under this denomination or description, with this difference, that the men have been raised by ballot, and do not leave their native country, unless they voluntarily offer their services for that purpose.

CONSECRATION, the act of converting or setting apart, any profane, or common thing, to a pious purpose; with certain ceremonies, prayers, benedictions, &c. appropriate to it.

Consecration is the reverse of sacrilege and profanation, which consist in perverting a thing set apart for a pious purpose, to a profane and popular one.

The bishop consecrates a church, or a chalice; the pope consecrates medals, agnus dei's, &c. and grants indulgences to those who bear such about them with devotion. The consecration, or dedication, of a church is an episcopal ceremony, consisting in a great number of benedictions, with aspersions and unctions of chrism, &c. on the walls, both within and without. The form for consecrating churches, chapels, and church-yards, or places of burials, in England, may be seen in Wilkins's *Concilia Magnæ Britanniæ*, &c. vol. iv. p. 668. It directs that the bishop and clergy, of whom there are to be at least two, shall enter the church or chapel in their several habits, and, as they walk up from the west to the east end, repeat alternately the 24th Psalm; the bishop beginning, "The earth is the Lord's," &c. with the "Gloria patri." When they are come to the Lord's table, the bishop sitting in his chair shall have the instrument of dedication, donation, and endowment of the church or chapel, church-yard, or burial-place, presented to him by the founder, or some proper person, which he shall cause to be read by his register, or other officer; and then the instrument shall be laid on the table, and he shall stand on the north side of it, and turning to the congregation, deliver an address to them, which is followed by suitable prayers. One of the priests then reads the service of the day, introducing proper psalms and lessons: after which, the bishop proceeds to the communion service, and instead of the collect of the day, uses one proper to the occasion. When the Epistle and Gospel are read, they are succeeded by the Nicene creed and the sermon; and then the bishop is to proceed with the service of the communion. When the service in the church is finished, the bishop and clergy with the people shall go into the church-yard, and make use of a prayer for the occasion. See *ubi supra*.

The custom of consecrating persons, temples, altars, vestments, utensils, &c. is very ancient; and all the ceremonies thereof are prescribed under the old law. When those consecrations relate to men, they are properly called *ordinations*; excepting those performed to bishops and kings, which still retain the name of *consecration*. Those which only consist in a ceremony instituted by the church, are more properly called *benedictions*. When they regard churches, altars, vessels, &c. they are properly called *dedications*.

In the trial of archbishop Laud, A. D. 1644, it was one of the charges alleged against him by the commons, that he had traitorously endeavoured and practised "to alter and subvert God's true religion by law established in this realm, and withed them to set up popish superstition and

idolatry, and to reconcile us to the church of Rome." One branch of this charge was his introducing and practising certain popish innovations, and superstitious ceremonies, not warranted by law, nor agreeable to the practice of the church of England since the reformation. In proof of this charge, the managers, on the part of the commons, insisted on his countenancing the setting up of images in churches, church-windows, and other places of religious worship. See *IMAGE*.

Another popish innovation charged on the archbishop was, his superstitious manner of consecrating chapels, churches, and church-yards, such as had been practised in Creed-church, and in the church of St. Giles's in the Fields. The managers objected further, his consecrating altars with all their furniture, as pattens, chalices, altar cloths, &c. even to the knife that was used for cutting the sacramental bread; and his dedicating the churches to certain saints, together with his promoting annual revels, or feasts of dedication, on the Lord's day, in several parts of the country, by which that holy day was profaned, and the people encouraged in superstition and ignorance. With respect to the consecration of churches, the archbishop replied, that the practice was as ancient as Moses, who consecrated the tabernacle, with all its vessels and ornaments; that the temple was afterwards consecrated by Solomon; that as soon as Christian churches began to be built, in the reign of Constantine the Great, they were consecrated, as Eusebius testifies concerning the church of Tyre, (E. H. l. x. c. 3.), and so it has continued to the present time. Besides, if churches were not consecrated, they would not be holy, &c. &c. As to the manner of consecrating Creed-church, St. Giles's, &c. his grace confessed that, when he came to the church-door, that passage in the Psalms was read, "Lift up your heads, O ye gates, even lift them up, ye everlasting doors, that the king of glory may come in;" that he kneeled and bowed at his entrance into the church, as Moses and Aaron did at the door of the tabernacle; that he declared the place holy, and made use of a prayer like one in the Roman pontifical; that afterwards he pronounced divers curses on such as should profane it, but denied his throwing dust into the air, in which he said, the witnesses had forsworn themselves; for the Roman pontifical does not prescribe throwing dust into the air, but ashes; and he conceived there was no harm, much less treason in it. As to the consecrating of churches, and also dedicating them to God, has been of ancient usage, so has the consecration of altars and their furniture; and such consecrations are necessary, for else the Lord's table could not be called holy, nor the vessels belonging to it, as they usually are; yea, there is an holiness in the altar, which sanctifies the gift, which it could not do, unless itself was holy; if there be no dedication of these things to God, no separation of them from common use, then there can be no such thing as sacrilege, or difference between our holy table and a common one. And as to the form of consecrating these things, the archbishop alleged, that he had it not from the Roman pontifical, but from bishop Andrews.

The managers for the commons replied, that if the temple was consecrated, it was by the king himself, and not by the high-priest; and if the tabernacle was consecrated, it was by Moses, the civil magistrate, and not by Aaron the high-priest; but we read, they said, of no other consecrating the tabernacle and its utensils, but anointing them with oil, for which Moses had an express command; nor of any other consecrating the temple, but of Solomon's making an excellent prayer in the outward court, not in the temple itself, and of his hallowing the middle court by offerings and peace-offerings; and it is observable, that the cloud and
glory

CONSECRATION.

glory of the Lord filled the temple, so that the priests could not stand to minister before Solomon made his prayer, which some call his consecration. But if it should be allowed that the temple was consecrated in an extraordinary manner, we have no mention either in Scripture, or in Jewish writers, of the consecration of their synagogues, to which our churches properly succeed. And, after all, it is no conclusive way of arguing, to derive a Christian institution from the practice of the Jewish church, because many of their ordinances were temporary, and abolished by the coming of Christ. Moreover, it is said, that from the beginning of Christianity, we have no credible authority for consecrating churches for 300 years. Eusebius, in his life of Constantine the Great, does indeed mention his consecrating a temple which he built over our Saviour's sepulchre at Jerusalem; but how?—with prayers, disputations, preaching, and exposition of scripture, as he expressly desires it (cap. 45.) Here were no processions, no knocking at the doors by the bishop, crying, "Open ye everlasting doors;" no casting dust or ashes into the air, and pronouncing the ground holy; no reverencing towards the altars, nor a great many other inventions of later ages. These were not known in the Christian church, till the very darkest times of popery; nay, in those very dark times, we are told by Otho, the pope's legate, in his Ecclesiastical Constitutions, that in the reign of King Henry III., there were not only divers parish churches, but some cathedrals in England, which had been used for many years, and yet never consecrated by a bishop. But the archbishop's method of consecrating churches, it is said, evidently appears to be a modern popish invention; for it is agreed by Gratian, Patina, the Centuriators, and others, that the popes Hyginus, Gelasius, Silvester, Felix and Gregory, were the first inventors and promoters of it; and it is no where to be found but in the Roman pontifical, published by command of pope Clement VIII. (*De Ecclesiæ dedicatione*, p. 209, 250.) for which reason it was exploded and condemned by our first reformers, and particularly by bishop Pilkington, in his comment upon Haggar (ch. i. v. 7, 8.) and archbishop Parker, who (in his *Antiq. Brit.* p. 85, 87.) expressly condemns the archbishop's method of consecration, as popish and superstitious. (See ALTAR.)

The archbishop, however, says, that if churches are not consecrated, they cannot be holy; whereas many places that were never consecrated are styled holy, as the most holy place, and the holy city Jerusalem; and our homilies say, that the church is called holy, not of itself, but because God's people resorting thither are holy, and exercise themselves in holy things; and it is evident that sanctification, when applied to places, is nothing else but a separation of them from common use to a religious and sacred purpose, which may be done without the superstitious method above-mentioned; and though the archbishop avers, that he had not his form of consecration from the Roman pontifical, he acknowledges that he had it from bishop Andrews, who could have had it no where else.

As for the consecration of altars, pattens, chalices, altarcloths, and other altar-furniture, its original is no higher than the Roman missal and pontifical, in both which there are particular chapters and set forms of prayer for this purpose: but to imagine that these vessels may not be reputed holy, though separated to an holy use, unless they are thus consecrated, is destitute of foundation in reason or scripture, and contrary to the practice of the church of England, and the opinion of our first reformers. As to the practice of *dedication*, &c. see DEDICATION. Neal's Hist. of the Puritans, vol. ii. ch. 5. 4to.

CONSECRATION of the Pope, a ceremony which is parti-

cularly described by cardinal Rasponi, in his book concerning the church of the Lat-ran; and which is also related by father Bonanni, in his medallic history of the popes; and by Lenfant, in his history of the council of Constance. "Before the usage of the conclave was introduced by Gregory the tenth," says cardinal Rasponi, "the cardinals, three days after the obsequies of the former pope, convened in the Lateran church, where, after the invocation of the Holy Spirit, and the celebration of mass, they proceed to the election of a pope. The election being made, the first cardinal deacon invested the pope elect in his pontifical habits, and announced the name which he chose to take;" for it has been the custom now, for several centuries, that the pope should assume a new name on being elected. "Afterwards, two cardinals, the most eminent in dignity, one on his right hand, the other on his left, conducted him to the altar, where he prostrated himself in adoration of God, whilst they sang the *Te Deum*. After the *Te Deum*, the cardinals seated the pope in a marble chair, which was behind the altar, under a sort of dome, or vault, where the pope, being set, admitted the cardinals, the bishops, and some others, to kiss his feet, and to receive the *keys of peace*. Then the pope rising, the cardinals conducted him through the portico to another chair, bored like what is called in French, *siège percé*. This chair was thence very properly named *stercoraria*, the stercorary. It was formerly placed before the portico of the patriarchal basilic, and is now to be seen in the cloister of that basilic." The use of these chairs, however, was afterwards abolished by Leo the tenth, probably for this, amongst other reasons, because the perforated chair was become connected with the fabulous story of the female pope. That, however, is not a protestant fable, as some persons ignorantly pretend, for it was current long before the days of Luther. But the continuance of the use of that chair preserved the memory of the story, and might appear to the credulous an evidence of its truth. Whilst the pope sat on the stercorary, the choir sang these words of scripture: *Suscitavit pulvere genibus, et de stercore erigit pauperem, ut sedent cum principibus, et solum gloriæ teneat*. Psalm, cxlii. 7. The last clause is not in the psalm. *He raiseth the poor out of the dust, and lifteth the needy off the dung-hill, that he may set him with the princes of his people, and that he may possess the throne of glory*. The intention of this ceremony, it was said, was to insinuate to the pope the need there is of the virtue of humility, which ought to be the first step of his greatness. After remaining some time in this chair, the pope received from the hands of the chamberlain three deniers, which he threw to the people, pronouncing these words: *Silver and gold I have none for my pleasure, but what I have I give you*. Afterwards, the prior of the Lateran basilic, and one of the cardinals, or one of the canons of that basilic, took the pope between them, and whilst they walked in the portico, shouts of acclamation were raised near the basilic, and the election was declared, with the name which the pope had taken. In this manner they conducted the pope to the basilic of St. Sylvester, where, being placed before this basilic in a chair of porphyry, the prior of the basilic put into his hands a *ferula*, in sign of correction and government, and the keys, to denote the power which God gave to St. Peter, prince of the apostles, of opening and shutting, of binding and loosing, and which passes (according to our historian) successively to all the Roman pontiffs. Thence the pope, carrying the *ferula*, and the keys, went to place himself in another chair, resembling the former; and after remaining there some time, restored the *ferula* and the keys to the prior, who girt him with a girdle of red silk, giving him a

purse

purse of the same colour and stuff, wherein there were twelve precious stones, and a small bit of musk. Onuphris, in his treatise on the basilic of the Lateran, says, that it was the prior of this basilic who gave these things to the pope. His sitting in the two chairs denoted the primacy which St. Peter conferred on him, and the power of preaching the gospel conferred by St. Paul. The girdle signified continence and chastity, the purse denoted the treasure, out of which the poor were to be nourished, the twelve precious stones represented the power of the twelve apostles, which resides totally in the pontiff; in fine, the musk denoted the fragrancy of good works, according to that saying, *We are to God a sweet savour of Christ*. In this chair the pope elect admitted the ministers of the palace to kiss his feet, and to receive the kiss of peace. There, too, several pieces of silver were delivered to him by the chamberlain, to the value of ten pence. These he threw to the people at three different times, pronouncing these words, *He hath scattered; he hath given to the poor; his righteousness remaineth for ever*. All this being done, the pope elect went next Sunday, attended by all the orders of the sacred palace, and the principal people of the city, to the basilic of the Vatican, and there, before the confession of St. Peter, he was solemnly consecrated by the bishop of Ostia, to whom this office specially belongs. After this function, the archdeacon and the second deacon gave the pall to the pope, the archdeacon pronouncing these words, *Receive the pall, which is the plenitude of the pontifical office, to the honour of Almighty God, of the most happy virgin his mother, of the blessed apostles St. Peter and St. Paul, and of the holy Roman church*.

After this description, cardinal Rasponi adds these words: "This is what was done when the pontiff was announced or proclaimed in the church of the Lateran; but when the election was made in the Vatican, the pope, immediately after being conducted to the altar by two cardinals, or after having performed his adoration, and offered a secret prayer, kneeling, was placed in a chair behind the altar, where he admitted the cardinal bishops, and the others, during the singing of the *Te Deum*, to kiss his feet, and to receive the kiss of peace. The following Sunday they assembled in the same church, and the pope, crowned according to the custom of his ancestors, went to the Lateran palace; but before entering it, he feasted himself in the *stercorary*, where, sitting down thrice, according to custom, he was introduced by the cardinals into the basilic, distributing money to the populace." There he ascended a throne behind the altar, where he admitted the canons of the basilic to kiss his feet, and to receive the kiss of peace: which being done, he went to place himself in the chairs that were before the oratory of St. Sylvester, where all was performed that has been recited above. But if it happened that the pope was created out of Rome, all the clergy, when he made his entry into that city, and before entering the gate of the Lateran, went to meet him without the gate, in pontifical habits, with the standard of the cross and censers; and, entering thus into the Lateran church, they observed, though in an order somewhat different, all the ceremonies mentioned above. And if the pope, coming to Rome after his consecration, went to the church of St. Peter, the same rites were used there as in the Lateran church, except only that he did not receive the canons of St. Peter to kiss his feet in the portico, and that he did not sit down on the *stercorary*, which is not in that church. For this reason, the next day after mass, he went without the tiara to the Lateran palace, and before entering the basilic, he placed himself on the *stercorary*, with the accustomed ceremonies."

CONSECRATION, or, as it is more usually called, BENE-

DICTION of the waters, denotes a ceremony annually practised in the Greek church, on the 6th of January, or, as we denominate it, Twelfth-day. For this ceremony at St. Petersburg, a sort of wooden chapel or tabernacle, painted green, and steeled round with boughs of firs, is constructed on the ice of the Neva, between the Admiralty and the Imperial palace. This little building is covered with a dome, resting on eight small columns, on which stands the figure of John the Baptist, with the cross in his hand, amidst bulrushes; the inside of the edifice being decorated with paintings, representing the baptism of Jesus, his transfiguration, and other transactions of his life. From the centre of the dome is suspended, by a chain, a monstrous large holy-ghost of wood, over the aperture in the ice, round which are spread rich carpets. This little temple is entirely surrounded with palisadoes, which are also ornamented with fir-branches; the space within being likewise covered with carpets. A sort of gallery round the building communicates with a window of the palace, from which the imperial family come forth to attend the ceremony; though for several years past (says Mr. Tooke) the empress and her grandchildren only saw the solemnity from the windows of the palace. The ceremony begins immediately when the regiments of guards have taken their station on the river. Then the archbishop appears amid the sound of church-bells and the firing of the cannon of the fortrefs, and proceeds along the carpets, attended by his train of bishops and other ecclesiastics, into this little church, where, standing at the hole in the ice, he dips his crucifix three times in the water, at the same time repeating prayers, and concludes with a particular one to the great saint Nicholas; which done, the water is accounted blessed. The prelate then sprinkles with it the whole surrounding multitude, and the banners of all the regiments which are at that time in Petersburg. When the consecration is ended, he retires: and now the people press in crowds to the hole in the ice, where they drink it with pious avidity; mothers, notwithstanding the cold, dip their naked babes in the stream, and men and women pour it on their heads; every one holds it a duty to take home a vessel of the water, in order to purify their houses, and for the cure of certain diseases, for which it is affirmed to be a powerful specific: during which four popes, one at each corner of the aperture, chant a sort of litany for the occasion. Tooke's Life of Cath. II. vol. i. p. 130.

CONSECRATION, in *Ecclesiastical Law*, is one of the ways by which a benefice may be vacated; the others being by death, by cession, by resignation, and by deprivation. Thus, when a clerk is promoted to a bishopric, all his other preferments are void the instant he is consecrated; but there is a method, by the favour of the crown, of holding such livings in *commendam*; which see.

CONSECRATION is particularly used for the benediction of the elements in the eucharist.

The Romanists define it, the conversion of the bread and wine into the real body and blood of Jesus Christ: and that this is the sentiment of their church, is evident from the priest's elevating the host immediately after consecration, for the people to adore it. See ELEVATION, HOST, &c.

There is a great controversy between the Latin and Greek churches, touching the words of consecration; the common opinion among the Romanists, agreeable to St. Thomas and the Schoolmen, is, that the consecration of the bread and wine consists in these words, *This is my body; this is my blood*. The Greeks, on the contrary, attribute the change of the elements to a certain prayer, which they call the *invocation of the Holy Ghost*, rehearsed after the words, *This is*

my body; this is my blood; which the Greeks maintain are only necessary in the process of the consecration, as they contain the history of the institution; not as they contribute any thing to the change.

CONSECRATION of various animals, was common among the ancient Greeks and Romans. Suetorius mentions the consecration of a great number of horses by Julius Cæsar, when he passed the Rubicon; and Eustathius observes, that it was common among the Greeks to consecrate whole herds of cattle, and several sorts of fowls, especially geese and peacocks, to their gods; giving such animals their liberty, and forbidding all persons to touch or molest them. Athenæus remarks, that they paid the same respect to fishes, particularly those best adapted to the palate; and Pliny takes notice, that the dolphin of Octavius Anicius had this favour conferred upon him. Ælian likewise relates, that they sometimes put necklaces about the necks of their fishes, and then turned them loose to their proper element. The Romans also had their magical consecrations: it being customary for their emperors to offer sacrifices, repeat charms, and dispose statues in certain places, imagining that such magical operations would hinder barbarians from entering their dominions. Thus Marcus Antoninus endeavoured to fortify himself against the invasion of the Marcomanni; and some have thought that the palladium of Troy, and the vocal statue of Memnon, were of this kind. Macrobius has given us a particular description of the consecration of the Roman pontiffs, to the following purport: they dug a pit in the earth, into which the person to be consecrated was let down, dressed in priestly vestments, and the pit was covered with a plank bored almost full of holes; a bull, crowned with garlands of flowers, was placed on this plank, and his throat being cut, the blood poured through the plank on the priest, who received it on his head and face. On ascending from the pit, covered with blood, he received the salutation of *Pontifex*.

CONSECRATION, among Medallists, is the ceremony of the apotheosis of an emperor; or his translation into heaven, and reception among the gods. See APOTHEOSIS.

On medals, the consecration is thus represented: on one side is the emperor's head, crowned with laurel, sometimes veiled; and the inscription gives him the title of *divus*: on the reverse is a temple, a bustum, an altar, or an eagle taking its flight towards heaven, either from off the altar, or from a cippus: at other times the emperor is seen in the air, borne up by the eagle; the inscription always, CONSEC-RATIO.

These are the usual symbols: yet on the reverse of that of Antoninus, is the Antonine column. In the apothecis of empresses, instead of an eagle there is a peacock. As to the honours rendered these princes after death, they were explained by the words *consecratio, pater, divus, and deus*. Sometimes after the temple or altar are put, *memoria felix, or memoria æterna*: for princesses, *æternitas, and sœderibus recepta*: on the side of the head, *dea, or Diva*. See MEDAL.

CONJECTARY, a proposition that follows, or is deduced, from some preceding definition, lemmata, axioms, conclusions, or the like. Some rather choose to call it a *consequence*: and others a *corollary*, &c.

CONSECUTIVE CHORDS, in Music, are such as immediately succeed each other in composition or performance. See MUSIC, Plate IV. Holder truly observes, when speaking of the rule in composition, which allows a succession of octaves or fifths, except by contrary motion, that in strictness the same applies to all consecutive intervals whatever; but that the intermixture of major and minor thirds,

and major and minor-sixths in the scale, renders the occurrence of consecutive major-thirds, major-sixths, minor-thirds or minor-sixths, very rare and inoffensive in their cloying effect upon the ear, compared with those of fourths, fifths, or octaves, if care is not taken by the composer to prevent the succession of the latter, except in contrary motions.

CONSECUTIVELY, CONSECUTIVÉ, in the School Philosophy, is sometimes used in opposition to *antecedently*, and sometimes to *effectively, or causally*.

Thus, say the schoolmen, the corruption of one thing is the generation of another, not *effectively*, but *consecutively*: that is, since matter cannot be without form, it is necessary, that the generation of one thing follow upon the corruption of another.

CONSEDIA, in *Ancient Geography*, a place of Gallia Lyonnensis, situated, according to the Itinerary of Antonine, between *Condate* and *Fanum Martii*.

CONSEIL DE GUERRE, Fr. *Council of War*. This is composed of the general in chief, and the general officers of the army, which he commands, whether it be held for the purpose of deliberating among themselves on the measures they ought to pursue in a difficult conjuncture, of an offensive or defensive nature or otherwise; or for some act of military justice; or for accepting, regulating, stipulating, or refusing articles of a proposed capitulation; or for establishing rules and regulations for the police and discipline of the troops; or, in fine, for judging of any military crime or offence.

CONSEIL de Guerre secret, Fr. A secret council of war. A secret council held by the king and his ministers for deliberating on a defensive, offensive, or federative war.

CONSENT of PARTS, in the *Animal Economy*. See SYMPATHY.

CONSENTES, in *Mythology*, derived from the old Latin *consens, to consensel*, denote twelve superior deities among the Romans, or the "dii majorem gentium," who were apprehended to belong to the council of Jupiter. They were comprehended by Ennius in the following districts:

"Juno, Vesta, Minerva, Ceres, Diana, Venus, Mars, Mercurius, Jovis, Neptunus, Vulcanus, Apollo."

Those which were esteemed the superior deities, and were the principal objects of the Pagan worship, had been men, according to Cicero (*Talcul. Disput. lib. i. c. 12, 13.*); and this was taught even in the mysteries. Varro mentions twelve deities under the same denomination, who superintended agriculture. Lib. i. De Re Rustica.

These consentes had a temple at Pisa in Italy; and they had their common altar at Athens, as Plutarch (in *Nicia*) informs us. Aristophanes says, it was usual to swear by them. In ancient inscriptions they are thus marked; J. O. M. i. e. *Jovi optimo maximo, CÆTERISQ. DIS CONSENTIBUS*. They were also called "Dii magni," "cælestes," or "nobles;" and are represented as occupying a different part of heaven from the inferior gods, who are called "Plebs."

CONSENTIA were feasts instituted in honour of these deities.

CONSENTIA, in *Ancient Geography*, *Cosenza*. a town of Italy and capital of the country of the Brutii by whom it was built. It was situated on the small river Crathis. Alexander, king of Epirus, surprised it in his expedition into Italy. See COSENZA.

CONSEQUENCE, in *Logic*, the conclusion of a reasoning, or argument.

The two premises of a syllogism being granted, the consequence must also be granted.

In a more restrained signification, consequence is used for the relation or connexion between two propositions, wherof one follows, or is inferred, from the other.—Thus: *It is an animal, and therefore feels.*

CONSEQUENT, the last proposition of an argument; being something deduced or gathered from a preceding argumentation. An enthymeme only contains two propositions, the antecedent and consequent: if the antecedent be absurd, the consequent must be too.

CONSEQUENT, in a more precise sense, is used for the proposition which contains the conclusion, considered in itself, and without any regard to the antecedent: in which sense, the consequent may be true, though the consequence be false.

CONSEQUENT of a ratio, in *Arithmetic*, the latter of the two terms of a ratio; or that to which the antecedent is referred. See PROPORTION.

Thus, in $a : b$, or a to b , b is the consequent, a the antecedent.

CONSEQUENTS, in *Rhetoric*, are also used to signify such things, as being allowed, necessarily, or very probably, infer their antecedents. Thus with respect to a substance, it is corruptible, and therefore material.

CONSEQUENTE, in the *Italian Music*, is used to signify concords, or those intervals which afford pleasure, be they either perfect, as the fifth and eighth, or imperfect, as the third, sixth, &c. See OCTAVE.

CONSEQUENTIA, in *Astronomy*, is opposed to antecedentia; and a motion in consequentia is a motion in the order of the signs of the zodiac.

CONSEQUENTIAL DAMAGES, in *Law*. See DAMAGE.

CONSEQUENZA, *Ital.* a term in *Music*, used by Zarlino and other old authors, instead of *Fuga*; but P. Martini makes it synonymous with *Riposta*, or reply to a subject given.

CONSERANS, or CONFERANS, in *Geography*, the name, before the revolution, of a country in France, in Gascony, and the diocese of a bishop, who resided at St. Leger, the capital; it was bounded on the east by Foix, on the south by Catalonia, and on the north and west by Comminges.

CONSERVATION, in *Ontology*, denotes giving duration, or continuance in existence to all creatures, in contradistinction to creation, which gives existence to all created substances. Some of the ancient schoolmen have represented conservation as a continued creation; to which it has been objected that as God, whenever he creates a substance, must create it with all the properties, modes, and accidents which belong to it, it will follow, that he must at the same time create or give being to, all their sinful thoughts and inclinations, and even their most criminal and abominable actions; or, in the most complete sense of the term, be the author of sin. Warts's *Philos. Ess. Ess. xi § 4.*

CONSERVATIVE SUTURE. See SUTURE.

CONSERVATOR, an officer established for the security and preservation of the privileges granted to some cities and communities; or, a person who has a commission to judge of, and decide, the differences arising among them. In most catholic universities, there are two conservators; the conservator of royal privileges, or those granted by kings; and the conservator of apostolical privileges, or those granted by the pope. The first takes cognizance of personal and mixed causes between the regents, students, &c. and the latter of spiritual matters between ecclesiastics.

VOL. IX.

Anciently there were appointed conservators of treaties of peace between princes; and these conservators became judges of the infractions made on a treaty, and were charged with procuring satisfaction to be made. They were usually the feudatories of the several powers. In lieu of conservators, princes now have recourse to other indifferent princes to guarantee their treaties. See GUARANTEE.

CONSERVATOR of the peace, in our *Ancient Customs*, was a person who had an especial charge, by virtue of his office, to see the king's peace kept.

Till the erection of justices of the peace by king Edward III. there were several persons who by common law were interested in keeping the same: some having that charge as incident to other offices; and others simply, or of itself, called *custodes*, or conservators of the peace. Those that were so by virtue of their office still continue; but the latter are superseded by the modern justices.

The chamberlain of Chester is still a conservator in that county; by virtue of his office. 4 Inst. 212.

Sheriffs of counties at common law are conservators of the peace; and constables, by the common law, were conservators, but some say they were only subordinate to the conservators of the peace, as they now are to the justices.

The king's majesty is, by his office and dignity royal, the principal conservator of the peace within all his dominions; and may give authority to any other to see the peace kept, and to punish such as break it: hence it is usually called "the king's peace." The lord chancellor, or keeper, the lord treasurer, the lord high steward of England, the lord marshal, the lord high constable of England, (when any such officers are in being,) and all the justices of the court of King's Bench (by virtue of their offices,) and the master of the rolls (by prescription) are general conservators of the peace throughout the whole kingdom, and may commit all the breakers of it, or bind them in recognizances to keep it. The other judges are only so in their own courts. The coroner is also a conservator of the peace within his own county; as is also the sheriff; and both of them may take a recognizance or security for the peace. Constables, tithing-men, and such like, are also conservators of the peace within their own jurisdiction; and may apprehend all breakers of the peace, and commit them till they find sureties for their keeping it.

Those that were, without any office, simply and merely conservators of the peace, either claimed that power by prescription, or were bound to exercise it by the tenure of their lands; or, lastly, were chosen by the freeholders in full county court before the sheriff; the writ for their election directing them to be chosen "de probioribus et potentioribus comitatus sui in custodes pacis." But when queen Isabel, the wife of Edward II., had contrived to depose her husband by a forced resignation of the crown, and had set up his son Edward III. in his place, this being an unprecedented measure, caused an alarm; and, therefore, in order to prevent any insurrections, and disturbance of the peace, the new king sent writs to all the sheriffs of England, vindicating the manner of his obtaining the crown, and commanding each sheriff to keep the peace throughout his bailiwick, on pain and peril of disheritance and loss of life and limb. Soon after it was ordained in parliament, that for the better maintaining and keeping of the peace in every county, good men and lawful, who were no maintainers of evil, or barretors in the country, should be assigned to keep the peace. Thus, and at this time, the election of conservators of the peace was taken from the people, and given to the king; such assignment being construed to

be by the king's commission. Nevertheless, they were still called only conservators, wardens, or keepers of the peace, till the statute 34 Edw. III. c. 1. gave them the power of trying felonies; and then they acquired the more honourable appellation of justices. Blackst. Comm. vol. i. See JUSTICE.

CONSERVATOR of the truce and safe conducts; *conservator induciarum & salvoorum regis conductuum*, was an officer appointed in every sea-port, under the king's letters patent. His charge was to enquire of all offences committed against the king's truce and safe conducts, upon the main sea, out of the franchises of the cinque-ports, as the admirals were wont to do, and such other things as are declared in statute 2 Hen. V. ft. 1. cap. 6.

Two men learned in the law of the land were joined to such conservators, for hearing and determining according to that law the same treasons, when committed within the body of any county. The above-cited statute, so far as it made these offences amount to treason, was suspended by 14 Hen. VI. c. 8., and repealed by 20 Hen. VI. c. 11., but revived by 29 Hen. VI. c. 2., which gave the same powers to the lord chancellor, associated with either of the chief justices, as belonged to the conservators of truce and their assessors; and enacted that, notwithstanding the party be convicted of treason, the injured stranger should have restitution of his effects, prior to any claim of the crown. See *SAFE CONDUCT*.

CONSERVATORIO, *Ital.* a title given in Italy to almost all charity-schools; but chiefly to those where children are taught music, and are otherwise educated with a view to that profession. The *conservatorios* of the city of Venice have been much celebrated by all travellers previous to the revolution: it had four of these schools: the *Ospedale della Pietà*, the *Mendicanti*, the *Incucabile*, and the *Ospedaleto a S. Giovanni a Paulo*, at each of which there was a performance every Saturday and Sunday evening, as well as on great festivals. At these, the performers, both vocal and instrumental, were all girls; the organ, violins, flutes, violoncellos, bassoons, and even double-basses, kettle drums, and French-horns, were supplied by females. Each of these establishments was a kind of foundling hospital for natural children and orphans, under the protection of several nobles, citizens, and merchants, who, though the revenue is very great, yet contribute annually to its support. These girls are maintained here till they are married, and all those who have talents for music are taught by the best masters of Italy.

There were three conservatorios in the city of Naples, for the education of boys who were intended for the profession of music, of the same kind with those of Venice, for girls. As the scholars in the Venetian conservatorios have been justly celebrated for their taste and neatness of execution, so those of Naples have long enjoyed the reputation of being the first *contra-puntists*, or composers in Europe. It is from these seminaries that Italy, and all Europe, have been delighted with the genius and talents of the two Scarlattis, Vinci, Leo, Pergolese, Porpora, Farinelli, Cafarelli, Gizziello, Durante, Jomelli, Perez, Piccini, Trueta, Anfossi, Sacchini, Pacifello, and innumerable others of the first eminence among composers and performers both vocal and instrument 1.

CONSERVATORY, in *Gardening*, a place constructed somewhat in the manner of the green-house, but more spacious and elevated, and finished in a neater and more perfect manner; being designed for containing and preserving the more rare and curious sorts of exotic plants, as well as for affording amusement by being provided with walks laid with some sort of neat material, according to the taste of

the proprietor, in a serpentine or other irregular manner between the plants.

Houses of this nature should have dry and rather elevated situations, at a small distance from the residence, and be ranged in such a manner as to have the benefit of the sun as much as possible during the day. They must likewise be provided with flues for the purpose of communicating fire heat when it may be necessary, and also valves and other contrivances for the introduction of fresh air when wanted, and to afford due ventilation.

The sides, ends, and roofs, must be formed with glass, as in the green-house, in order to admit light freely; and at the same time protect the plants.

It has been generally considered as synonymous with green-house, but its principle or essential difference consists in this, that in the latter the trees and plants are either in tubs or pots; and placed on stands or stages through the winter till they are removed into some sheltered situation abroad for the summer; while in the former the ground plan is laid out in beds and borders made up of the finest compositions of soils or of earthy materials that can be procured, three or four feet in depth; in which the trees and plants, taken out of their tubs or pots, are regularly planted, in the same manner as hardy plants in the open air. And instead of taking out the plants in the summer, as in the green-house, the whole of the glass roof is taken off, and the plants exposed to the open air; when on the approach of autumn-frosts the lights are again put on, and remain so till the state of the season is such as that they can be removed again without danger from cold.

In cases of necessity, it is evident however that these buildings may also be used as green houses by introducing stages instead of beds, in which case the glass roof should be fixed. Other conveniences may be attached to them, such as retiring rooms, seed rooms, aviaries, &c. Some buildings of this sort are, according to the editor of Miller's dictionary, formed so as to have one of the wings facing the south-east, and the other the south-west, so that from the time of the sun's first appearance upon any part of the building, until it goes off at night, it may be constantly reflected from one part to the other, and the cold winds be also kept off from the front of the centre building. In the area of the adjoining rooms or wings, many of the more tender exotic plants may be placed in the summer season and in the spring before the plants can be set out. The beds and borders of this area may be full of anemones, ranunculuses, early tulips, &c. which will be past flowering, and the roots fit to take out of the ground, by the time the plants are taken out of the house. In the centre of this area may be a small basin of water, which will be very convenient for watering the plants, not only on account of its nearness, but because the water will be softened and warmed by the reflection from the glasses. And the wing facing the south-east should always be preferred for the warmest, or bark-floves, because the sun, at its first appearance in the morning, shines directly upon the glasses, and warming the air of the house, gives new life to the plants, after the long nights of the winter season.

It is also farther observed, that in these buildings, if there are not sheds running behind them their whole length, the walls should not be less than three bricks thick, and if they are even more it will be better, because where the walls are thin and exposed to the open air, the cold will penetrate; and when the fires are made the heat comes out through the walls, so that it will require a larger quantity of fuel to maintain a proper temperature of warmth in the houses; and in general, the clearer and better these houses are built, the less fuel will be required to warm them, so that the

first expence in building them properly will be the cheapest, where the after expence of fires is taken into the account.

The ground plan and elevation of an elegant and very convenient improved house of this sort may be seen in the appropriate plate.

CONSERVATORY is sometimes used for a place to preserve snow and ice. See Phil. Trans. N^o 8. p. 140. See *Ice-House*.

CONSERVE, in *Pharmacy*, &c. a dry confection, or form of medicine, or food, contrived to preserve the flowers, leaves, roots, peels, or fruits of several simples, as near as possible to what they were when fresh-gathered; and to give them an agreeable taste.

Conserve are compositions of recent vegetable matters and sugar beaten together into an uniform mass. Vegetables whose virtues are soon lost by drying, may be preserved in this manner for a considerable time unimpaired, the sugar preventing the natural decomposition and moulding which would otherwise take place.

The preparation of the conserve is as simple as possible. The sugar is first ground to fine powder, and then mixed by long beating (not by solution) with the vegetable pulp or other material. No heat or other mode of preparation is employed, so that the vegetable matter remains as nearly as possible in the state in which it existed in the plant at the moment of gathering. The conserve directed by the London college are those of hips, roses, sloes, arum and squills. Of these the two last alone can be considered as active medicines; and the arum is exhibited with peculiar efficacy in this form, as its pungency to the palate is a little sheathed, whilst its internal stimulating powers remain unaltered.

The *conserve of arum*, or cuckow-pint, is a composition of arum bruised, half a pound, and double refined sugar, $1\frac{1}{2}$ pound, beaten together in a mortar. Those who hold in veneration the integrity and experience of Sydenham, will have no doubt of the effects of this medicine in rheumatic cases. This conserve may be given to adults in doses of a dram.

The *conserve of the hip*, or "conserva cynosbati," is formed by mixing one pound of hips with 20 ounces, by weight, of double refined sugar, powdered. This pulp should be separated with great care from the rough prickly matter inclosing the seeds; a small quantity of which, retained in the conserve, is apt to occasion an uneasiness at the stomach, a pruritus about the anus, and sometimes vomiting.

The *conserve of the sloe*, "conserva pruni sylvestris," is prepared by putting the sloes in water upon the fire, that they may soften, taking care that they do not burst; then taking them out of the water, pressing out the pulp, and mixing it with three times its weight of double refined sugar.

The *conserve of squills*, "conserva scillaz," is made by beating together in a mortar one ounce by weight of fresh squill with five ounces by weight of double refined sugar. This conserve is directed to be prepared in a small quantity, in order to guard against its variation in strength. It may be given to adults, from half a dram to two scruples, or more; especially when fresh.

For the *conserve of sea-worm-wood*, the outer rind of the *Seville orange*, *wood sorrel*, and of the *red rose*; pluck the leaves from the foot-stalks, and the unblown petals from the calyx, cutting off the heels: take off the outer rind of the oranges with a grater: when you have thus prepared them, bruise them with a wooden pestle in a marble mortar; and then beat them up with three times their weight of double-refined sugar, until they are mixed. The sugar should be powdered by itself, and passed through a sieve, before it is

mixed with the vegetable mass; otherwise it cannot be properly incorporated. Rose buds, and some other vegetables, are usually prepared for mixing with sugar by a small wooden mill, contrived for that purpose. All the conserve are to be kept in close vessels, especially those of arum and squill.

With regard to fruits, as currants, &c. they set them on the fire to make them yield their juice, then drain and strain them, and thicken what comes from them over the fire, and add to it the sugar. This last sort of conserve is particularly called a *jelly*; which see.

CONSERVES, Fr. in *Military Language*. See COURTER-GUARD, or *contre-garde*, the names by which this work is usually and best known.

CONSET'S BAY, in *Geography*, a bay on the N.E. coast of the island of Barbadoes, N. of Conset's point, which is a cape, 10 miles N.E. of Bridge-town.

CONSETTI, ANTONIO, in *Biography*, an historical painter, native of Modena, where he enjoyed considerable reputation, in the last century. He was born in the year 1636, and is said to have been successively the disciple of his countrymen Francesco Stringa, and Donato Creti of Bologna, from whose precepts and example he acquired a correct style of drawing, and facility of composing. Unfortunately, however, his colouring is destitute of those charms of union and softness, which captivate the eye at first sight. The principal part of the life of this artist was spent in the state of Modena, where his pictures are by no means uncommon, and where he died in 1766. Lanzi. Storia Pittorica.

CONSIDERATIO CURIE, in *Law*, terms often occurring in law proceedings, and where matters are determined by the court. "Ideo consideratum est per curiam," i. e. therefore it is considered and adjudged by the court. *Consideratio curie*, &c. denotes the judgment of the court.

CONSIDERATION, the material cause, or *quid pro quo*, of any contract, and without which no contract is obligatory or binding.

This consideration is either *expressed*; as if a man bargain to give ten guineas for a horse, or to sell his land for a certain sum, or to grant it in exchange for other lands, &c.; or when a person agrees for a stipulated sum to do a thing; or *implied*, when the law itself enforces a consideration; as if a man coming into an inn, take meat, drink, and lodging for himself and horse, the law presumes he intends to pay for them, though there be no express contract between him and his host: and if he discharge not the house, the host may stop his horse.

Considerations may be regarded either as pertaining to *contracts* generally, or to *deeds* in particular. As to *contracts*, consideration may be defined to be the reason which moves the contracting party to enter into the contract. The civilians hold, that in all contracts, either express or implied, there must be something given in exchange, or something that is mutual or reciprocal. This thing, which is the price or motive of the contract, is called the consideration; and it must be a thing lawful in itself, or else the contract is void. A good consideration is that of blood or natural affection between near relations; the satisfaction accruing from which the law esteems an equivalent for whatever benefit may move from one relation to another. (3 Rep. 83. 1 Inst. 271. 1 Rep. 176.) This consideration may sometimes, however, be set aside, and the contract become void, when it tends in its consequences to defraud creditors or other third persons of their just rights. But a contract for any *valuable* consideration, as for marriage, for money for work done, or for other reciprocal considerations, can never be un-

peached at law; and, if it be of a sufficient adequate value, is never set aside in equity: for the person contracted with has then given an equivalent in recompence, and is therefore as much an owner, or a creditor, as any other person. These valuable considerations are divided by the civilians into four species. 1. *Do, ut des*; as when I give money or goods on a contract to receive in return money or goods: of this kind are all loans of money upon bond, or promise of repayment, and all sales of goods, in which there is an express contract to pay so much for them, or else the law implies a contract to pay as much as they are worth. 2. *Facio, ut facias*; as when I agree with a man to do his work for him, provided that he will do mine for me; or if two persons agree to intermarry; or to do any other positive acts on both sides: or, to forbear on one side on consideration of something done on the other, as that in consideration A, the tenant, will repair his house, B, the landlord, will not sue him for waste; or, for mutual forbearance on both sides. 3. *Facio, ut des*; as, when a man agrees to perform any thing for a price, either specifically mentioned, or left to the determination of the law to let a value on it. Thus, when a servant hires himself to his master for agreed wages, he contracts to serve his master for that specific sum; or, otherwise, if he be hired generally, he is under an implied contract to perform this service for its reasonable worth. 4. *Do, ut facias*; as, when I agree with a servant to give him such wages upon his performing such work, which is the last species inverted; for *servus facit, ut herus det*, and *herus dat, ut servus faciat*.

A consideration of some sort or other is so absolutely necessary to the forming of a contract, that a *nudum pactum*, or agreement to do or pay any thing on one side, without any compensation on the other, is totally void in law; and a man cannot be compelled to perform it. (Dr. and Stud. l. 2. c. 24.) Thus, if one man promises to give another 100*l.*, nothing is contracted for or given on the one side, and therefore nothing is binding on the other. And, however a man may or may not be bound to perform it, in honour or conscience, which the municipal laws do not decide; those laws will certainly not compel the execution of what he had no visible inducement to engage for; and, therefore, our law has adopted the maxim of the civil law, that “*ex nudo pacto non oritur actio*.” But any degree of reciprocity will prevent the pact from being nude; nay, if even the thing be founded on a prior moral obligation (as a promise to pay a just debt, though barred by the statute of limitations), it is no longer *nudum pactum*. And as this rule was principally established to avoid the inconvenience that would arise from setting up mere verbal promises, for which no good reason could be assigned, it therefore does not hold in some cases, where such promise is authentically proved by written documents. For if a man enters into a voluntary bond, or gives a promissory note, he shall not be allowed to aver the want of a consideration in order to evade the payment; for every bond from the solemnity of the instrument, and every note from the subscription of the drawer, carries with it an internal evidence of a good consideration. Courts of justice will therefore support them both, as against the contractor himself; but not to the prejudice of creditors or strangers to the contract. Plowd. 308, 309. Hard. 4. 1 Ch. Rep. 157. Ld. Raym. 760. Fonblanque, Treat. Eq. 334. n.). See CONTRACT.

With regard to *deeds*, it may be observed, that they must be founded upon good and sufficient consideration; not upon an usurious contract (stat. 13 Eliz. c. 8.); nor upon fraud or collusion, either to deceive purchasers *bona fide* (stat. 27

Eliz. c. 4.), or just and lawful creditors (stat. 13 Eliz. c. 5.); any of which bad considerations will vacate the deeds, and subject such persons as put the same in use, to forfeitures, and often to imprisonment. A deed also, or other grant made without any consideration, is, as it were, of no effect; for it is construed to enure or to be effectual, only to the use of the grantor himself. (Park. § 533.). The consideration may be either a *good* or a *valuable* one. A good consideration is such as that of blood, or of natural love and affection, when a man grants an estate to a near relation; being founded on motives of generosity, prudence, and natural duty. A valuable consideration is such as money, marriage, or the like, which the law esteems an equivalent given for the grant (3 Rep. 83.); and is therefore founded in motives of justice. Deeds made upon good consideration only, are considered as merely voluntary, and are frequently set aside in favour of creditors, and *bona fide* purchasers. See DEED.

A mere voluntary censure will not be a good consideration of a promise; but the value and proportion of the consideration is not material for maintaining an action, whether it be a penny or 100*l.*; but a jury will give damages proportionable to the loss. (Hob. 5. 10 Rep. 76.) A consideration that is void in part, is void in the whole; and if two considerations be alleged, and one of them is found false by the jury, the action fails. (Hob. 126. Cro. Eliz. 848.) But if there be a double consideration for the grounding of a promise, for the breach of which an action is brought; though one of the considerations be not good, yet if the other be good, and the promise broken, the action will lie upon that breach; for one consideration is sufficient to support the promise. (1 Lill. 297.) A consideration must be lawful, to ground an *assumpsit*. (2 Lev. 161.) Where considerations are valuable, and consist of two or more parts, there the performance of every part ought to be shewn. (Cro. Eliz. 579.) In case a deed of feoffment be made of lands, or a fine and recovery be passed, and no consideration is expressed in the deed, &c. for the doing thereof, it shall be intended by the law, that it was made in trust for the use of the feoffer or confour; for it shall be presumed he would not part with his land without a consideration; and yet the deed shall be construed to operate something, and that which is most reasonable. (4 Lill. Abr. 299.) Blackst. Com. vol. ii. Jacob's Law Dict. by Tomlins.

CONSIGLIONE, in *Geography*, a town of the island of Sicily, in the valley of Mazar; 19 miles S. of Palermo.

CONSIGNE, Fr. parole or counter-sign. When used in the masculine gender, it also means a person formerly paid by the French government for residing constantly in a garrisoned town in order to take cognizance of all persons that entered by the gates or went out of them. He had a place allotted to him, and regularly delivered a report to the governor or commandant of the place.

CONSIGNÉ. A person who could not pass the post, or quit the house, to which the order of his superior had consigned him.

CONSIGNMENT, or CONSIGNATION, the depositing any sum of money, bills, papers or commodities, in sure hands; either by order of a court of justice, in order to their being delivered to the persons to whom they are adjudged; or voluntarily, in order to their being remitted to the persons they belong to, or sent to the places they are destined for.

CONSIGNMENT *of goods*, is the delivering or making them over to another. Thus goods are said to be consigned to a factor,

factor, when they are sent to him to be sold, &c. or when a factor sends back goods to his principal, they are said to be consigned to him.

CONSILINUM, in *Ancient Geography*, a town of Italy, in a gulf between Brutium and Zephyrium, according to P. Mela. Frontinus says, that it was a Roman colony, and places it in Lucania.

CONSILIUM, *dies consilii*, in *Law*, was a time allowed for the accused to make his defence, and to answer the charge of the accuser. It is now used for a speedy day appointed to argue a demurrer; which the court grants after a demurrer joined, on reading the record of the cause. See IMPARLANCE.

CONSIMILICASU. See CASU.

CONSISTENCE, a state of rest, wherein things capable of growth or decrease, continue for some time at a stand, without either.

This term is particularly used with regard to trees, for the time, or age, beyond which they do not grow, and yet at which they do not decline.

Thus we distinguish three states or stages of a tree; its growth, consistence, and return: and these are common to all trees, even fruit trees.

The consistence of an oak is from fifty to a hundred and sixty years: some, however, hold, that their consistence only commences from a hundred years; asserting that they grow till that time, and that they continue in that state of perfection to two hundred years of age.

CONSISTENCE, in *Physics*, is that state of a body wherein its component particles are so connected, or entangled among themselves, as not to separate or recede from each other.

Consistence only differs from continuity in this, that consistence implies a regard to motion or rest, which continuity does not; it being sufficient to denominate a thing continuous, that its parts are contiguous to each other.

When used relative to a disease, it imports the crisis or acme thereof: when applied to the humours, excrements, or excretions, it imports their state as to thickness or thinness.

CONSISTENCE is particularly used with regard to bodies considered as they are more soft, or more hard, more liquid, or more dry.

Forms of medicines, as electuaries, lambatives, boluses, syrups, unguents, &c. differ chiefly in consistence.

Not only the gratefulness, but also the operation, of medicines, depend in some measure on their consistence; for medicines of a thick consistence are taken into the stomach, and penetrate into the body with greater difficulty than such as are thin and liquid; and it requires more trouble to swallow a thick than a thin medicine: for this reason thick medicines are generally nauseous and ungrateful; and this is the reason why cathartic boluses are often dissolved in some agreeable liquor, since in this form they are more grateful than in any other: for this reason also apozems are generally clarified by whites of eggs, or a strainer.

On the contrary, a thick consistence is on some occasions more to be desired; in ulcers of the aspera arteria, and esophagus, for instance, where we must give medicines made up with gum tragacanth, or other substances of a like nature, which by their viscosity fix the medicines, as it were, longer to the part affected.

CONSISTENT *Bodies*, is a term used by Mr. Boyle,

for such as we ordinarily call *firm*, or *fixed bodies*; in opposition to *fluid* ones.

That author has a particular essay on the *atmosphere of consistent bodies*; wherein he shews, that all, even solid, hard, ponderous and fixed bodies, do exhale or emit effluvia to a certain space all around them.

CONSISTENTES, in *Church History*, a kind of penitents who were allowed to assist at prayers, but could not be admitted to receive the sacrament.

CONSISTORIAL *Advocate*. See ADVOCATE.

CONSISTORY, or *Roman Consistory*, denotes the college of cardinals: or the pope's senate, and council, before whom judiciary causes are pleaded.

De-Cange derives the word from *consistorium*; i. e. *locus ubi consistitur*; used chiefly for a vestibule, gallery, or antechamber, where the courtiers wait for admission; and called a *consistente multitudo*.

The consistory is the first court, or tribunal of Rome; it never meets but when the pope pleases to convoke it: the pope presides in it in person, mounted on a magnificent throne, and habited in his *pontificalia*; on the right are the cardinal bishops and priests, and on the left the cardinal deacons.

The place where it is held, is a large hall in the apostolical palace, where princes and ambassadors of kings are received. The other prelates, protonotaries, auditors of the rota, and other officers, are seated on the steps of the throne: the courtiers sit on the ground; ambassadors on the right, and consistorial and fiscal advocates behind the cardinals.

Besides the public consistory, there is also a private one, held in a retired chamber, called the chamber of *papegay*; the pope's throne here being only raised two steps high.

Nobody is here admitted but the cardinals, whose opinions are collected, and called *sentences*. Here are first proposed and passed all bulls for bishoprics, abbeyes, &c. Hence bishoprics, and abbeyes, are said to be consistorial benefices; in regard, they must be proposed in the consistory, the annats be paid to the pope, and his bulls taken.

Anciently they were elective; but by the concordat, which abolishes elections, they are appointed to be colated by the pope alone, on the nomination of the prince.

CONSISTORY was also the name of a court under Constantine, where he sat in person, and heard causes: the members of this court were called *comites*.

CONSISTORY is also used among the reformed, for a council or assembly of ministers and elders, to regulate their affairs, discipline, &c.

CONSISTORY, or *Court Christian*, in the *English Laws*, is a council of ecclesiastical persons, or the place of justice in an ecclesiastical or spiritual court.

Every archbishop and bishop has a consistory-court, held, before his chancellor or commissary, who is the judge, and supposed to be skilled in the civil and canon law, either in his cathedral, or in some other convenient place of his diocese, for ecclesiastical causes, arising within their respective dioceses. In places of the diocese, far distant from the bishop's consistory, the bishop appoints a commissary, *commissarius foraneus*, to judge in all causes within a certain district, and register to enter his decrees, &c. (2 Rol. Abr. 286. Seld. Hist. Tithes, 413, 414.) The spiritual court was anciently, in the time of the Saxons, joined with the county or hundred court; and the original of the consistory court,

court, as divided from those courts, is found in a law of the Conqueror, quoted by lord Coke.

From this court there lies an appeal to the archbishop of each province respectively, by virtue of stat. 24 Hen. VIII. c. 12.

CONSOLATION, one of the places in *Rhetoric*, wherein the orator endeavours to abate and moderate the grief or concern of another.

In consolation, a principal regard is to be had to the circumstances and relations of the parties. Scaliger considers this exceeding well, *De Arte Poetica*. "The consolator, says he, is either a superior, an inferior, or an equal; with regard, either to preferment, honour, wealth, wisdom, or age. Livia is therefore to comfort Ovid, in a manner very different from that wherein Ovid comforts Livia. Thus, as to authority, a father and son, Cæsar and Pompey, are to conduct their consolations very differently: so in wealth; as if a client should undertake to comfort Crassus: in wisdom; as when Seneca comforts Polybius and his mother: as to age, there need no examples."

"A superior may interpose his authority, and may even chide; a wife man may even dispute; sentences will become him. An inferior is to show respect and affection, and own he had this from some wife or learned person: an equal to appeal to their common friendship."

CONSOLE, in *Architecture*, a bracket or projecting body commonly in the shape of the letter S, which is used to support a cornice, vase, bust, statue, or even a column, as in the barbarous architecture of the Diocletian palace at Spalatro. Corbel is essentially the same thing as console, but is generally confined to the description of Gothic building.

CONSOLIDA, in *Botany*, Major; Bauh. Pin. See *SPHYNTHUM officinale*.

CONSOLIDA *media*; Bauh. Pin. See *AJUGA*.

CONSOLIDA *palystris*; Taber. See *SENECIO palystris*.

CONSOLIDA *regalis*; Bauh. Pin. Taber. Mons. See *DELPHINIUM*.

CONSOLIDATION, in *Law*, the combining and uniting of two benches into one; stat. 37 Hen. VIII. cap. 21. which union is to be by the assent of the ordinary, patron, incumbent, &c. and to be of small churches lying near together.

The term is borrowed from the civil law; where it properly signifies an union of the possession, or occupation, with the property. Thus, if a man hath by legacy *usufructum fundi*, and afterwards buys the property, or fee-simple of the heir; this is called a consolidation.

CONSOLIDATION, in *Surgery*, is the process of nature, by which a solution of continuity is united, either in a soft or hard part of the body; and, as this process was formerly supposed to be within the controul of surgeons, the remedial applications employed for that purpose were denominated *consolidating medicines*, or *jarotics*. Of this kind were the different balsamic and resinous unguents, with all the stimulating compositions containing turpentine. The surgeon may certainly vary the ingredients of his dressings in such a manner as to change the surface of a sore, and, in many cases, so as to occasion a healing process; but, after all, he acts only as the hand-maid of nature, and is unable to advance one step towards the consolidation of a wound, unless there be a previous tendency in the part to heal.

Warm stimulating applications will indeed cause a flow of blood to the part whereon they are applied; and by exciting the healthy action of blood-vessels, as well as by increasing the sensibility of the skin or adjacent ulcerated surface, they may promote suppuration, and even contribute to

effect a cure, where it seemed unlikely before. In this sense of the term, therefore, we may admit the existence of consolidating remedies.

CONSONANCE, in *Grammar*, denotes a like cadence, or close of words, periods, &c.

Consonances are ordinarily faults in discourse, especially in English prose: though the ancients make a figure of them, which they call *ἁρμονία*. Too great a consonancy in the rhymes has always an ill-effect.

CONSONANCE, in *Music*, signifies the union or agreement of two sounds produced at the same time, and in this sense, it includes all sorts of musical intervals, which naturally divide themselves into three kinds, *viz.* 1st. *Concords*, or such as produce an agreeable and pleasing effect upon the ear; see that article. 2^d. *Imperfect or tempered concords*, which are intervals nearly related to concords in respect to their position in the scale, as explained when we were treating of perfect concords, and also in partaking somewhat of the pleasing effect of the concords to which they belong, when not too much tempered; these are also further distinguished by the phenomena of *BEATS*, see that article; and *IMPERFECT Concords*; and 3^d. *Discords*, which are intervals that have a grating or disagreeable jarring effect upon the ear, or sometime a fluttering roughness when nearly equal to an imperfect concord, or to certain intervals in the scale, as the tones major and minor, the tritone, semidiapente, and others, as mentioned in relating Dr. Robison's experiments upon the concords. See *DISCORD* and *FLUTTER*. Consonance, considered as signifying a sound arising from several others sounding together, whether agreeable or disagreeable to the ear, may be divided into *concord* and *discord*. On this principle, Dr. Holder defines *consonancy*, "A passage of several tunable sounds through the medium, frequently mixing and uniting in their undulated motions, caused by the well proportioned commensurate vibrations of the sonorous bodies, and consequently arriving smooth and sweet, and pleasant to the ear; as, on the contrary, *dissonancy*, he maintains to arise from disproportionate motions of sounds, not mixing, but jarring and clashing as they pass, and arriving in the ear grating and offensive."

This notion of a consonance exactly quadrates with that we have already laid down for a *concord*. Accordingly, most authors confound the two together; though some of the more accurate distinguish them; making consonance to be what the word implies, a mere *sounding of two or more notes together, or in the same time*; in contradistinction to the motion of those sounds in *succession*, or one after the other.

In effect, the two notions coincide; for two notes, thus played in consonance, constitute a concord; and two notes that please the ear in consonance, will likewise please it in succession. Notes in consonance constitute harmony, as notes in succession constitute melody.

In the popular sense, consonances are either *simple* or *compound*, &c. The most perfect consonance is union; though many, both among the ancients and moderns, discard it from the number of consonances; as conceiving consonance an agreeable mixture of different sounds, grave and acute; not a repetition of the same sound.

The second consonance is the octave; then the fifth, the fourth, the thirds, and the sixths: the rest are multiples, or repetitions of these.

Consonance is sometimes used by writers in the same sense with *concord*; and thus, such are said to be variable, and the term imperfect is prefix'd when applied to intervals which have a major and a minor of *the same name*, as thirds and

and sixth, and perfect when applied to conords which never change their name, as the fifth, fourth, and octave; the absurdity of this use of the words perfect and imperfect is so apparent, that we wish to see them disused, and discountenanced in elementary books on music, in order that these terms may exclusively apply to intervals correctly tuned or perfect in respect of their accordance, or the reverse: there was an impropriety in originally assigning one name to the thirds and to the sixth, which naturally have no nearer relation to each other, than the fourth and fifth, or octave and unison, or even so much; but these being established in use, may safely remain, without our continuing to confound and reverse all ideas of perfection and imperfection, in consequence only of this defect in the musical nomenclature.

Consonances are said, by Dr. Smith, (*Harmonics*, p. 19.) to be *pure*, where none of the equal times between the pulses of the acuter found are subdivided by any intermediate pulse of the graver; and *interrupted* when any of those equal times are interrupted by one or more pulses of the graver found. See *CYCLES*.

* **CONSONANT**, in *Grammar*, a letter which cannot be perfectly sounded by itself; but joined with a vowel, forms an articulate found, by a particular motion or contact of the parts of the mouth: and hence the name *con-sonant*, q. d. *que sonant cum alia*.

A consonant, considering it philosophically, is nothing else but the modification of a found, produced by means of the organs of the voice, not a production of found itself: thus, v. gr. the founds signified by the characters, *a, e, i, o, u*, &c. are differently modified when we say *ah*, than when we say *ae* or *ea*, *ad* or *da*; and those modifications are called *consonants*.

Accordingly, Dr. Wilkins (*Essay towards a real Character*, p. 366.) defines consonants to be those letters, in the pronouncing of which the breath is intercepted, by some collision or closure, among the instruments of speech: and for this reason, he says, they are styled "*clausæ literæ*," in contradistinction to vowels, which are "*apertæ*." See **VOWEL**.

Consonants are divided into *single*, as *b, m, q*, &c. and *double*, as *x* in *axillary*, corresponding to the ξ of the Greeks.

Consonants have been also divided into *mutes* and *semi-vowels*. The mutes are such as cannot be sounded at all without a vowel, and all of which begin their found with a consonant; as *b, d, g, k, p, q, t*, and *c* hard, being expressed *be, de, te*, &c. The semi-vowels have of themselves an imperfect found, and all begin with a vowel; as *l, m, n, r, s, f, z*, &c. being founded *ef, el, em*, &c. Four of these, viz. *l, m, n, r*, are distinguished by the name of *liquids*, from their readily uniting with other consonants, and flowing, as it were, into their founds. The mutes, as some writers have described them, are those consonants whose founds cannot be protracted; and the semi-vowels are those whose founds can be continued at pleasure, partaking of the nature of vowels, from which they derive their name. The mutes may again be subdivided into *pure*, being those whose founds cannot be at all prolonged, as *k, p, t*; and *impure*, whose founds may be continued for a short time, as *b, d, g*. The semi-vowels may be subdivided into *vocal* and *aspirated*: the former being formed by the voice, and the latter by the breath. The vocal, which are eleven, are *l, m, n, r, v, w, y, z, ih flat, zb*, and the aspirated, five in number, are *f, b, s, th sharp, sb*. The vocal semi-vowels may be subdivided into *pure*, which are formed entirely by the voice, and *impure*, which are such as have a mixture of breath with the voice. Of the pure there are seven, viz. *l, m, n, r, v, w, y*,

az; and four of the impure, viz. *w, z, ih flat, zb*. The popular writer, whose "*Grammar*" we are now citing, has given the following list, exhibiting the founds of the consonants, which are twenty-two in number.

<i>b</i>	as heard in	bay, tub.
<i>d</i>	_____	day, sad.
<i>f</i>	_____	off, for.
<i>v</i>	_____	van, love.
<i>g</i>	_____	egg, go.
<i>h</i>	_____	hot.
<i>k</i>	_____	kill, oak.
<i>l</i>	_____	lap, all.
<i>m</i>	_____	my, mum.
<i>n</i>	_____	no, on.
<i>p</i>	_____	pit, map.
<i>r</i>	_____	rat, far.
<i>s</i>	_____	so, less.
<i>z</i>	_____	zed, buzz.
<i>t</i>	_____	to, mat.
<i>w</i>	_____	wo.
<i>y</i>	_____	ye.
<i>ng</i>	_____	ing.
<i>sh</i>	_____	shy, ash.
<i>th</i>	_____	thin.
<i>th</i>	_____	then.
<i>zh</i>	_____	zition.

Mr. Murray adds, that several letters marked in the English alphabet, as consonants, are either superfluous, or represent, not simple, but complex founds. *C, c, g*, is superfluous in both its founds; the one being expressed by *k*, and the other by *s*. *G*, in the soft pronunciation, is not a simple but a complex found; as *age* is pronounced *adje*. *J* is unnecessary, because its found, and that of the soft *g*, are in our language the same. *Q*, with its attendant *u*, is either complex, and resolvable into *kw*, as in *quality*; or unnecessary, because its found is the same with *k*, as in *opaque*. *X* is compounded of *gs*, as in *example*, or of *ks*, as in *expect*. See Murray's English Grammar, p. 4, &c. ed. 8.

Dr. Wilkins (*ubi supra*) disapproves of the common division of consonants into *semi-vowels* and *mutes*; and prefers the distribution of them into three kinds, viz. *spiritous* or *breathed*, *semi-spiritous* or *half-breathed*, and *non-spiritous* or *breathless*. By the former he means such consonants as require to the framing of them a more strong emission of the breath, either through the nose or mouth; and he distinguishes those that are formed by expiration through the nose into *sonorous*, as *m, n, ng*, and *mute*, as *bm, hv*, and *hng*: the sonorous being such as require some vocal found for framing them, and the mutes being other letters of the same configuration, pronounced by a strong emission of the breath, without any vocal found. The spiritous consonants that are formed by breathing through the mouth are also of two kinds, viz. *sonorous*, as *v, db, l, r, z, zb*; and *mute*, as *f, th, h, hr, s*, and *sh*.

Semi-spiritous or half-breathed consonants are such as are accompanied with some kind of vocal murmur, as *b, d, g*; whereas those are denominated non-spiritous or breathless which are wholly mute, as *p, t, c*. Thus, *b* and *p* are framed when the breath is intercepted by the closure of the lips; the first of them being more soft, with some kind of murmur; the other more hard, and wholly mute. Again, *d* and *t* are commonly framed by an appulse or collision of the top of the tongue against the teeth or upper gums; the first being more soft and gentle, with some kind of murmur; the other wholly mute. Moreover, *g* and *e* are framed more inwardly, by an interception of the breath towards the throat by the middle or root of the tongue, with

such.

such a kind of difference between them as subsists in the two former cases. The consonants already enumerated belong to the class of those that are simple: but those that are called compound are usually distinguished into such as are aspirated, and such as are double: the former seem to be blended with *h*, and are usually so written; and the latter are compounded of some of the other letters, but for the sake of dispatch and brevity in writing, they are in several languages expressed by single characters, and reckoned in the alphabet as if they were distinct species of simple letters: such in the Latin alphabet are *g* and *x*, and the double letter *z*, whose power is the same as *ds* or *ts*. The consonant *q* is allowed to be a compound of *c* and *u*; but what is the true original of *j* consonant, and that power attributed to *ch* in the words *charity*, *chaise*, &c. have not been so well ascertained. It is plain that neither of them is a single letter, because in the prolation of them we do not end with the same found with which we began: it seems, however, to be plain that *j* consonant is a compound of *d* and *z*, and *ch* of *t* and *h*. As for the other three consonants that are reckoned in the common alphabet, *k*, *w*, *y*. Dr. Wilkins thinks them unnecessary. If *c*, he says, be used always according to its proper power, *k* must be superfluous; and therefore the Welsh, who use *c* for only one kind or found, have no *k*. And as for the letters *w* and *y*, their power is the same with that of the vowels *u* and *i*, as will evidently appear when they are rapidly pronounced before any other vowel by way of diphthong, so as to make but one syllable, *war* or *war*, *swim* or *swim*, *ies* or *yes*, *ioke* or *ioke*. Upon the whole, Dr. Wilkins enumerates 34 simple letters, 3 of which are vowels, and 26 consonants, besides 24 diphthongs. See LETTER.

According to some writers, the most natural division of consonants is that of the Hebrew grammarians; who have been imitated in this respect by the grammarians of other oriental languages: these divide the consonants into five classes, with regard to the five principal orders of the voice; which all contribute, it is true, but one more notably than the rest, to certain modifications, which make five general kinds of consonants. Each kind, or class, comprehends several consonants, which result from the different degrees of the same modification, or from the different motions of the same organs.

These organs are the *throat*, *palate*, *tongue*, *teeth*, and *lips*; whence the five classes of consonants are denominated *guttural*, *palatal*, *lingual*, *dental*, and *labial*.

We account sixteen consonants in the English alphabet, viz. *b*, *c*, *d*, *f*, *g*, *k*, *l*, *m*, *n*, *p*, *q*, *r*, *s*, *t*, *x*, *z*; to which there are three others to be added, viz. the *h*, and *j* consonants, and *v* consonant, which make the whole number of consonants nineteen: one whereof is guttural, viz. the aspirate *h*; five palatal, viz. *c*, as when pronounced before *a*, *o*, and *u*, as in *cavern*, *corn*, *curiosity*; *g*, as in *Geneva*; *j* consonant in *julep*; *k* in *kernel*; and *q* in *query*. To these some have added *w* and *y*, which are really consonants when they begin a word or syllable; although in every other situation they are called vowels. That they are consonants when used as initials seems to be evident, from their not admitting the article *an* before them, and from their following a vowel without any hiatus or dissimilarity of utterance; that in other situations they are vowels appears from their regularly taking the found of other vowels.

The four lingual consonants are *d*, *l*, *n*, *t*; the four dental are *r*, *s*, *x*, *z*, the three last whereof are *hissers*; and five labial, *b*, *f*, *m*, *p*, and *v* consonant.

With regard to which division it may be observed, that though the *g* be modified in three different manners, as it

comes before an *a*, an *o*, or an *u*; yet it is still a consonant of the palate; that the *j* consonant differs in nothing but its figure from the *g* before *e* or *i*; that *k* has the same pronunciation with the *c*; that *x* comprehends the found of two letters in its found, viz. *c* or *k*, and *f* or another *c*, as in *Alexander*, and *Alexis*, which we pronounce as if wrote *Alexander* and *Aleaxis*, or *Alefsis*; and that the *c* before an *e* or *i*, is no consonant of the palate, because in that case it loses its proper found, and assumes the hissing found of the *f*.

The abbot Dangean thinks the nature of the division of the Hebrew grammarians to be very reasonable; but he does not acquiesce in the distribution they have made of them: to find a natural and just division of the consonants, he observes, no regard must be had to the characters that represent them; nor any thing be considered but their found, or the modification they give the found.

On this principle, the same author finds in the French five labial consonants, *b*, *p*, *v*, *f*, and *m*; five palatal ones, *d*, *f*, *g*, *k*, *n*; four *hissers*, *s*, *z*, *j*, *ch*; two liquids, *l* and *r*; two that run into and mix with each other, as *ll*, and *gn*; which last, however, is peculiar to the French language; and the *h* aspirate.

He adds, 1. That *m* and *n* are properly two nasal consonants; the *m* a *b* passed through the nose, and the *n* a *d*, in like manner, pronounced through the nose; and, in effect; people with a cold pronounce *barket* for *market*, *deed* for *need*, &c.

2. That among the consonants, some are weak, others strong; their difference consisting in this, that the former are preceded with a small emission of the voice, which softens them, which the latter have not. The weak are *b*, *c*, *d*, *g*, *z*, *j*; the strong, *p*, *f*, *t*, *k*, *s*, *ch*.

It may be here observed, that when we speak of a person's talking through the nose, it must be understood in a sense quite different from what the words seem naturally to import: since the nose in this case concurs less to the pronunciation than when we do not speak through the nose; in regard the air, not being able to make its way through the nose, is returned into the mouth, where it forms a dull obtuse found, called *nasal*.

From the whole we may conclude, that the excess of consonants in one language above another only consists in this, that there are more modifications of found received and established in the one than in the other: for all men, having the same organs, may form the same modifications; so that it is entirely owing to custom, nothing to nature, that the English have not the *z* of the Greeks, the *ain* and *hah* of the Hebrews, the *ch* of the Germans, the *gn* of the French, the *gl* of the Italians, the *ll* of the Welsh, &c.

Also, that the Chinese have no *r*, the Iroquois no labial consonants, the Hurons have abundance of aspirates, and the Arabs and Georgians abundance of double consonants: which last is owing to this, that they make several organs concur strongly and equally to the modification of a found; whereas, in the rest, only one organ is moved very strongly and sensibly, and the rest weakly.

It is hence also visible, that in all languages the aspirates, or guttural letters, are real consonants; since the throat modifies the found as much as the palate, tongue, or lips.

Lastly, to find all the consonants that may be formed in any language, there needs nothing but to observe all the modifications that the founds of speech will admit of, by which we shall have all the consonants practicable.

Dr. Hunter (Edinb. Transf. vol. ii.) in his investigation of the manner in which consonants are formed, distinguishes them in two different respects, viz. by the operation of the

the breath which is employed to make them audible. There are *five* positions, he says, by which the vocal found is to be articulated: the *first* is formed by the close junction of the lips, so that no breath is suffered to transpire, and the just modification of this position is that called *oral*, when the passage of the breath or sound by the nose is stopped, and thus are formed the letters *p* and *b*; and the second modification, termed the *nasal*, is formed by opening the communication, or exit, by the nose, and suffering the found or breath to pass that way; in which case the letter *m* is founded. The *second* position is formed by the application of the under lip to the fore-teeth of the upper jaw, which do not form an absolute interruption to the breath, but suffer it to pass in an audible manner, by means of the restraint with which it is made to pass: and then are produced the letters *f* and *v*. The *third* position is formed by a similar application of the tongue to the fore-teeth, and a similar expression of the breath; these producing the two consonants *h* and *th*. The *fourth* position is formed by the application of the point or fore part of the tongue to the root of the same teeth, or fore part of the palate, which position may be variously modified; as by applying the tongue closely to the palate, so as to form an absolute interruption of the breath, in a manner similar to that of the first position, which may be called the *mute* modification, and which seems to form the consonants *t* and *d*. 2. The tongue is not kept closely fixed to the palate, but suffers the breath to be expressed in an audible manner, similar to those of the second and third positions: this may be termed the *filabating* modification, and is that by which are expressed *f* and *z*. 3. The passage of the breath between the point of the tongue and the palate is opened alternately in a quick and tremulous vibration: this may be denominated the *vibratory* modification, and serves to form the letter *r*. 4. The passage of the breath or sound is not interrupted in any degree, but it is made to pass in a very peculiar manner through the mouth; for this purpose the tongue is closely applied to the fore part of the palate, but it is retracted on each side so as to leave an open space, and then a passage is preferred for the breath, which goes under the tongue and out of the mouth: this may be termed the *liquid* modification, and serves to form the sonorous letter *l*. 5. The lateral passages opened for the breath in the last modification are shut, and the found at the same time is suffered to escape by the nasal passage, as in the second modification of the *first* position: this may be denominated the *nasal* modification, and produces the letter *n*. The *fifth* position is formed in all respects like the *fourth*, but only by a different part of the tongue and palate, and has the same number of modifications, which correspond in their nature, and may be denominated in the same manner. Thus, the letters *k* and *g* are formed in the *mute* modifications; *ph* and *j* in the *filabating*; the guttural or Northumbrian *r* in the *vibratory*; the Spanish *ll*, or the French *l moullé*, in the *liquid*; and the guttural *n* or the English *ng* in the *nasal* modification. Having thus explained the several positions of the organ, with their different modifications, Dr. Hutton proceeds to illustrate the formation of the consonants, and articulations of voice, by the action of the breath and found. In all the positions of the articulating organ, he says, there is either employed the simple aspiration of the breath, or a found produced in the wind-pipe, and modified in the articulating organ. Thus, in all the positions, and in several of their modifications, there are produced two distinct articulators, according either as found is emitted along with the articulation, or only the breath employed without any other found. Hence proceeds the

distinction of mutes and consonants among the articulators of voice.

But in each of these distinctions of mutes and consonants, it is necessary to make a sub-distinction, according as the articulator is either perfect or imperfect, whether as a mute or as a consonant. Each of these, the author explains in the following manner: The perfect mute can only take place in those positions in which the breath is absolutely interrupted by the close or impervious organ; which does not happen in the second and third positions, and only in some of the modifications of the fourth and fifth. This mute articulator is formed, either by interrupting the vocal found with the close position, in which case it is a final articulator; or by beginning to express the vocal found in this close position, when it forms, upon opening the passage, an initial articulator. Of this kind there are just three articulators, corresponding to the three positions in which the organ may be absolutely closed, in relation to the exit of the breath: these are *p* in the *first* position, *t* in the *fourth*; and *k* in the *fifth* position. The imperfect mute is formed by emitting a guttural found, or that of the wind-pipe, in these three positions of the mute articulator. The found here is extremely limited; for it is necessarily restricted to that quantity of breath which may be expelled through the sounding wind-pipe in compressing the air, or distending the cavity of the close organ. These short founded articulators may therefore be termed imperfect mutes. The *b*, *d*, and *g*, are the three imperfect mutes, corresponding to the three absolute mutes, *p*, *t*, and *k*, of the *first*, *fourth* and *fifth* positions. In the filabating articulators of the *second* and *third* positions, and of the second modification of the *fourth* and *fifth* positions, the breath may be continually emitted, either with the simple expiration, or attended with the guttural found. This, then, forms two cases of articulation, differing from each other, and also from the other two cases of mute articulation; seeing that in the present case, whether the consonant be formed with a guttural found, or only an audible aspiration, it is a continued thing, and is not necessarily terminated, as in the mutes, by the close position of the organ. Now, as in the case of mutes, we have the distinction of perfect and imperfect, with regard to that species of letter, so, in the case of consonants, we have a species which is perfect, and one which is imperfect. The imperfect species of consonant-articulators is formed in the four filabating positions and modifications just now mentioned, viz. the *f* in the *second* position, the *h* in the *third* position, the *z* in the filabating modification of the *fourth*, and the *ph* in that of the *fifth* position. To perfect those four consonants, we have merely to add the guttural found to the continued expiration, and we then produce of the *f* the *v*, of the *h* the *th*, of the *z*, and of the *ph* the *j*. We have now only remaining the *nasal* modification of the *first* position, which gives the consonant *m*; the *vibratory* modification of the *fourth* and *fifth* positions, which give two species of the letter *r*; the *liquid* modifications, which give two species of the letter *l*; and the *nasal* modifications of those two last positions, which give two species of the letter *n*. In none of all these is formed a distinct articulator, by means of the simple aspiration; consequently all these are perfect consonants. Our author observes, that the letter *h* is a general articulator, which is formed in many different positions of the vocal organ. Diphthongs and consonant-vowels, or rather articulating vowels, are formed in the following manner: the diphthong, by sounding both vowels equally in the time of one; the consonant-vowel again, by an unequal division of this time, or by sliding quickly from the

sition of the two extreme vowels *i* and *u*, to the vocal sound which is to be thus articulated. See VOWEL.

CONSONANT, is a term in *Music*, which Dr. Callcott in his *Musical Grammar* applies to the conords, octave, fifth, fau th, thirds major and minor, and sixths major and minor. The consonant triads, or common chords, according to the same author are,

in the major mode  and in the mi-

nor mode . See TRIAD.

CONSORT. *Queen*. See QUEEN.

CONSOUD, in *Botany*. See SYMPHYTUM and SOLIDAGO.

CONSOW, in *Geography*, a town of Poland, in the palatinate of Sandomirz; 28 miles S.E. of Radom.

CONSPIRACY, in *Law*, is taken for a combination or confederacy to do something evil, or illegal: though in the original sense of the word, and in its use in other languages, it signifies merely an agreement, whether for good, bad, or matters indifferent.

In our statutes and law books, *conspiracy*, in a general sense, is frequently confounded with *maintenance*, and *champarty*.

CONSPIRACY, in its special signification, is used for a confederacy of two, at least, falsely to indict one, or procure him to be indicted of felony; who, after acquittal, shall have writ of conspiracy. See 3 Edw. I. stat. 2. 7 Hen. V. 18 Hen. VI. c. 12. "The term is now commonly used for the unlawful combination of journeymen to raise their wages, or to refuse working, except on certain stipulated conditions; an offence particularly provided for by stat. 2 & 3 Ed. VI. c. 15. revised, continued, and confirmed by stat. 22 & 23 Car. II. c. 19 (now expired); which enacts, among other things, that "if any artificers do conspire, that they shall not do their work but at a certain price, or shall not take upon them to finish what another hath begun, or shall do but a certain work in a day, or shall not work but at certain times, every person so conspiring shall forfeit for the first offence, 10*l.* or be imprisoned 20 days; for the second, 2*l.* or be pilloried; and for the third, 4*0l.* or be pilloried, lose an ear, and become infamous." This statute appears to be yet in force, though it is not frequently resorted to for remedy in this case; the proceeding being usually by indictment for conspiracy.

By the common law all conspirators wrongfully to prejudice a third person are highly criminal. 1 Hawk. P. C. c. 72. § 2. stat. 5 Eliz. c. 4. Journeymen confederating and refusing to work unless for certain wages, may be indicted for a conspiracy, although the statutes which regulate their work and wages do not direct this mode of prosecution; for the offence consists in the conspiring, and not in the refusal; and all conspiracies are illegal, though the subject-matter of them may be lawful. Thus also, a bare conspiracy to do a lawful act to an unlawful end is a crime, though no act be done in consequence of it. 8 Mod. 321. The fact of conspiring need not be proved on the trial, but may be collected by the jury from collateral circumstances. 1 Black. Rep. 392. Stra. 144. And if the parties concur in doing the act, although they were not previously acquainted with each other, it is conspiracy. 1 Hawk. P. C. c. 72. § 2. Writ of conspiracy lies for him that is indicted of a trespass,

and acquitted, though it was not felony; also upon an indictment for a riot. 2 Mod. 306. 5 Mod. 405. Writ of conspiracy lies where a man is falsely indicted of any crime which may prejudice his fame or reputation; and though it doth not import slander, if it endanger his liberty, or the indictment be injurious to his property, &c. 3 Salk. 97.

But though a conspiracy to charge falsely be indictable, yet the party ought to shew himself to be innocent; for the writ of conspiracy doth not lie without an acquittal. Mod. Caf. 127. 185. 186. Not only writ of conspiracy, which is a civil action at the suit of the party, but also action on the case in the nature of a writ of conspiracy, doth lie for a false and malicious accusation of any crime, whether capital or not capital, even of high treason; and this, though the bill of indictment be found *ignoramus*, or it does not go so far as an indictment. And the same damages may be recovered in such action as in a writ of conspiracy, where the party is lawfully acquitted by verdict. 1 Rol. Abr. 111, 112. 9 Rep. 56. Gilb. Ca. 185. 10 Mod. 148. 214. Salk. 15. An action on the case is preferable, as it is more in use, and the proceedings more easy and not attended with such niceties as the writ of conspiracy.

If one falsely and maliciously procure another to be arrested, and brought before a justice of peace to be examined concerning a felony, &c. on purpose to vex and disgrace him, and put him to charges and trouble, although he is not indicted for the same, yet he may have an "action on the case;" in which he need not aver that he was lawfully acquitted, as he ought to do in a writ of conspiracy; but he must aver that the accusation was *false et malitiose*, which words are necessary in the declaration; and it must appear that there was no ground for it. And as an "action on the case" may be prosecuted against one person, where the writ of conspiracy or indictment doth not lie but against two, this action is most commonly brought. 1 Dauv. Abr. 208. 213. 2 Inst. 562. 638.

Conspirators may be indicted at the suit of the king, and at the common law, one may prefer an indictment against conspirators, though nothing be executed: however, the conspiracy ought to be declared by some act, or promise to stand by one another, &c. But a bare conspiracy will not maintain a writ of conspiracy, at the suit of the party, because he is not damaged by it; though it is a ground for an indictment. 9 Rep. 56. 2 Roll. Abr. 77. If the defendants can shew any foundation or probable cause of suspicion, they shall be discharged: and if a man hath good cause of suspicion, that a person is guilty of felony, and causes him to be indicted, in prosecution of justice, action of conspiracy will not lie; but it is otherwise if the prosecutor imposes the crime of felony, where no crime of felony was committed. 1 Roll. Abr. 115. 4 Rep. 438. Conspiracies ought to be out of court; for if a protection be ordered in a course of justice, and witnesses appear against a party, &c. there shall be no punishment; and if persons acted only as jurors in a criminal matter, or judges in open court, there is no ground for prosecution. S. P. c. 173. 12 Rep. 24. If all the defendants but one are acquitted on indictment for conspiracy, this one must be also acquitted; because one person alone cannot be indicted for this crime: and husband and wife, being but one person, may not be indicted alone for a conspiracy. 2 Rol. Abr. 708. The acquittal of one person is the acquittal of another upon indictment of conspiracy (3 Mod. 220.) *i. e.* where only two are indicted, and it is not laid or proved that they conspired with others, unknown. However, where one is found guilty, according to the opinion of lord chief justice Hale, if the other doth not come in upon process, or if he

dies pending the suit, judgment shall be had against the other. 1 Vent. 234. It hath been resolved, that if an "action on the case" be brought against several persons, and all but one be acquitted, yet judgment may be given against that one only. 1 Hawk. 192. Judgment may be also given against one only before the trial of the others; and it has been held, that a conspiracy may be laid without any overt act. 1 Str. 195. Persons acting separately may be also guilty of a conspiracy; as particularly in the case where they are all of a family, e. g. husband, wife, and servants. 1 Str. 144.

If the parties are found guilty of conspiracy, upon an indictment of felony, at the king's suit, the judgment anciently was, that they should lose their "frank law," (which disabled them to be put upon any jury, to be sworn as witnesses, or to appear in person in any of the king's courts,) and that their lands, goods, and chattels should be forfeited into the king's hands, their houses and lands stripped and wasted, their trees rooted up, and their bodies imprisoned. This is commonly called "villainous" judgment, and is given by the common law, and not by any statute, and in some books it is said generally to be the proper judgment upon every conviction of conspiracy at the suit of the king, without any restriction to such as endangered the life of the party; but this point doth not seem to be any where settled. 1 Hawk. 193. 2 Inst. 143. 222. This judgment, however, hath been but seldom given; there being no instance of it since the reign of Edw. III. The usual mode of punishment at present is by pillory, fine, imprisonment, and surety for good behaviour. Burr. 696. 1027. Str. 196. The quarter sessions have jurisdiction over this offence. Finch. 80. 8 Mod. 321. And on motion in arrest of judgment, the defendant must be personally present in court. Stra. 1227. Burr. 931.

In cases where villainous judgment is imposed, the matter of the conspiracy ought to touch a man's life. As fine and imprisonment are at this day the usual punishment for conspiracy, so on writ of conspiracy, &c. the party shall be fined, and render damages. 1 Hawk. P. C. 72.

CONSPIRATION, Fr. See CONSPIRACY.

CONSPIRATION, *contre le service du Roi*, conspiracy against the king's service. Under the old government of France every conspiracy, collusive, or unlawful combination or understanding against the king, his governors, commanders, or other officers, was regarded as a capital military offence; and by an order of the 1st July 1727, it was enacted that every person convicted of such a crime should be broken on the wheel.

CONSPIRATIONE, in *Lawo*, a writ that lies against conspirators. Reg. Orig. 134. F. N. B. 114.

CONSPIRATORS, according to the statute, are those that do confederate, or bind themselves by oath, covenant, or other alliance, that every one of them shall aid, and bear the other, falsely and maliciously, to indict, or cause to indict, or falsely to move, or maintain pleas; and such as retain men in the country, with liveries or fees, to maintain their malicious enterprizes: and this extendeth as well to the takers, as the givers; and stewards, and bailiffs, of great lords, which, by their office, or power, undertake to bear, or maintain quarrels, pleas, or debates, that concern other parties than such as touch the estate of their lords, or themselves. 33 Edw. I. stat. 2. 2 Inst. fol. 384. 562.

Moreover, against conspirators, false informers and imbracers of inquest, the king hath provided a writ in the chancery; and the justices of either bench and justices of

assize, shall, on every plaint, award inquest thereupon. Stat. 28 Ed. I. st. 3. c. 10. There are also conspirators in treason, by plotting against the government, &c. See TREASON.

CONSPIRING POWERS, in *Mechanics*, are all such as act in directions not opposite to one another. See POWER, and MOTION.

CONSTABLE. This appellation hath afforded ample matter of disquisition to learned antiquarians. History has traced it backwards from its introduction to England, through France, Germany, and Greece, to the imperial seat at Constantinople, in the days of Constantine the Great; and if we ascend farther towards the East, we shall find the term *cône* or *clône* in Palestine, which signified in the times of the Old Testament, a stability, strength, or stay. Some trace of this word has been discovered in the appellation of Laocoon at Troy, and particularly in that of Constantine, who was himself of oriental extraction, having sprung from Dardania, a country of Upper Macedonia, and said by flatterers to have been descended from Dardanus and the Trojans. It is not improbable that this appellation of the emperor might have occasioned the adoption of the word into the Roman language about the same time. For it was at that period that the word *count*, obviously deduced from *cône* or *cune*, first became a name of dignity; and from thence was transmitted westwards, with some variation, according to the different genius of languages throughout the provinces. Amongst the Saxons the word was *kening* or *kyninge*, from which, without doubt, we derive our word king. Moreover, the word *stole*, *stalls*, *steele*, or *stable*, by an easy transmutation of the several letters frequent in almost all languages, which seems to be the other constituent of the appellation *constable*, is likewise common to the languages of the middle ages, and signifies a standing place, division, or department, called by the Romans *statio*. According to this etymology, the word *constable* signifies the stability or stay of the place, or the strong man of the division. Those who derive it from the Saxon, discover *constable* in *konings-pretzel*, denoting the support of the king. But others, as Sir Henry Spelman, and Dr. Cowel, considering that we borrow the name, as well as the office, from the French, deduce it, with greater probability, from that language; in which it is plainly derived from *comes stabuli*, the master of the stables, or perhaps of the horse, an officer well known in the empire; so called, because, like the great constable of France, as well as the lord high constable of England, he was to regulate all matters of chivalry, tilts, tournaments, and feats of arms, which were performed on horseback. Accordingly, they suppose, that the dignity, which at first was civil, in time became military, and the master of the stables was made general of the army.

CONSTABLE of England, *Lord High*, is an ancient officer of the crown, now disused in England, except on solemn occasions, as the king's coronation, and the like. The first constable of England is said to have been created by the conqueror, who appointed Ralph de Mortimer, one of the principal commanders of his army; and the office continued till the reign of Henry VIII. A. D. 1521: when it became extinct, as the powers annexed to it rendered it troublesome to the king, by the attainder of the third duke of Buckingham, who derived it from the Bohuns, earls of Hereford, and in whom it was hereditary. Since this time there hath not been any permanent high constable; but the office has been kept vacant, except on particular occasions. About a century after, *viz.* in 1607, it was also suppressed.

in France, by an edict of Lou's XIII.; though the office has been exercised in the command of the marshals, by the first officer in the army. See *CONNETABLE*.

What authority and jurisdiction belonged to the constable, we may partly learn from a statute of the 13th of Richard II., in which it is said "that he ought to have cognizance of contracts touching feats of arms and of war out of the realm, and also of such things relating to arms or war within the realm, as could not be determined or discussed by the common law, with other usages and customs appertaining to the same matters, which other constables before that time had duly and reasonably used." Madox (*Hist. Excheq. c. 11.*) says, that he was a high officer, both in war and peace. As the duties enjoined on the constable and marshal or marshal, as well in war as in peace, in camp and in court, were multifarious, honourable, and confidential; so the powers, privileges, authority, and pre-eminence of those officers, were extensive, judicial, executive, and respectable. The powers and functions of each of these two high officers, when acting in their military capacities, were, in some instances, concurrent; in others, separate and independent. In the discharge of some official duties, they were upon an equal footing, and the marshal acted as coadjutor to the constable, but in others, the former was subordinate and subservient to the latter. The functions of the constable, in his civil capacity, were few, and in a great measure restricted to certain personal attendances on the king in his court, on high festivals, and on occasions when such affairs were transacted as required pomp and solemnity. In his military capacity, the constable examined the number and qualifications of those who were sent by the military tenants, either into the field or garrison, and also the stipendiaries retained by the king, and gave them either their admittance or discharge. When the army took the field, and was commanded by the king in person, the constable acted as his lieutenant, and was next to him in authority; but whenever the king was absent, the constable had the supreme and sole command of the forces. In both cases, the marshal was the substitute or vice-general of the constable. See *COURT OF Chivalry*, and *MARSHAL*.

From those mighty magistrates, the constables of England, are derived the inferior ones, since called the *constables of hundreds and franchises*: these were first ordained in the thirteenth year of Edward I. by the statute of Winchester (13 Ed. I. stat. 2. c. 6.); which, for the conservation of the peace, and view of armour, and for preventing defaults of armour, and of the suits of towns and of highways, &c. appointed, that two constables should be chosen in every hundred and franchise.

These are what we now call *constabularii capitales*, or *high constables*: because continuance of time, and increase of people, &c. have occasioned others of like nature, but inferior authority, in every town and parish, called *petty constables*, or *sub-constabularii*, first instituted (as some say) about the reign of Edward III.

Although it has been a prevalent opinion, maintained by Coke, Hale, and others, that high constables are not more ancient than the statute of Winchester above cited; yet Hawkins concurs with others in maintaining, that both constables of hundreds, commonly called high constables, and also constables of tythings, now denominated petty constables or tything-men, existed by the common law, and were not first ordained by the statute of Winton or Winchester; for that statute doth not say, that such officers shall be constituted, but evidently seems to suppose that there were such before the making of it. 2 Hawk. 61. That the high con-

stable was instituted long before the statute of Winton is a fact ascertained by a writ or mandate of Henry III., preserved in the *Adversaria* to Watts's edition of *Matt. Paris*, and from which chapters 4 and 6 of the statute of Winton are evidently taken. By this writ it is provided, "that in every hundred there shall be constituted a CHIEF CONSTABLE, at whose mandate all those of his hundred, sworn to arms, should assemble and be observant to him, for the doing of those things which belong to the conservation of the king's peace." No mention of this officer, it is believed, can be any where found prior to the date of this instrument; which perhaps may no more determine the question as to his original creation than the statute of Winton. As for the "constable of the vill," or petty constable, as he is frequently called by way of distinction from the chief constable, this officer has been repeatedly acknowledged to be one of the most ancient officers in the realm, for the conservation of the peace (*Poph. 13. 4 Inst. 265.*). It must be confessed, however, that no mention of him by this identical name is any where found to occur anterior to the writ or mandate of king Henry III. already mentioned; by which it is also provided, that in every village or township there should be constituted a constable or two, according to the number of the inhabitants. But it is partly certain that lord Coke's idea is well founded, and that "this officer is actually owing to the institution of the frank-pledge, usually attributed to king Alfred," and was in fact originally the senior or chief pledge of the tything or *decima*. Hence it appears, that the ordinance of Henry III., far from instituting the office, merely enlarged the number of officers, placing them in towns and villages, instead of franchises; hence it might frequently happen, that a manor of great extent had only a single constable for several townships; a case exactly similar sometimes occurring at this day, in which a township, comprehending several hamlets, equally populous perhaps with itself, has only one constable for the whole. Upon the whole, it seems highly probable, that, at the common law, and before the mandate of Henry III., the constable of the hundred and the constable of the manor, were officers of the same nature and authority, originating at the same time and differing only as to the extent of their several districts; in short, that they bore to each other the same analogy as subsisted between the bailiff of the hundred and the bailiff of the manor. Hence it follows, that the constable of the hundred neither possessed nor could have exercised any more authority within the precinct of the latter, than the constable of one manor possessed or could have exercised in another; the manor being to all intents and purposes exempt from, and excluded out of the hundred.

High constables are chosen at the court leets of the franchise or hundred over which they preside, or, in default of that, by the justices at their quarter sessions, or by the greater number of the justices of the division: and they are sworn on the sessions, or by warrant from the sessions; which course hath often been allowed and commended by the justices of assize. *Dalt. c. 28. Salk. 150.* And by stat. 29 Geo. II. c. 25, § 8, 9, in Westminster a high constable is to be elected annually by the dean or high steward or his deputy at a court leet. But by 1 Geo. stat. 2. c. 13, high constables are required to take the oaths of allegiance, supremacy, and abjuration, as other persons who qualify for offices; but they are not within the statute of the 25 C. II. c. 2. as to receiving the sacrament and subscribing the declaration against transubstantiation; and petty constables are exempted both from the one and from the other. The petty constables have two offices united in them; the one ancient, the other modern. Their ancient office is that of *Head-borough* (which see), tything-man,

or borough, who are as ancient as the time of Alfred; and their more modern office is that of constable merely, which was appointed (as it has been said) so lately as the reign of Edward III., in order to assist the high constable. And, in general, the ancient head boroughs, tything-men, and borough-keepers, were made use of to serve as petty constables; though not so generally, but that in many places they still continue distinct officers from the constable.

The common law requires, that every constable should be *idoneus homo*, i. e. apt and fit to execute the said office; and in law he is said to be *idoneus* when he possesses three qualifications, *viz.* honesty, knowledge, and ability, (8 Rep. 41. b.) And if one be elected constable, who is not *idoneus*, he by the law may be discharged of his office, and another who is *idoneus* appointed in his place. He must also be an inhabitant of the place for which he is chosen, (12 Mod. 256.) nor should he be the keeper of a public-house, (6 Mod. 42.) which is made an express disqualification in Westminster, by stat. 29 Geo. II. c. 25. Persons exempt from serving the office of constable are aged persons, and in Westminster those 63 years old are expressly exempted by stat. 31 Geo. II. c. 17. § 13;—aldermen of London;—the president, commons and fellows of the college of physicians in London, by 32 Hen. VIII. c. 40; but no other physicians, nor they elsewhere:—apothecaries, practising in, or within seven miles of London, free of the company, or in the country having served seven years, stat. 6 and 7 W. III. c. 4;—surgeons, free of the company of surgeons in London, examined, approved, and exercising the science, by stats. 5 Hen. VIII. c. 6: 32 Hen. VIII. c. 42: 18 Geo. II. c. 15; and by custom all surgeons (Com. Rep. 312.), and it seems by the same stats. barbers free of that company in London;—attornies of the courts of K. B. and C. P.;—practising barristers;—dissenters, being teachers and preachers in a congregation, tolerated by law, taking the oaths and making the required declaration, but not others, by 1 W. c. 18. § 11;—foreigners naturalized, who may rather be said to be incapacitated;—militia-men, during the time of their service, by 20 Geo. III. c. 107. § 130;—servants to members of parliament, but doubtful;—professors of felons to conviction; the original proprietors, or first assignees of a certificate (commonly called a tyburn-ticket), if a parish or ward office; within the parish or ward where the felony happened; to be only once used, by 10 and 11 W. c. 23. § 23; but this is no exemption from serving the office for a manor, nor, as it should seem, for a vill or township; nor where the office is to be executed out of the privileged district;—but masters of arts, justices of peace in another county, officers of the guards, officers or watchmen at the Custom-house, tenants in ancient demesne, and younger brothers of the trinity-house, cannot plead exemption. If, however, a gentleman of quality, or a physician, officer, &c. be chosen constable, where there are sufficient persons besides, and no special custom exists; such persons, it is said, may be relieved in B. R. 2 Hawk. P. C. 100. c. 10. § 41. A constable, whose office is ministerial, and not judicial, may appoint a deputy; but the constable is answerable, and his deputy ought to be sworn, though this is not in all cases necessary; but if the deputy is allowed and sworn, the principal is not responsible. Dissenters chosen to the office of constable, &c. scrupling to take the oaths, may execute the office by deputy, who shall comply with the law in this behalf, stat. 1 W. & M. c. 18. § 7. And by 31 Geo. III. c. 32. the like privileges are given to Roman Catholics on their taking and subscribing the oath and declaration therein specified. Constables may appoint a deputy to execute a warrant, when by reason of sickness, &c. they cannot do it themselves. A woman made constable, by virtue of a cus-

tom, that the inhabitants of a town shall serve by turns, on account of their estates or houses, may procure another to serve for her, and the custom is good.

Constables are chosen by the common law at the leet, or, where there is no leet, at the tourn; sometimes by the suitors, and sometimes by the steward; and now, in many towns and parishes, by the parishioners: all according to ancient and particular usage. But by whomsoever they shall be chosen and appointed, they are to be sworn and placed in their office by the lord, or his steward, or by the sheriff respectively, as being judge of the court. 2 Hawk. 62. If the constable be present when chosen, he is to take the oath in court; if absent, he may be sworn before a (single) justice of the peace: but in the latter case, he ought to have special notice of his election, and a time and place should be appointed for his taking the oath (well and truly to serve the office). Every petty constable being a principal peace officer, and it being necessary for the preservation of the peace, that every vill should be furnished with one, the justices of the peace have, ever since the institution of their office, taken upon them, as conservators of the peace, not only to swear the petty constables, who have been chosen at a tourn or leet, but also to nominate and swear those who have not been chosen at any such court, on the neglect of the sheriffs or lords to hold their courts, or to take care that such officers are appointed in them. And this power of justices of the peace, having been confirmed by the uninterrupted usage of many ages, shall not now be disputed, but shall be presumed to have been grounded on sufficient authority. Some have carried this point so far, as to allow the justices, at their sessions, to swear one who was chosen at the leet, and unduly rejected by the steward, who had sworn another in his place. 2 Hawk. 65. A constable has been sworn by a single justice of the peace; and upon motion for an information as not being duly sworn, the court held this to be a good swearing. 2 Strad. 1149. It is certain that justices of the peace had power to nominate and swear constables, on the default of the tourn or leet, before the statute of 13 & 14 C. II. c. 12.; and therefore that they have such authority in some cases not mentioned in that statute, which enacts, that if a constable shall die, or go out of the parish, any two justices may make and swear a new one, until the lord shall hold a leet, or till the next quarter sessions, who shall approve of the officer so made and sworn, or appoint another; and if any officer shall continue above a year in his office, the justices in their quarter sessions may discharge him, and put in another, till the lord shall hold a court as aforesaid. 2 Hawk. 65. 13 & 14 C. II. c. 12. § 15. It seems to be clear at this day, that the King's Bench hath power by mandamus to compel the court or judge to swear a constable duly chosen. 2 Hawk. 65. And constables lawfully chosen, if they shall refuse to be sworn, may be bound over by a justice of the peace to the assizes or sessions, there to be indicted. Dalt. c. 28. 2 Str. 920. But it seems that a justice hath no power to commit any person for such refusal and no more, the proper mode being to indict him upon his refusal; and if found against him, to assess a good fine upon him. Cro. Car. 567.

Constables of London, which city is divided into 26 wards, and every ward into precincts, in each of which is a constable, are nominated by the inhabitants of each precinct on St. Thomas's day, and confirmed, or otherwise, at the court of wardmote; and after they are confirmed, they are sworn in to their office, at a court of aldermen, on the next Monday after Twelfth-day. The oath of these constables is long and particular, and comprehends a variety of duties, now seldom performed, but regulated by articles of the Wardmote in-
quest,

quest, which directs the conduct of the constable; who is a kind of superintendent of the morals of the inhabitants, and who ought to notice all new-comers, that those whose character is bad may be required to give security for their good behaviour, or be imprisoned. Cath. 129, 138. Every constable may execute warrants through the whole city. Such as are chosen into the office are obliged to place the king's arms, and the arms of the city, over their doors; and if they reside in alleys, at the ends of such alleys, towards the streets, to signify that a constable lives there, and that they may be more easily found when wanted.

The general duty of all constables, both high and petty, is to keep the king's peace in their several districts; and for this purpose they are armed with very large powers, of arresting, and imprisoning, and of breaking open houses, and the like. One of their principal duties, arising from the statute of Winchester, which appoints them, is to keep watch and ward in their respective jurisdictions. See **WARD** and **WATCH**.

If any one shall make an affray or assault upon another, in the presence of the constable, or shall threaten to kill, beat, or hurt another, or in a fury be ready to break the peace; the constable may commit him to the stocks, or other safe custody, and afterwards take him before a justice, or to a gaol, until he shall find surety for the peace; and if the party will not find surety to the constable, he may imprison the party till he shall do it, provided the offence be in his own view. Dalt. c. 1. Cro. Eliz. 375, 376. The duties of constables are so numerous and minute, in consequence of a variety of statutes, that the mere recital of them would extend this article beyond its due bounds. They will be found under several different heads or titles, that occur in this work.

If a constable neglect any duty incumbent on him either by common law or by statute, he may be indicted and fined by the justices of peace, to whom he is subordinate. If he will not return his warrant, or certify what he has done under it, he may be fined. If he wilfully lets a felon escape out of the stocks, and go at large, it is felony; and it seems generally agreed, that all voluntary escapes in the officer amount to the same crime as the offender was guilty of, whether treason or felony. 2 Hawk. P. C. c. 19. § 22, &c. It is a misdemeanour in him to discharge an offender, brought to the watch-house by a watchman in the night. In short, he is liable to various pecuniary, and sometimes personal, punishments, on neglecting the duty imposed on him by various statutes. As by his office he is subordinate to a justice of the peace, he is bound to execute his warrants; and therefore it hath been resolved, that where a statute authorises a justice of the peace to commit a man of a crime, and to levy the penalty by warrant of distress, without saying to whom such warrant shall be directed, or by whom it shall be executed, the constable is the proper officer to serve such warrant, and indictable for disobeying it. 2 Hawk. 262. By 33 Geo. III. c. 55. two justices, at any special or petty sessions, upon complaint upon oath, of any neglect of duty, or disobedience of any lawful warrant or order of any justice, by any constable, or other peace or parish officer, (such person being duly summoned to appear and answer to such charge,) may impose, upon conviction, any reasonable fine, not exceeding 40s., upon such constable, &c.; and if not paid, levy the same by distress and sale of the goods of such offender, to be applied to the poor of the parish or place where he resides; or for want of such distress, the offender shall be committed to the house of correction for any time not exceeding ten days. The officer executing such warrant, if required, shall shew the same to the person, whose

goods and chattels are distrained, and suffer a copy of it to be taken. 27 Geo. III. c. 26.

On the other hand, the constable is protected by law, in the execution of his duty. By stat. 7 Jac. I. c. 5. 21 Jac. II. c. 12. if any action is brought against a constable for any thing done by virtue of his office, he, and all who aid him, may plead the *general issue*, give the special matter in evidence, and if he recovers, shall have double costs; but this must be certified on the record by the judge: and stat. 19 Geo. II. c. 21. against profane swearing, gives treble costs. By stat. 24 Geo. II. c. 44. no action shall be brought against any constable or others assisting him for any thing done in obedience to any warrant of a justice of peace, until demand of the perusal and copy of such warrant, and the same hath been refused or neglected for the space of six days, &c. &c. No action shall be brought against any constable but within six months after the act committed. For the charges of conveying malefactors to gaol, see **COMMITMENT**. By 27 Geo. II. c. 20. the constable executing a justice's warrant, for levying a penalty or other sum of money directed by an act of parliament by distress, may deduct his own reasonable charges; and if any person shall be appointed to execute any warrant for felony, two justices may order by warrant under their hands a reasonable allowance to such special constable for his expences and loss of time, to be paid by the treasurer out of the county rate. 41 Geo. III. c. 78. Two justices may in like manner order an allowance to be made to any high constable for extraordinary expences incurred in the execution of his office, to be defrayed in the same manner. And by 18 Geo. III. c. 19. every constable, headborough, and tything-man, shall every three months, and within fourteen days after he goes out of office, deliver to the overseers of the poor a written account, entered into a book kept for that purpose, and signed by him, of all sums expended in consequence of his office, which the overseers within the next fourteen days shall lay before the inhabitants; and if approved, the money shall be paid out of the poor rate: but if disallowed, they are to return the book to the constable, who may produce it before a justice of peace, giving reasonable notice to the overseers; and the justice shall examine the account, settle the sum due, sign the account, and order payment out of the poor rate; the overseers, however, may appeal to the quarter sessions.

If a constable commits a person in charge, he is not liable to an action for false imprisonment, though the charge be ill-founded; and if the constable is assaulted in the execution of his office, and the constable kill the assailant in a contest, it is no felony; but if the constable is killed, it shall be construed premeditated murder. A justice of peace's warrant is a sufficient justification of a constable in a matter within the jurisdiction of such justice.

High constables shall account, if required, at the general or quarter sessions, for the general county-rate by them received, on pain of being committed to gaol until they account; and they shall pay the money in their hands, according to the order of the court, under the like penalty. 12 Geo. II. c. 29.

Constables may be removed in the same manner and by the same authority by which they were chosen. The sheriff, or steward of the leet, having power to place a constable in his office, has also a power of removing him. Justices of the peace have also displaced such constables as have been chosen and sworn by them. Dalt. c. 28. 2 Hawk. 63. 65. And by 13 & 14 Geo. II. c. 12. if a constable shall continue above a year in his office, the sessions may discharge him, and put another in his place, till the court shall hold a leet. And if the court, or other judge, shall refuse

to discharge a constable, the King's Bench may compel them by mandamus. 2 Hawk. 65. If a constable be discharged without just cause, the court of King's Bench will by rule of court order him to be restored to his place. Bult. 174.

CONSTABLES of the *Castles*, in *Antiquity*, were keepers or governors of the castles of the king, or of great barons, who were frequently hereditary, or by feudal tenure: such were the constable of the Tower, the constable of London, or Baynard's castle, the constables of the castles of Dover, Windsor, Chester, Caernarvon, and other castles in Wales; some of which offices, though not now hereditary, are remaining to this day. Their office seems to have been the same with that of the *castellani*, or governors of castles. These constables are those to whom Magna Charta (c. 17. 20.) refers; and who in the stat. of Westm. 1. (3 Ed. 1.) c. 15. are called constables of fees, and there considered as keepers of prisons; a constituent part indeed of all ancient castles. 2 Inst. 31. The statute of 5 Hen. IV. c. 10. reciting the oppressions of these constables, and enacting that none be imprisoned but in the common gaol, seems to have put an end to a race of tyrants, who, by their misconduct, had rendered themselves odious to the people.

CONSTABLE of France. See CONNETABLE.

CONSTABLE, *Provost of the*. See PROVOST.

CONSTABLE, in *Biography*, general of the Dominican order about the end of the sixteenth century, was born at Ferrara, to which city he was constituted inquisitor, and afterwards nominated master of the holy palace by pope Gregory XIII. In literary history he is known by a work entitled, "De causis in sancto officio cognoscendis," which related to the history of the dreadful tribunal invented by the founder of his order. His own zeal in the duties of the office to which he had been chosen was exemplary; and to excessive fatigue and over exertions occasioned in visiting on foot the monasteries under his government, is to be ascribed an illness that terminated in his death, at Venice on 17th of Sept. 1582. Moreri.

CONSTADT, or KUNSTADT, in *Geography*, a small town of Prussia, situated in Lower Silesia, in the principality of Oels.

CONSTANCE, COSTANTZ, or COSTNITZ, a considerable town of Wirtemberg, in the circle of Swabia, formerly a free imperial city, under the protection of Austria, delightfully situated at the north-western extremity of the lake of Constance, where the Rhine issues out of it again; or between the two lakes; 45 miles N.E. from Zurich. N. lat. 47° 40'. E. long. 9° 12'. The fort of Peterhausen defends it on the left side of the Rhine. "I was much afflicted," says Mr. Coxe, who visited this place in 1776 (see Travels in Switzerland, vol. i. p. 16.) "with the solitary appearance of a town once so flourishing in commerce, and so celebrated in the annals of history. A dead stillness reigns throughout; grass grows in the principal streets; in a word, it wears the melancholy aspect of being almost totally deserted, and scarcely contains 3000 inhabitants. This city has endured a sad reverse of fortune; it was formerly in alliance with Zurich and Basse; and, supported by their assistance, expelled the bishop, and embraced the reformation. But the Protestant cantons being worked in 1351; and the league of Smalcalde, of which Constance was a member, being defeated by Charles V., the town was obliged to submit to the emperor;" (having been placed under the ban of the empire in the year 1548, for deserting the Roman Catholic religion), "and readmit the Catholic religion. From this period it lost its independence." In 1549 it was placed under the

power of the house of Austria by Ferdinand I.; and though the estates of Swabia refused their assent, the subjection was ratified by the diet at Augsburg. Being neglected by the house of Austria, the town fell to decay. Constance somewhat revived, and afforded the prospect of becoming a commercial town, through the permission granted by the emperor Joseph, to the emigrants from Geneva, of settling and carrying on their trade and manufactures, with very considerable privileges; the principal of which were the following: *viz.* the right of purchasing or building houses; the free exercise of religion, entirely independent of the Catholic clergy; the power of erecting a tribunal for the purpose of deciding all affairs relative to their manufactures and commerce; exemption from serving in the militia and quartering soldiers, from all contributions during the space of 20 years, from duties on their tools and utensils; and the invariable establishment of the standard of the gold and silver employed in their manufactures. "These favourable terms (says Mr. Coxe) signed on the 30th of June 1785, attracted so many settlers to Constance, that in my second visit to this place, on the 25th of October 1787, the new colony of Genevans consisted of 70 families, comprising 350 persons: among these were 54 watch-makers, who had introduced the different branches of manufacture which belong to their trade. Four hundred watches were already finished, and above 1400 more were preparing. The emperor also has granted to Mr. Macaire the convent of Dominicans lately secularized, towards establishing a manufacture of printed linens and cottons. The refectory is appropriated for the chapel of the new colony." "This convent, which was once the asylum of monkish superstition, is now the seat of trade and industry; and it must suggest a pleasing reflection to a philosophic mind, that a successor of Sigismund, who violated his word," (as in the case of Hufs) "should have assigned to a reformed establishment that very convent in which the Bohemian divine was imprisoned, and from which he was led to the stake; and that the most enlarged principles of toleration should be manifested in the same spot where persecution was inculcated by precept and example. It is the triumph of reason and religion over bigotry and intolerance." Since the period to which we have now referred, France has extended its revolutionary spirit and operations to the states of Switzerland; and time must develop the effects on the liberty and commerce, and consequent prosperity of the country. See HELVETIC CONFEDERACY and SWITZERLAND. At present the manufactures and commerce of Constance are inconsiderable. Its celebrity is chiefly owing to a council held here from 1414 to 1418, which deposed three popes, *viz.* John XXIII., Gregory XII., and Benedict XIII., who had set up against each other; appointed Martin V. in their room, condemned the doctrine of Wickliff, and committed his works to the flames, in 1415; and caused John Hufs and Jerome of Prague to be burnt, the former July 6, 1415, and the latter May 30, in 1416. At this council the assembled fathers on the 14th of June in 1415, passed the famous decree which took the cup from the laity in the celebration of the eucharist, ordered that the Lord's supper should be received by them only in one kind, *i. e.* the bread, and rigorously prohibited the communion in both kinds. The history of this council by L'Enfant is composed with great accuracy and elegance. A second edition of this work appeared at Amsterdam in the year 1728, in 2 vols. 4to.: the first was published in 1714. For an account of the treaty at Constance, A. D. 1183; see the article CITY.

CONSTANCE, *Lake of*, separates Switzerland from that

that part of Germany hitherto called the circle of Swabia.

It is divided into three parts: the upper part, which is the broadest, is called *Boden-See*, the middle part *Bodmer-See*, and the lower part *Zeller See*.

The superior lake is about 15 leagues in length, and 6 in its greatest breadth. The borders consist of gently rising hills; on the left hand Swabia, and on the right Thurgau, with a variety of scattered towns, villages, and monasteries, and delightful villas, which afford several views to those who navigate the lake, that are truly enchanting. The form of the lake inclines to an oval, and the water is of a greenish hue. This lake, like all the other lakes of Switzerland, is considerably deeper in summer than in winter; a circumstance which is owing to the first melting of the snow from the neighbouring mountains. It abounds with all sorts of fish, and more particularly with the species of trout, called in its vicinity "Illankin," and by Linnaeus *Salmo lacustris*. A little above Stein, which is an independent town, under the protection of Zurigo; the Rhine widens considerably, and forms the inferior lake of Constance, or the *Zeller-see*, which is divided into two branches; from Stein to Constance is about 16 miles, and from the latter to Zell, its greatest breadth, about 10.

Near Meribourg the lake of Constance is said to be 350 fathoms deep. This great depth is extremely advantageous to commerce, the lake being navigated by vessels of 100 tons and upwards. There are two islands in its middle, on one of which is the town of Lindau, formerly a free imperial city, but belonging now to the king of Bavaria, who, by the treaty of the confederation of the Rhine, has engaged to have it fortified and provided with artillery establishments. On the other island, about a mile in circumference, is the town of Meinau, which belonged to the knights of the Teutonic order, and whose situation is delightful.

The Rhine enters the lake of Constance at its south-eastern extremity, and issues out of it again at the north-west, not far from Stein. There is an ancient, and generally accredited tradition, that the Rhine, in crossing the lake in all its length, does not mix with its water. The same is said of the Rhone, which runs through the lake of Geneva. Pliny the Elder, and Ammianus Marcellinus, are the authors of these fables. It is true that the two rivers are distinctly seen some time after their entrance into the lakes, but the difference of colour vanishes as soon as they have deposited the sand which they carry. Mr. Coxe, seated on board a vessel on the lake, in vain attempted to distinguish the waters of the Rhine from those of the lake. The river, in its course from the superior lake, being exactly of the same beautiful greenish colour as the inferior lake into which it flows; it is evident that the one can never be distinguished from the other. Probably, upon its first entrance into the superior lake it is troubled, and, consequently, for some distance, its current may be easily traced; but it purifies itself by degrees, and becomes an indistinct part of the great body of water.

Of no better foundation is the report that the lake of Constance never freezes. Wagner assures that it was frozen in 1572 and 1596, when two inhabitants of Constance walked over the lake on the ice, measured it, and found it to be 7265 fathoms long, from Romizhorn to Bouchon, which is not its whole length.

CONSTANCY, in a general sense, denotes immutability; but in ethics, or the philosophy of the human mind, the term implies resolution or steadiness, particularly under

adverse trials and suffering. It was the saying of a heathen philosopher, that there cannot be imagined upon earth a spectacle more worthy of the regard of the creator, intent on his works, than a brave man superior to his sufferings. Nothing, indeed, can be more noble or honourable, than to possess courage sufficient for executing the injunctions of reason and conscience; for maintaining the dignity of our nature, and the station assigned us; and for being to much unaffected by poverty, pain, and even death itself, as not to do any thing that is reproachful or sinful in order to avoid them. To possess this temper, is to be great above title and fortune; and manifests a mind of heavenly extraction, and worthy of the offspring of the deity. Of this kind, many illustrious instances occur in history, and particularly in the history of the Christian church, and of the last moments of confessors and martyrs.

CONSTANS I., FLAVIUS JULIUS, in *Biography*, third son of Constantine the Great, by Fausta, was born A. D. 320, and was created Cæsar at six years of age. Upon the death of his father in 337, Constans succeeded to the sovereignty of Italy, Africa, and the western Illyricum, as his share of the empire. He had enjoyed his power but three years, when he was attacked by his brother Constantine, whom he defeated and slew.

Constans, by this victory, became possessor of Gaul, Spain, and Britain; and in his turn, attacked the Franks, whom he humbled, and the Scots, which probably did not end much to his credit, as no notice is taken of the fact by his early biographers. Nevertheless, the prince was elated by the success of his arms, and assumed a degree of pride on the occasion, which would have ill become any man, and in him was rendered quite contemptible, owing to his want of talents and application. He was, moreover, a slave to his passions, and allowed himself in acts of voluptuousness, that drew down upon him the indignation of the people. Magnentius, an ambitious soldier, encouraged by popular discontent, was resolved to assert the honour of the Roman name. A conspiracy was formed, and Marcellinus, count of the sacred largesse, who had already supplied, with a liberal hand, the means of seduction, under pretence of celebrating his son's birth-day, gave a splendid entertainment: the intemperance of the feast was artfully protracted till a late hour, and the unsuspecting guests were tempted to indulge themselves in a dangerous freedom of conversation. On a sudden, the doors were thrown open, and Magnentius, who had retired for a few moments, returned into the apartment invested with the diadem and purple. The conspirators instantly hailed him with the titles of Augustus and emperor. The guards immediately took the oath of fidelity, and ere the dawning of the day, Magnentius became master of the troops and treasure of the palace and city of Autun. Constans, who was pursuing his pleasure in an adjacent forest, being informed of the fact, threw off the imperial robes, and fled towards Spain; but before he could reach the seaport, where he intended to embark, he was overtaken by a party of cavalry near Helena, at the foot of the Pyrenæes, and put to death. Gibbon. Univer. Hist.

CONSTANS II. grandson of Heraclius, emperor of the East, was raised to the throne in 641, after the senate had deposed the usurper Heraclionas, and his mother Martina. He was then only in his twelfth year, yet before the Byzantine senate, he delivered an oration that did him great credit. Having returned thanks for the just punishment of the assassins, who had intercepted the fairest hopes of his father's reign, he added "By the divine providence, and by your righteous decree, Martina and her incestuous progeny have
been

been cast headlong from the throne. Your majesty and wisdom have prevented the Roman state from degenerating into lawless tyranny. I therefore exhort and beseech you to stand forth as the counsellors and judges of the common safety." The senators were gratified by the respectful addresses of their sovereign; but Constantius was anxious to secure the crown that had suddenly devolved on him. He obliged his elder brother Theodosius to take hasty orders, which rendered him incapable of civil government. The young emperor was not satisfied with this act, which was regarded as a profanation of the sacraments, but he caused Theodosius to be put to death. The act was scarcely perpetrated before the execrations of his subjects, joined to the agonies of remorse, rendered life a burden. He could no longer bear to reside in the capital that had been the witness of a base and infamous fratricide. He became a voluntary and perpetual exile; and embarking for Greece, displayed the hatred which he felt, and was conscious that he inspired, by spitting against the walls of Constantinople as he left them. After passing the winter at Athens, he visited various parts of Italy, and concluded a pilgrimage of disgrace, by fixing his residence at Syracuse. Constantius easily fled from the imprecations of an injured people, but he could not forget what he had done. The remorse of his conscience created a phantom that pursued him wherever he went: the image of his murdered brother was ever before his eyes, presenting to his lips a cup of blood, and saying, or seeming to say, "Drink, brother, drink,"—"a sure emblem," says the historian, "of the aggravation of his guilt, since he had received from the hands of the deacon, the mystic cup of the blood of Christ." Constantius, however, did not resign the cares of government. He took part in some wars carried on in Italy, and having been successful, entered the capital with great pomp, and was met by the pope and clergy at a distance from the city. In return for this mark of respect, he plundered Rome, and sent its wealth and ornaments to Constantinople. He then departed for Syracuse, where he resided five years, oppressing the people, and hated by those about him. Domestic treason put an end to his life; he was assassinated while he was in the bath, in the year 668, after a miserable reign of 27 years. Gibbon. Univer. Hist.

CONSTANT, DAVID, was born at Lausanne, in Switzerland, in the year 1638, and became distinguished as a protestant divine, and professor of theology. He was indebted to his own country for the rudiments of useful knowledge, and was afterwards a student at Herborn in Germany, from which place he went to Groningen, Leyden, and Paris, for farther improvement. At Paris, he became acquainted with many very celebrated members of the reformed church, and having laid the foundation of solid learning, and formed a connection with several worthy characters, he returned to Switzerland in the year 1658, was ordained minister according to the calvinistic form, and undertook the charge of a church at Copet. Here he cultivated a literary intimacy with Turretin, Tronchin, and other professors in the university of Geneva, and with Bayle, the celebrated historian, but who at that time was tutor in the family of count de Donha, baron of Copet, the patron of David Constant. On a vacancy at the college of Lausanne, Constant was appointed tutor to the first class, by the magistrates of Berne, and was afterwards elected professor of moral philosophy and the Greek language. The important duties of these stations he discharged with high honour to himself, and to the advantage of those placed under his instructions; his vacant hours were employed in editing some of the classics,

or on original works. By his contemporaries he was much respected; they regarded him as a man of considerable literary acquirements, possessed of a solid judgment and a correct taste. In the year 1700, he was chosen professor of theology, a situation which he retained until he was eighty-nine years of age, when he resigned in favour of a successor, reserving to himself, even then, the right of giving his assistance and advice at the public meetings of the college. He died in 1733, having attained the venerable age of ninety-five. He published new editions of Forus; of Cicero's smaller pieces, and of various other pieces adapted to the use of schools. His original writings were respectable; they were dissertations on curious theological subjects. We have also "Systema Ethico-theologicum," printed at Lausanne, 1695; a work "De Juramentis;" and another "On Providence."—Moreri.

CONSTANT quantity, in *Geometry*, that which remains the same, while others increase or decrease. Thus the semi-diameter of a circle is a *constant quantity*; for while the absciss and semi-ordinates increase, it remains the same.

CONSTANT winds. See WIND.

CONSTANTIA in *Ancient Geography*, a town of Valeria, in the vicinity of the Danube.—Also, a town of Thrace, in the territory of mount Rhodope.—Also, a town of Asia, in Mesopotamia; said by Ammianus Marcellinus to have been *Amida*, which was enlarged by the emperor Constantine, and assumed his name.—Also, a name given to Majumas, the port of Gaza, after Constantine raised it to the rank of a town and gave it the name of his son.—Also, a name given to the town of Salamine.—Also, a name assigned by Constantine to the town of Arclata (*Arles*), according to Ausonius, cited by Scaliger.

CONSTANTIA *Castris*, a town of Gaul, in the second *Lyonensis*; now *Coutances*.

CONSTANTIA, in *Geography*, a district of the Cape of Good Hope, a mile and a half from Alphen, close under the mountains, about midway between Table bay and False bay, consisting of two farms which produce the far-famed Cape or Constantia wine, so remarkable for its peculiar rich flavour and sweetness. One of the farms where the white wine is made is called *Little Constantia*; the other produces red. There are only from fifty to one hundred casks, of 154 gallons each, made annually of the genuine Constantia wine. The grape is the muscadell, and the rich quality of the wine is owing partly to the situation and soil of the vineyards, and partly to the care taken in manufacturing the wine. No stalks, and no fruit but such as is full ripe, are suffered to go under the press; precautions rarely taken by the other farmers of the Cape, who make annually about six hundred 154-gallon casks of the common Cape wine, which, however, is frequently brought into the European markets, under the name of Constantia wine. The muscadell grape grows at every farm: and at some farms in Drakenstein, the wine pressed from it is equally good, if not superior, to the Constantia, though sold, on account of the name of the latter, at one sixth part of the price. This wine sells at the Cape for 70 or 80 six-dollars for the half-um, which ought to contain 20 gallons; but the avaricious disposition of the proprietors, has led them to fabricate false casks, few of which that come to England being found to measure more than 17 or 18 gallons, and many not above 16. When they find that the wine is to be sent abroad, they adulterate it with some other wine. For, according to their own returns, the quantity exported and consumed in Cape Town, as in the case of Madeira wine, greatly exceeds the quantity manufactured.

The following table shews the quantity of Constantia wine exported in four successive years.

Years.	Half Anns.	Value.
1799	157	11,752
1800	188	14,070
1801	173	13,007
1802	210	15,745
In 4 years.	728	54,574 R. D.

Barrow's Travels in S. Africa, vol. ii. p. 290.

CONSTANTINA, or CONSTANTINE, the eastern province of the kingdom of Algiers, which see. This province, which is the largest and richest of the four provinces into which Algiers is commonly divided, (the three others being Mascara, the territory of the city of Algiers, and Titeri,) lies betwixt the meridians of the rivers Booberak and Zaine, which separates it from Tunis, and is bounded on the north by the Mediterranean, on the east by the kingdom of Tunis, on the south by Biledulgerid, and on the west, in its greatest extent, by the river Malva, or by the territory of Algiers, &c. It is nearly equal in extent to the two western and southern provinces, being, by Dr. Shaw's statement, 250 miles in length, and more than 100 in breadth; and far surpassing them in wealth and strength, as well as in the number and goodness of its cities. The tribute collected by the vicery of this province, according to Dr. Shaw, is proportionably greater. For whilst the Titeri bey brings every year into the treasury of Algiers little more than 12,000 dollars, each dollar being 3s. and 4d. or 6d., and the Tlemian bey from 40 to 50 thousand; the vicery of Constantina never pays in less than 80, and sometimes 100 thousand. The sea-coast of this province, from the Booberak to Boujciab, and from thence almost entirely to Bona, is rocky and mountainous; and the whole tract which lies between the meridians of the rivers Booberak and Zhorre, from the sea-coast to the parallels of Seteef and Constantina, is, for the most part, a continued chain of exceedingly high mountains; few of whose inhabitants, from the ruggedness of their situation, pay any tribute to the Algerines. Near the parallels of Seteef and Constantina it is diversified with a beautiful interchange of hills and plains, which afterwards become less fit for tillage, till it terminates, upon the Sahara, in a long range of mountains, supposed by Dr. Shaw to be the *Buzara* of the ancients. The district of *Zaab* (which see) lies immediately under these mountains; and beyond *Zaab*, at a great distance in the Sahara, is *Wadraag*, another collection of villages. This part of the eastern province, including the parallel of *Zaab*, answers to the *Mauritania Sitifensis*, or the first Mauritania, as it was called in the middle age. The mountains are inhabited by free Arabian and Moorish tribes, which from time to time have proved formidable enemies to the power of Algiers. The most remarkable places are *Boujciab* or *BUGIA*, *CULLU*, *BONA*, *LA CALLE*, the island of *TABARCA*, and *CONSTANTINA*; which see respectively.

CONSTANTINA, *Constantine*, formerly *Cirta*, is one of the most considerable cities of ancient Numidia, the capital of the above-described province, and the residence of the bey. Next to Algiers, it is the most populous city in the Algerine dominions. For a particular account of it, see *CIRTA*.

CONSTANTINA, a town of Spain, in Andalusia; 50 miles S.W. of Cordova, and 42 N.N.E. of Seville.

CONSTANTINA, in *Ancient Geography*, a town of Phœnicia.—A town of Asia, in Melopotamia.

CONSTANTINE I., FLAVIUS VALERIUS CONSTANTINUS, in *Biography*, the first Christian emperor, and surnamed the GREAT, was son of Constantius Chlorus by Helena. The celebrity to which this prince attained, has rendered posterity attentive to the most minute circumstances of his life and actions. The place of his birth, and the condition of his mother, have been subjects of warm, not to say violent, disputes. According to Mr. Gibbon, Helena was the daughter of an inn-keeper, and Naiffus in Dacia was the birth place of her son, the subject of this article, about the year 274. In his youth he discovered little inclination to improve his mind by the acquisition of knowledge; but the comeliness of his figure, the dexterity which he exhibited in all manly exercises, and his known courage and affability, rendered him a favourite with the army and the people. He was about eighteen years of age when his father was promoted to the rank of Cæsar: this event was attended with his mother's divorce, in order to make way for the second wife of Constantius, who could boast of an alliance with the imperial race. By this act the noble-minded Constantine was reduced to a state of disgrace and humiliation. Indignant, probably, at the base conduct of his father, he remained in the service of Dioclesian, and signaling himself in the wars of Egypt and Persia, he was raised to the rank of tribune of the first order. The popularity of this young man rendered him an object of jealousy to Galerius, through whose interest he had already been denied the rank of Cæsar. Endangered by the power and wiles of his opponent, and being sent for by Constantius, his father, whose health was daily declining, he secretly left Nicomedia, where he then was, and travelled with all expedition to Boulogne, and embarked with Constantius for Britain. The expedition was prosperous, and they easily obtained a victory over the Caledonians; but it was the last exploit of Constantius. He died at York, in the year 306, within little more than a year after he had received the title of Augustus. His death was immediately succeeded by the elevation of Constantine, who was proclaimed emperor by the army. The throne was the object of his ambition; and he knew too well the character of Galerius, the colleague of his late father, to hesitate as to the part he must take in this crisis. He was satisfied that if he wished to live, he must resolve to reign. At first he affected to resist the choice of his people, and wrote a respectful letter to the emperor of the East, acquainting him with the event. The earliest emotions of Galerius were those of surprise, disappointment, and rage: he threatened to commit to the flames the letter, and him that brought it. Upon farther deliberation, he resolved not to contest his succession to the sovereignty of the provinces beyond the Alps, but conferred on him the title of Cæsar, reserving that of Augustus to his favourite Severus. Constantine, who already possessed the substance, expected without impatience an opportunity of obtaining the honours, of supreme power; and accordingly employed himself some years in governing and securing the dominions fallen to his share. In defending his own rights, he was often betrayed into acts of cruelty, unworthy of a great mind. Contending with the Franks, he took two of their kings, whom he barbarously exposed to wild beasts in the amphitheatre of Trèves: in some instances where he was victorious, he spared neither sex nor age; exhibiting a ferocity that seems ill to accord with the general tenor of his character, to which he was probably

probably prompted by the supposition, that upon a barbarous foe all kinds of barbarity were allowable. In 307 he married Fausta, daughter of Maximian, who had resumed the purple; but he took no part in the fortunes of his father-in-law, who was ever engaged in warfare, till he became himself Constantine's open enemy, and endeavoured to dispossess him of his rightful authority. Under these circumstances he was delivered into the hands of his son-in-law, who slewed him no other favour than that of allowing him the choice of the manner in which he would die: Maximian strangled himself in the year 310.

Shortly after this event, which was little creditable to the feelings of Constantine, or to the filial piety of Fausta, who took no means to soften the resentment of her husband, a civil war broke out. Maxentius, who had reigned in conjunction with Constantine, now laid claim to the monarchy of the whole West, and made preparations for an invasion of Gaul. Constantine relying as well on his own talents, as on the hatred borne to his rival, resolved to anticipate the attack, and to carry the war into the heart of Italy. The armies of Maxentius, amounted to one hundred and seventy thousand foot, and eighteen thousand horse. The wealth of Italy supplied the expenses of the war, and the adjacent provinces were exhausted to form magazines of corn and other kinds of provisions. The whole force of Constantine consisted of ninety thousand foot, and eight thousand horse; a large part of which was necessary to the defence of his other dominions. At the head of forty thousand soldiers, he marched to encounter an enemy, whose numbers were at least four times superior to his own. Constantine had been trained from his earliest youth to war, to action, and to military command, and his troops were in the highest state of discipline: these he disposed with consummate skill, and for himself he chose the post of honour and danger. Distinguished by the splendor of his arms, he charged, in person, the cavalry of his rival, and his irresistible attack determined the fortune of the day. The victory was complete, and the dismayed followers of Maxentius rushed by thousands into the Tyber. The emperor himself attempted to escape back into the city over the Miltivan bridge, but the crowds which pressed together through that narrow passage, forced him into the river, where he was immediately drowned by the weight of his armour. His body which had sunk deep into the mud, was found the next day; and the sight of his head, when it was exposed to the eyes of the people, convinced them of their deliverance, and led them to acknowledge as their sovereign Constantine, who thus attested by his valour and high talents the most splendid enterprize of his life. It was previous to this battle, A. D. 312., that historians assign the date of Constantine's conversion to Christianity, who had never before discovered religious principles of any kind. A splendid miracle is mentioned as the immediate instrument of this change. Dr. Lardner, indeed, offers some reasons why Constantine could not well have remained through life without some religious impressions; he is however willing to follow the account of Eusebius, who says, that about the period of the war with Maxentius, the emperor was led to consider that he stood in need of more powerful assistance than military forces; he therefore fought for a God that should be his helper. The historian goes on to say, that in part of his march, as the day was declining, there appeared to the sight of Constantine, and to that of all his army, a luminous cross above the sun, with the inscription *crux vinca*, by this conquer; that the monarch not comprehending the meaning of this sign was farther instructed, in the following night by a vision of Christ himself, bearing his cross, and directing him to take a similar standard, under which he should march to victory. In the morning Con-

stantine communicated this wonderful circumstance to his friends; and sending for ingenious workmen, he gave them a description of the sign, and saw them make one like it in gold and precious stones; which, says Eusebius, "we have seen." Much has been said respecting this surprising phenomenon. By some the whole is regarded as a fiction, a stratagem and political device of Constantine, yet it is related by Eusebius a grave historian, who declares that he had it from the emperor, who confirmed the narration by an oath. By Fabricius, we are told, that the appearance in the heavens was generally looked upon as a reality, and a miracle: but for his own part, he is inclined to consider it as the result of a natural phenomenon in a solar halo; he accordingly admits of the reality of the phenomenon, but does not suppose it to be properly miraculous. Upon a full and candid review of the evidence, Dr. Lardner, whom we have before quoted, and than whom no one was a better judge of human testimony, seems inclined to doubt the relation given by the emperor, upon whose sole credit the story is recorded, though it was twenty years after the event, when Eusebius wrote his account, during which period he must have heard it frequently from eye-witnesses, if the emperor's relation were accurate that the appearance was visible to his whole army as well as to himself. The oath of Constantine, on the occasion, with Dr. Lardner, brings the fact into suspicion, and another striking circumstance is that Eusebius does not mention the place where this wonderful sight appeared. Without, however, entering, at present, farther into the discussion, which we shall refer to the article Cross; we may observe, that Eusebius has led us to the period, when the sign of the cross began to be made use of by Constantine, among his armies, and at his battles; this was probably the day before the last battle with Maxentius, fought on the 27th of October, 312. About this period, it is admitted, that Constantine became a Christian, and continued to the remainder of his life, taking care also to have his children educated in the same principles. His conversion seems to have been partly owing to his own reflections on the state of things, partly to conversation and discourse with Christians, with whom, the son of Constantine, their friend and favourer, must have been some time acquainted, but perhaps, chiefly to the serious impressions of his early years, which being once made can never be wholly obliterated. Constantine was however a politician as well as a Christian, and he probably hit upon this method to reconcile the minds of his army, to the important change in their religious profession and habits, as well as making use of it as a mean of success in his designs against his enemies, for which purpose he rightly judged, that the standard of the cross, and the mark of it as a device on his soldier's shields, would be of no small service.

We must now return to Constantine in the character of a victorious general. After the battle, he entered the capital in triumph, wholly destroyed the family of his rival, but refused to include among the victims, many whom the Romans would gladly have sacrificed to their abhorrence of the late tyranny. He disbanded and dispersed the pretorian guards which had so often made and murdered emperors: he recalled many who had been banished, and resorted to them their estates: he discouraged informers, and promoted the welfare of the city. The senate immediately passed a decree, conferring on him the first rank among the three Augusti, who then were masters of the world: Licinius and Maximin were the other two. Africa readily followed Italy in recognizing the sovereignty of the conqueror. To Licinius, with whom he had an interview, he gave his sister Constantia in marriage, in order to strengthen his own hands. From Milan, where the two emperors issued an

edict under their joint authority, allowing a general toleration in religious matters within their dominions, Constantine was called by an attempt of the Franks to cross the Rhine. Over these he gained a complete victory, and made many prisoners, whom, as in former instances, he exposed to wild beasts. In the mean time a civil war arose between Maximin and Licinius, which terminated in the destruction of the former, and the extirpation of his whole family.

Constantine and Licinius were now masters of the world, but they did not long continue united. A war broke out between them in the year 314, but the result of several battles was decidedly in favour of Constantine. Licinius sued for peace, which he obtained, and which continued eight years. In 323 another war was excited between the emperors. Licinius had long been hostile to the Christians, whose affections he had alienated, and who looked up to Constantine as their patron, and the head of their religion. Aware of this circumstance, and relying on his own superiority, as a military commander, Constantine began the quarrel. Under the banner of the cross, and accompanied by bishops and other ministers of their holy religion, he went out with 130,000 well-disciplined and well-accounted soldiers to meet his rival, who waited his arrival in the vicinity of Adrianople. Constantine was again victorious: Licinius fled to Byzantium, and when he found that place no longer tenable against the power of his enemy, he withdrew to Chaledon, and from thence, after hazarding another battle, in which he was also unsuccessful, to Nicomedia; where, by the intercession of his wife, he obtained a solemn promise of having his life spared, on the condition of his renouncing all claims to sovereignty. To the disgrace of Constantine imprisonment and death soon followed the humiliation of his rival. This deed has been justified on the plea that the fallen emperor had engaged in a treasonable correspondence against the reigning sovereign, but sufficient evidence of the fact was not adduced. The son of Licinius was also sacrificed to the jealousy of Constantine, who, by these atrocious means, delivered himself from all dread of opposition. An arbitrary prince seldom finds any difficulty in freeing himself from his enemies, but Constantine with all his powers, could neither foresee, nor prevent, those domestic calamities to which he shortly became the prey. Crispus, his son, by a former wife, was viewed, by his mother-in-law Fausta, as the chief obstacle to the future greatness of her own children. She insinuated into the breast of Constantine suspicions of his son's loyalty, and is said also to have brought a charge against him of having attempted her own chastity. Crispus was examined, imprisoned, and put to death in the year 326. His grandmother Helena, convinced of his innocence, resolved to be revenged for his hard fate, and found means of convicting the empress of an adulterous connection with a slave of the palace, for which she was suffocated in the steam of a hot bath. From these circumstances, and from the contempt which he shewed for the pagan rites, the emperor became unpopular with the people and the senate. On his part there was no personal attachment to the ancient metropolis, and he was resolved to perpetuate his name by the foundation of a new city. After much deliberation he fixed on Byzantium, which he had once besieged, as the imperial city that should, with future ages, give him celebrity and renown. See CONSTANTINOPLE.

In the year 331 Constantine was involved in a war with the Goths, who at first were successful against his power, but were, at length, defeated and compelled to agree to such terms as the victor thought proper to propose. Constantine, by chastising the pride of the Goths, and by accepting the

homage of a suppliant nation, vindicated the majesty of the Roman empire; and ambassadors from Ethiopia, Persia, and the most remote countries of India, came to congratulate him on the peace and prosperity of his government; and he seems to have enjoyed as uninterrupted a share of felicity, as a man situated as he was could reasonably expect. He attained to the thirtieth year of his reign, a period which none of his predecessors, since Augustus, had been permitted to celebrate. Constantine survived that solemn festival about ten months, and, at the age of sixty-four, after a short illness, he ended his memorable life at a palace in the suburbs of Nicomedia, whither he had retired for the benefit of the air, and with the hope of recruiting his exhausted strength by the use of the warm bath. The demonstrations of grief, or at least of mourning, surpassed whatever had been practised on any former occasion. The body of the deceased emperor was transported to the city which was destined to preserve the name and memory of its founder: there it was adorned with the symbols of greatness, and deposited on a golden bed in one of the apartments of the palace, which was splendidly illuminated and furnished for the purpose. Every day, at the appointed hours, the officers of state, approaching the person of their sovereign, offered the same respectful homage to his dead body as they had been accustomed to present to him during his life, so that it has been said Constantine alone, by the peculiar indulgence of heaven, reigned after his death.

It remains now to give a general estimate of the character of this great man, who was unquestionably the most splendid among the Roman emperors. It is no wonder that a prince who removed the seat of empire, and introduced such important changes into the civil and religious constitution of his country, should have fixed the attention, and divided the opinions of mankind. By certain classes of Christians he has been regarded as the deliverer and defender of the church, and has been decorated with every attribute of a hero, and even of a saint: by others he has been considered as the real, though without any ill intentions on his part, enemy to the cause of true Christianity, by incorporating it with the civil government of the world: by contemporary historians who did not embrace the religion of Christ, Constantine was compared to the most abhorred of those tyrants, who, by their vices and weakness, dishonoured the imperial purple.

Constantine was, in person, remarkably tall, of a comely and majestic presence, and great bodily strength. The general tenor of his life proves that he was a person of no mean capacity: the achievements and success of Constantine do not belong to men of weak and irresolute minds. His mind indeed was equal to his fortune, great as it was: his valour was tried and approved frequently in his youth, and was conspicuous on all proper occasions throughout his whole life: his chivalry, justice, and prudence, are commended by those of his biographers, who, on account of a difference in religion, were not disposed to flatter him: his many acts of bounty to the poor, and his just edicts are arguments of a merciful disposition, and a love of justice. According to Eusebius the palace of Constantine was converted into a church; and the emperor himself cheerfully led the way to those that assembled there with him. Taking the sacred books into his own hands, he attentively read and meditated upon the divine oracles; and then recited the usual prayers with those who were met together. Constantine besides prayed daily in private in his closet. In time of war he had a chapel at a small distance from his camp for the performance of religious duties, especially before battle, seeking thereby the divine protection and blessing. He
taught

taught even his heathen soldiers a form of prayer, in which they worshipped the one true God. These and many other instances of the Christian temper are ascribed to the emperor by Eusebius. By our own historian, the early part of his life is highly pauperized: "He delighted," says Mr. Gibbon, "in the social intercourse of familiar conversation; and though he might sometimes indulge his disposition to rally with less reserve than was required by the severe dignity of his station, the courtesy and liberality of his manners gained the hearts of all who approached him. The disadvantage of an illiterate education had not prevented him from forming a just estimate of the value of learning; and the arts and sciences derived some encouragement from the munificent protection of Constantine. In the dispatch of business, his diligence was indefatigable; and the active powers of his mind were almost continually exercised in reading, writing, or meditating: in giving audience to ambassadors, and in examining the complaints of his subjects. Even those who censured the propriety of his measures were compelled to acknowledge, that he possessed magnanimity to conceive, and patience to execute, the most arduous designs, without being checked either by the prejudices of education, or by the clamours of the multitude. In the field, he infused his own intrepid spirit into the troops, whom he conducted with the talents of a consummate general; and to his abilities, rather than to his fortune, we may ascribe the signal victories which he obtained over the foreign and domestic foes of the republic. He loved glory, as the reward, perhaps as the motive, of his labours. The boundless ambition, which, from the moment of his accepting the purple at York, appears as the ruling passion of his soul, may be justified by the dangers of his own situation, by the character of his rivals, by the consciousness of superior merit, and by the prospect that his success would enable him to restore peace and order to the distracted empire." As he advanced in life, his character was less respectable, his actions less honourable. The ostentatious grandeur of his court, and his magnificent buildings, were supported by taxes which bore very heavily on the people, and in his old age he was charged with prodigality and rapacity. Eutropius says, that Constantine, "in the early parts of his reign, might be compared to the best princes, in its conclusion to the indifferent ones." And Dr. Lardner, who took great pains to understand and appreciate the worth of this emperor, observes, with his usual candour, that "we should be willing to make allowances in favour of princes, and especially of long reigns. It is next to impossible for human wisdom and discretion, in the course of many years filled with action, not to be surprised into some injustice, through the bias of affection, or the specious suggestions of artful and designing people. Though, therefore, there may have been some transactions in this reign which cannot be easily justified, and others that must be condemned, yet we are not to consider Constantine as a cruel prince or a bad man." Gibbon, Lardner, Jortin, Univer. Hist.

CONSTANTINE II., the eldest of the three sons of Constantine the Great, was born in the year 316, and, by the indulgence of his father, was admitted at a very tender age to share the administration of the empire. He and his brothers may be said to have studied the art of reigning at the expence of the people entrusted to their care. During his father's life-time, the younger Constantine was appointed to hold his court in Gaul; and upon his death in 337, he succeeded to the government of Gaul, Spain, and Britain; to him also was assigned the city of Constantinople, with a certain superiority of rank above his brothers. During his short

reign, he did little that has been deemed worthy of historical record. Dissatisfied with the share of empire allotted to him, he was desirous of possessing the provinces of Africa, which had been given to Constantine. His intentions were in vain: determining, therefore, to wield by force, what he could not obtain by argument, at the head of a tumultuary band, he invaded the dominions of Constantine, and laid waste many parts of the country. The measures of his brother were directed with more prudence; and Constantine, by too great eagerness, was betrayed into an ambushade, which had been concealed in a wood, where he and his attendants were surrounded and slain, A. D. 340. His body was afterwards found in the obscure stream of Alfa, and obtained a place in the imperial sepulchre; but his provinces transferred their allegiance to the conqueror. Contemporary historians speak of Constantine as a prince of great accomplishments; but his conduct towards his brother met with a punishment which neither merited nor obtained the pity of survivors.

CONSTANTINE III., the next emperor of this name, was the son of Heraclius by Eudoxia, and succeeded his father in 641. Of him more cannot be well said than that he reigned three months, and died in his 30th year, either by disease, or by poison, supposed to have been administered by his mother-in-law.

CONSTANTINE IV. succeeded his father, Constantine II., in the year 668. Very soon after he came to the throne, he went to Sicily, with a view of punishing his father's murderers, and to depose the usurper whom they had established. His enterprize was successful: but upon his return to Constantinople, he was scarcely recognized, on account of the alteration in his beard; hence he obtained the appellation of the *bearded*. In this reign the Saracens invaded Africa, Sicily, and Cilicia, and at length laid siege to Constantinople. Their attempts were completely baffled, and their loss in men was very considerable. The emperor, however, became tributary to the Bulgarians, who successfully invaded some of his territories. This prince, who died in the year 685, appears to have possessed a small share of talent, intermixed with cunning and cruelty. On his two brothers he had bestowed the empty title of Augustus, unconnected with trust or power. At their secret instigation, the troops of the Anatolian province approached the city on the Asiatic side, demanding for their royal brothers the partition or exercise of sovereignty, and supported their claims by a theological argument. "We are Christians," they said, "the sincere votaries of the holy and undivided Trinity: since there are three equal persons in heaven, there should be three equal persons on earth." The emperor invited them to a friendly conference, in which they might propose their arguments to the senate: they obeyed the summons; but the view of their bodies, hanging on the gibbet in the suburb of Galatea, reconciled their companions to the unity of the reign of Constantine. He pardoned his brothers; but on the repetition or suspicion of a similar offence, the obnoxious princes were deprived of their titles and noses, that the deformity might disqualify them from the empire. In the close of life, Constantine was anxious to establish the right of primogeniture; and the eldest son was exalted to the rank of Augustus, and the assurance of the empire.

CONSTANTINE V., son of the emperor Leo, was born in 719, and crowned in his infancy. He was surnamed *Copronymus*, from having polluted the baptismal font. During a long reign of 34 years, he ever exhibited an abhorrence of image-worship, which rendered him an object of hatred to the catholics, who have used every means in their power to transmit his name to posterity in the most disgusting light.

light. Although he did not merit all the opprobria affixed to his character by ecclesiastical bigots, yet he undoubtedly exercised much cruelty towards the party which resisted his attempts for reform in the church. Some were put to death, others mutilated, and not a few underwent less severe punishments. As a general, he exhibited much prudence and courage. Soon after his accession he marched against the Saracens, who had made an irruption into Asia; and his brother-in-law, taking advantage of his absence, placed himself at the head of the orthodox faction, and was declared emperor. A civil war ensued, in which Constantine was victorious: the metropolis surrendered to its lawful sovereign, and the usurper and his son were deprived of their ill-gotten power, and of their eyes. When every thing at home was settled to his satisfaction, he made war again upon the Saracens, took their strong places, and destroyed their fleet. In the midst of his successes, an earthquake, and a pestilence among his own people, were calamities which excited in him the greatest consternation. After this he was attacked by the Bulgarians, by whom he was so completely defeated, that he was obliged to seek refuge in his capital: but in another attack, victory determined for Constantine, who cut off the invaders, with scarcely any loss. As he was proceeding on a new expedition against the same people, he was seized with a fever, which terminated his life in 775. To the praise of this prince, his enemies admit that he restored the ancient aqueduct, a work of great importance to the inhabitants of Constantinople. He redeemed nearly three thousand captives: and under his reign, plenty was the characteristic of the times. Moreri. Gibbon. Univer. Hist.

CONSTANTINE VI., grandson of the preceding, was born in 770; and when only five years of age, he was associated with his father, Leo IV., in the government: but neither then, nor in 780, when he succeeded entirely to the throne, was he capable of efficient business. His mother Irene was appointed guardian to the young emperor: she, naturally ambitious, and impatient of control, was unwilling to resign the power out of her own hands. The contents between the mother and her son were the most prominent features of this reign. During the childish years of the emperor, nothing could be better administered than the government under Irene: but when he had attained the years of maturity, by the advice of his adherents, he would fain have rewarded his mother's services by perpetual banishment to the isle of Sicily. Irene was too politic to be thus served: she retaliated upon her enemies, and obtained for herself almost an unlimited obedience. Her abuse of victory proved detrimental to her interests: Constantine ascended the throne sole sovereign, and his mother was dismissed to a life of solitude, to the enjoyment of which her mind was by no means adapted. She was recalled to court, and soon obtained a certain degree of authority. The emperor was attacked and defeated by the Bulgarians; and suspecting an insurrection in favour of Nicephorus, son of Constantine V. by a second marriage, he had him seized and his eyes put out, and the tongues of his four brothers were amputated. After this cruel punishment, they were doomed to perpetual imprisonment. For five years they submitted to their fate: an opportunity then offered, and they made their escape to the church of St. Sophia, displaying a pathetic spectacle to the people. "Countrymen and Christians," exclaimed Nicephorus for himself and mute brethren, "behold the sons of your emperor, if you can recognize our features in this miserable state. A life, an imperfect life, is all that is spared: this is now threatened, and we appeal to your compassion." Their wretchedness affected the people, but the minister of

Constantine contrived to soothe their miseries, and draw them from public view. They were speedily embarked for Greece, and Athens allotted to them as a place of exile. Once more they escaped from the hands of their keepers, and appeared in purple at the gates of Constantinople. This was their last effort: in attempting to gain a crown, they lost their lives. Irene soon found an opportunity of exciting discontents, with a view of deposing her son. Suspecting his danger, he attempted to escape to the provinces, but was seized on the Asiatic shores, and carried prisoner to his own palace, where, in the very chamber in which he was born, the emissaries of his unnatural and infamous mother assaulted him in his sleep, and plunged their daggers in his eyes. In this state he survived many years, to reflect on his own cruelty, and to learn the usurpations of Irene.

CONSTANTINE VII. was son of the emperor Leo VI., and nephew to Alexander, whom he succeeded in 912, being but seven years of age. During his minority, Romanus Lecapenus, a successful general, got possession of the emperor's person, and persuaded him to marry his daughter. He then assumed the royal purple himself, and associated his own three sons in the imperial authority, degrading the lawful emperor to the fifth rank among the titular princes. Much, however, to the honour of Romanus, he permitted him to live unmolested; and the time of Constantine was spent in the study and practice of the fine arts. The fall of Romanus was occasioned by the ambition of his own children, who effected the banishment of their father, and, contrary to their own expectations, elevated Constantine to his rightful throne. To prevent their future intrigues, the emperor's first act was to seize the conspirators, and banish them to the same island and monastery in which they had so lately confined their father. Romanus met them on the beach with a sarcastic smile, and, after a just reproach of their folly, ingratitude, and weakness, presented his imperial colleagues with an equal share of his water and vegetable diet. Constantine was now in possession of the eastern world, which he governed, or appeared to govern, fifteen years. He was, however, devoid of that energy of character which became the sovereign of so mighty an empire. The studies which had amused his life of comparative solitude, were not easily exchanged for the serious and important duties of a monarch. The reins of government he entrusted to his wife Helena, while he employed much of his time in the instruction of his son Romanus, and in drawing up a treatise for his immediate benefit, but of which he made no ill use, that he is suspected of having administered poison to his father, in order to succeed him in the empire. The death of Constantine was regretted by his subjects, who paid every demonstration of respect to his deceased corpse, which, according to usual custom, lay in state at the palace. Before the procession moved to the sepulchre, an herald proclaimed the awful admonition: "Arise, O King of the world, and obey the summons of the King of kings."—One of the deposed sons of Romanus had, during his short-lived authority, assumed the title of CONSTANTINE VIII.: of him therefore enough has been said;—and we proceed to the reign of CONSTANTINE IX., who, in conjunction with his brother, Basil II., succeeded to the throne, on the death of John Zimisces, in the year 976. During the long life of Basil, Constantine had only the name of emperor: all emanated from his brother. After his decease, Constantine enjoyed, about three years, the power, or rather the pleasures, of royalty; and his chief care was the settlement of the succession. He had possessed, sixty-six years, the title of Augustus; and the reign of the two brothers is the

longest and most obscure of the Byzantine history. He ended his inglorious life in 1028, at the age of seventy.

CONSTANTINE X. was surnamed *Monomachus*, the single combatant, which was probably expressive of his valour and victory in some public or private quarrel. He was a Greek of noble extraction, and recalled from exile in Lesbos to succeed Michael V. He was at that time married to Zoe, the daughter of Constantine IX. With her, who had already been wife to two emperors, he was dissatisfied, and took, as concubine, a widow, to whom he gave the title of Augusta. This reign was disturbed by various revolts, in which the emperor was usually victorious. He was successful also against his foreign enemies; but his indolence or avarice gave the Turks an opportunity of gaining a footing in Asia Minor. He died in 1054. The health of this emperor had, during the greater part of his life, been broken by the tortures of the gout, and his reign was spent in the alternatives of sickness and pleasure.

CONSTANTINE XI. surnamed *Ducas*, was chosen by the emperor Isaac Comnenus, as the fittest person to succeed him, when he voluntarily laid down the crown in 1059. The beginning of his reign was affected by a conspiracy of his own people against him. Having quelled this, he began to turn his attention to government, for which he seems to have been very unequal. By the principles of avarice, he neglected the maintenance of his garrisons on the frontiers, and the Uxiens, a people of Scythia, taking advantage of this circumstance, passed the Danube, and laid waste the country. They penetrated into Greece, and defeated the imperial generals, who had been sent against them. Constantine would have gladly purchased peace, on any terms; they, however, disdain to treat, and were finally stopped in their victorious career, by pestilence, and the arms of the Bulgarians, circumstances which destroyed the greater part of the number, that in the outset amounted to nearly half a million of souls. During this reign an earthquake did much damage to the empire. Constantine died at the age of 60 years, having previously secured the succession of his three sons. Of these one assumed the title of CONSTANTINE XII.; but his glory was merely nominal, and lost in that of his elder brother Michael. Of the eleventh CONSTANTINE, historians say he was an orthodox and just prince, but the slave of avarice. The XIIIth prince of this name was son of the emperor Manuel Palaeologus, and succeeded his brother John in 1448, at a period when the whole empire scarcely extended beyond the limits of the capital. This sovereign having squandered the small remaining resources of his dominion in imperial ostentation, found himself threatened with the hostility of his potent neighbour, sultan Mahomet II., who erected a fortress on the Bosphorus, found occasion for a quarrel, and laid siege to the capital. Constantine determined to resist to the last, and to share the fate of his people. He sought for succour among the Christian princes of the West, but the aid he obtained was tardy, and insufficient to the greatness of the occasion. Constantinople was encompassed by Turkish arms, and the emperor, in this extremity, fulfilled the part of a hero. When the final assault was prepared, he took leave of his people in a moving harangue, received the sacrament in the church of St. Sophia, and then went to the walls. The numbers of the Turks without, exceeded those of the Christians within, the city, more than a hundred fold. Every hope of successful resistance was vanished; breaches had been made in the walls, and at length they and the towers were covered with swarms of the assailants. Amidst these multitudes, the emperor, who nobly accomplished all the duties of a general, and soldier, was long seen, and finally lost; his mournful exclamation

was heard, "Cannot there be found a Christian to cut off my head?" His last fear was that of falling alive into the hands of the infidels. He had thrown off the purple, and falling by an unknown hand, was buried under a mountain of slain. The final catastrophe of the Greek empire, and emperor, happened May 29th, 1453, Constantinople having sustained a siege of 58 days. See CONSTANTINOPLE. Moreri. Gibbon. Univer. Hist.

CONSTANTINE, FLAVIUS JULIUS, from a private soldier, in the legions of Britain, was raised to imperial honours, on account of his name, and in respect for the great Constantine. He had no sooner attained the high honour, than he passed over to Gaul with his troops, and made himself master of that country. With the assistance of his son Constantus, he reduced Spain; and upon Constantus he conferred the title of Augustus. Constantine fixed his throne at Aries, and when the Goths under Alaric had taken possession of Italy, he marched as far as the Po, on the pretence of effecting its deliverance, but probably with a view of sharing in the spoil. After passing through various scenes, in which he experienced by turns success and disaster, Constantine was besieged in his capital by Constantius, to whom he surrendered, on the promise of security for himself and his son. The terms were granted, but the engagement was not fulfilled. The fallen prince was sent to Italy, where he and his son Julian, in violation of a solemn promise, suffered death by the emperor's orders, Sept. the 18th, 411. Moreri. Gibbon.

CONSTANTINE: there were two popes of this name: the one a native of Syria, raised to the Roman see in 708, characterized for his charity to the poor; and for his ambition, in engaging Justinian to subjugate the independent see of Ravenna to the yoke of Rome; the other, from a layman, was raised to the highest office in the church by the influence of his brother; an honour, however, that he did not long retain. An insurrection being excited against him, in about a year after his elevation, he was deposed, and, under the reign of the new pope, was subject to the insults and most cruel treatment of the people, deprived of his sight, and condemned to perpetual imprisonment. Moreri.

CONSTANTINE is the name likewise of an abbot who flourished at Metz in the eleventh century, and who was author of "The Life of Adalberon II." bishop of that city; and of a monk distinguished for his writings in the thirteenth century, against Veccus, patriarch of Constantinople. Another of the same name was born at Florence, and became bishop of Orvieto. He acquired celebrity by his preaching talents, and after his elevation to the bishopric, he was appointed legate from pope Alexander IV. to Theodore Lascaris, the Grecian emperor, hoping, by his persuasion, to induce the emperor and his clergy to submit to the Roman see. He was author of the life of St. Dominic, and other works. He died in the year 1257.

CONSTANTINE, surnamed the *African*, was born at Carthage, about the middle of the eleventh century. He resided many years in Babylon, where he became celebrated for his knowledge in the Arabian, Chaldean, Persian, and Egyptian languages. Among the sciences, medicine seems to have received the greatest share of his attention, as appears by two of his works, which were thought deserving of being printed several centuries after his death. In the first, which was published at Bale, in the year 1536. in folio, "De morborum cognitione, et curatione," libri septem, he treats of affections of the stomach, hypochondriasis, on the diseases of women, &c. In the second, which was also published at Bale, three years after the former, he treats of fevers, of the elephantiasis, of incantations, and of remedies taken

taken from parts of animals. The whole are however supposed to have been principally translated from Arabian writers. After a residence of thirty nine years at Babylon, he returned to Carthage, but soon fell into such disgrace with his countrymen, whom he suspected of intending to destroy him, that he went to Salerno. Though he was there introduced to duke Robert, who wished to retain him about his person, preferring a life of ease and retirement, he entered into a monastery of the Benedictines, St. Agatha, in Aversa, where he died in 1087. Haller Bib. Med. Eloy Dict. Hist.

CONSTANTINE, ROBERT, a native of Caen in Normandy, was born, as it is said, about the year 1502. He was profoundly versed in Greek, Latin, and oriental literature. This procured him the intimacy of J. Cæsar Scaliger (with whom he resided several years), and of other great scholars, but did not defend him against the sarcasms of Joseph Scaliger, who attacked him with great ferocity. He took his degree of doctor in medicine, but from the many learned works he published, does not seem to have dedicated much of his time to the practice of that art. His editions, with annotations, of the works of Theophrastus, Dioscorides, Celsus, and Quintus Serenus, gained him much credit. They were published between the years 1554 and 1566, as was also his "Nomenclator insignium Scriptorum, quorum libri extant vel manuscripti, vel impressi," Svo. But the work which established his name as a scholar, was his "Lexicon Græco-Latinum," first published at Geneva, in 1562, in two volumes folio; reprinted, much improved, in 1592. He is said by De Thou to have lived to the great age of 103 years, preserving his faculties entire to the last. Other writers say he died of a pleurisy at the age of 75 years. Haller. Bib. Bot. Eloy Dict. Hist.

CONSTANTINE, ANTONY, an eminent physician at Lyons, published in 1597, in Svo. "Brief traité de la Pharmacie Provençale, et familière," in which he attempts to shew his countrymen, that they may find in their fields remedies for their diseases, without having recourse to drugs imported from foreign countries. Also "Opus Medicæ prognosæ, in quo omnium symptomatum, causæ et eventus exponuntur." Svo. 1613. He died, far advanced in years, in 1616. Eloy Dict. Hist.

CONSTANTINE, *Order of, in Heraldry*, otherwise the order of the Golden Angel and St. George. Constantine the Great is by some considered as the founder of this order, after his memorable victory over the tyrant Maxentius, A. C. 312. This is at present the second order of the kingdom of Naples. Others affirm that the emperor Isaac Angelus Comnenus was the founder of it. The badge of the order is a red cross, somewhat in the form of four fleurs-de-lis joined at the extremities, surrounded with a border of gold, thereon embroidered the four letters I. H. S. V.; meaning, "In hoc signo vinces," being the words displayed on the celestial meteor, or luminous cross, which is said to have appeared to Constantine, and encouraged him to attack Maxentius. In the centre of the badge is a monogram, or cypher of our Saviour's name, expressed by the letters X and P, and on each side are placed one of the letters A and Ω (alpha and omega, or the first and the last letters of the Greek alphabet.)

The great collar of this order, worn over the mantle, consists of fifteen enamelled golden shields of an oval form, and on each the letters X and P appear in the form of a cypher. The middle shield is somewhat larger than the others, and is surrounded with oak and laurel leaves entwined; and from the lower part of it is suspended the effigy of St.

George, in complete armour, on horseback, and in the act of striking the dragon.

The council of this order is composed of 50 ferators, who are grand crosses. When the grand master assists in state therein, his dress is as follows: the vest and small cloaths are of imperial scarlet, as also the stockings and shoes; above the vest is worn a cassock of silver, richly embroidered, with wide sleeves, and reaching to the knees, fastened round the waist with a girdle of scarlet velvet, embroidered with silver, and about the neck with two rich cords of gold and scarlet silk mixed, with tassels reaching to the ground. On the left side of the mantle, the crests of the order is richly embroidered in gold. The cap is of crimson velvet, and is one span high, lined with white satin, and adorned with a black ostrich feather. The four sides are turned up, and on each the cypher of our Saviour, as above described.

The grand crosses (in number 50) wear a blue vest and small cloaths, and over the same a white vest, which reaches to the knees; their stockings and shoes are white; their girdle red, and their mantle of blue damask is lined with white; they wear the great collar of the order, and their cap, which is of blue satin, is turned up at the four sides, and on each the cypher as before: the cap is also adorned with a white ostrich feather.

The popes had conferred the grand mastership on the house of Comnenus for ever; but in 1699 Angelus Flavius Comnenus, the last of this house, resigned it to Francis Farnese, the then duke of Parma, to him and his successors for ever; which was confirmed by a brief of pope Innocent XII. dated 20th October, 1699. In 1735 the ducal house of Farnese becoming extinct in the male line by the death of Anthony the last duke, Don Carlos, the eldest son of Philip V. king of Spain, and of Elizabeth Farnese, the sole heirs of the family, succeeded to the duchies of Parma and Placentia, and to the grand mastership of this order. This prince was successively grand duke of Tuscany, and king of Naples: upon his succession to the latter he declared this order royal, and annexed it to the crown of Naples.

CONSTANTINOPLE, in *Geography*, the metropolis of the Turkish empire, was built on the site and ruins of the ancient *Byzantium* in Thrace, by the Roman emperor Constantine the Great, who, in the year of our Lord 330, removed the seat of the empire from Rome to this new capital. The reasons which induced Constantine to fix his residence here, are not exactly known. The imperial court had in fact been removed from Rome about thirty years before. Of the associate emperors Diocletian and Maximian, the former resided at Nicomedia, and the latter mostly at Milan. Galerius had his court at Nicomedia; Constantius Chlorus at York. It is supposed that Diocletian and Maximian, having concerted a plan of administration more systematically despotic than that of any of the preceding emperors, and being desirous of setting entirely aside the nominal authority which the senate still possessed, had fixed their residence at a distance from the ancient metropolis of the empire, in order to avoid the republican remonstrances of that august body. Constantine was probably actuated by the same motive, for his administration was still more despotic; and after he had removed the seat of empire to Constantinople, the senate could scarcely be reckoned a constituted order in the state. Others attribute Constantine's choice of a new capital to a dislike which he had conceived against Rome, on account of the enthusiastic attachment of that city to paganism. But whatever may have been Constantine's motive, it cannot be denied that the situation of Constantinople actually was preferable to that of Rome, both as
a check

a check to the Persians, and as a barrier against the Goths, those terrible enemies of Rome, who, having once tasted the rich plunder of Greece and Asia Minor, seized every opportunity of making predatory incursions into all parts of the empire. Besides, the beautiful and picturesque arrangement of the land and water in the environs of Constantinople decidedly entitled it to be preferred to Rome. It is situated on an elevated ground, consisting of gently swelling eminences, rising like terraces, one above another, without any of those deep valleys which separate the seven hills on which Rome is seated, and which, together with the marshes adjoining the Tyber, render the air unwholesome. It fills a triangle formed by the harbour, the Bosphorus and the Propontis, or sea of MARMORA. Situated in the 41st degree of latitude, the imperial city commanded, from her seven hills, the opposite shores of Europe and Asia; the climate was healthy and temperate, and the soil fertile, and the approach on the side of the continent was small in extent, and easy of defence. The harbour on the north side is secure and capacious; it is five hundred yards wide at its entrance from the Bosphorus, and runs seven miles into the land. The Bosphorus and the Hellespont may be considered as the two gates of Constantinople; and the prince who possessed those important passages could always shut them against a naval enemy, and open them to the fleets of commerce when those gates were shut. The capital still enjoyed within their spacious enclosure every production which could supply the wants, or gratify the luxury, of its numerous inhabitants. In sailing up the Propontis towards Constantinople the most enchanting prospects charm the eye of the navigator; from every part of that sea he may discover the high lands of either Thrace or Bithynia, and never loses sight of mount Olympus, till at last the city itself, rising from the Strand, attracts his view, and exhibits the most magnificent appearance. Constantinople also commands the commerce of the vast regions of the north, by means of the Euxine sea, and of the rivers Don and Dnieper, which discharge themselves into it. By the strait of the Hellespont, which forms the communication between the Propontis and the Mediterranean sea, it is equally well situated for the trade of the south and west; and when Egypt is under its dominion its position is extremely advantageous with respect to the trade to India, and the eastern coasts of Africa.

Whatever rude commodities were collected in the forests of Germany and Scythia, as far as the sources of the Tanais and Borythenes; whatsoever was manufactured by the skill of Europe or Asia; the corn of Egypt, and the gems and spices of the farthest India, were brought by the varying winds into the ports of Constantinople, which for many ages attracted the commerce of the ancient world.

The prospect of beauty, of safety, and of wealth, united in a single spot, was sufficient to justify the choice of Constantine. However, as prodigy and fable have, in every age, been supposed to reflect a becoming majesty on the origin of great cities, the emperor thought proper to avail himself of this circumstance; and in one of his laws he has taken care to inform posterity, that in obedience to the commands of God, he laid the everlasting foundation of Constantinople. The ingenuity of succeeding writers has led them to describe the nocturnal vision which appeared to the fancy of Constantine as he slept within the walls of Byzantium. The tutelary genius of the city, a venerable matron, sinking under the weight of years and infirmities, was suddenly transformed into a blooming maid, whom his own hands adorned with all the symbols of imperial great-

ness. The monarch awoke, interpreted the auspicious omen, and, without hesitation, obeyed the will of heaven. In order deeply to impress the minds of the spectators, the emperor himself, on foot, with a lance in his hand, led a solemn procession, and directed the line, which was traced as the boundary of the destined capital, till the growing circumference was observed with astonishment by the assistants, who, at length, ventured to observe that he had already exceeded the most ample measure of a great city. "I shall still advance," replied Constantine. "till He, the invisible guide who marches before me, thinks proper to stop." In surveying the actual state of the city, the palace and garden of the seraglio; occupy the eastern promontory, the first of the seven hills, and cover about 150 acres of our measure. The new walls of Constantine stretched from the port to the Propontis across the enlarged breadth of the triangle, at the distance of fifteen stadia from the ancient fortification; and with the city of Byzantium they enclosed five of the seven hills, which, to the eyes of those who approach Constantinople, appear to rise above each other in beautiful order. About a century after the death of the founder, the new buildings, extending on one side up the harbour, and on the other along the Propontis, already covered the narrow ridge of the sixth, and the broad summit of the seventh hill. The incessant inroads of the Barbarians rendered it necessary for Theodosius the younger to surround his capital with an adequate and permanent enclosure of walls. The new wall of Theodosius was constructed in the year 413; and after having been thrown down by an earthquake in 447, it was rebuilt in three months by the diligence of the prefect Cyrus. The suburb of the Blachernæ was first taken into the city in the reign of Heraclius. From the eastern promontory to the golden gate, the extreme length of Constantinople was about three Roman miles; the circumference measured between ten and eleven; and the surface might be computed as equal to about 2000 English acres. The suburbs of Pera and Galata, though situate beyond the harbour, may deserve to be considered as a part of the city; and this addition may perhaps authorize the measure of a Byzantine historian, who assigns sixteen Greek (about fourteen Roman) miles for the circumference of his native city. After all, Constantinople must yield to Babylon and Thebes, which filled the great but not incredible circumference of about 25 or 30 miles, to ancient Rome, to London, and even to Paris.

As to the expence incurred by the progress of the work, some estimate may be formed of it by the allowance of about two millions five hundred thousand pounds for the construction of the walls, the porticoes, and the aqueducts. The forests that overshadowed the shores of the Euxine, and the celebrated quarries of white marble, in the little island of Proconessus, supplied an inexhaustible stock of materials ready to be conveyed, by the convenience of a short water-carriage, to the harbour of Byzantium. A multitude of labourers and artificers urged the termination of the work with incessant toil; but the impatience of Constantine soon discovered that, in the decline of the arts, the skill, as well as the number of his architects, bore a very unequal proportion to the greatness of his design. However, the buildings of the new city were decorated by the hands of the most celebrated masters of the age of Pericles and Alexander. By the commands of the emperor, the cities of Greece and Asia were despoiled of their most valuable ornaments. The trophies of memorable wars, the objects of religious veneration, the most finished statues of the gods and heroes, of the sages and poets of ancient times, contributed to the splendid triumph of Constantinople; whence the historian Cedrenus took

occasion to observe, that nothing seemed wanting except the souls of the illustrious men, whom those admirable monuments were intended to represent. For an account of the principal buildings with which this imperial city was decorated, we must refer to the articles *FORUM*, *HIPPODROME*, &c. and the sequel of this article.

The baths of this city, which still retained the name of Zeuxippus, were enriched by the munificence of Constantine with lofty columns, various marbles, and above three-score statues of bronze. In short, whatever could adorn the dignity of a great capital, or contribute to the benefit or pleasure of its numerous inhabitants, was contained within the walls of Constantinople. A particular description, composed about a century after its foundation, enumerates a capitol or school of learning, a circus, two theatres, eight public, and 153 private baths, 52 porticoes, five granaries, eight aqueducts or reservoirs of water, four spacious halls for the meetings of the senate or courts of justice, 14 churches, 14 palaces, and 4388 houses, which, for their size and beauty, deserved to be distinguished from the multitude of Plebeian habitations. In order to furnish this favoured city with a population, corresponding to its extent and magnificence, Constantine invited many opulent senators of Rome, and of the eastern provinces, to fix upon his chosen residence for their own habitation; and he bestowed on his favourites the palaces which he had built in several quarters of the city, assigned them lands and pensions for the support of their dignity, and alienated the demesnes of Pontus and Asia, for the purpose of granting hereditary estates by the easy tenure of maintaining a house in the capital. By degrees, however, a variety of concurring circumstances contributed to fill the city with inhabitants. In less than a century, Constantinople disputed with Rome itself the pre-eminence of riches and numbers; and it became necessary to enlarge its extent by additional edifices, the foundations of which, on either side, were advanced into the sea, and which, of themselves, might have composed a very considerable city. The emperor also conferred, by way of additional allurements or encouragement to his plan of population, several privileges on the settlers at Constantinople. He divided the city into fourteen regions or quarters, dignified the public council with the appellation of senate, communicated to the citizens the privileges of Italy, and bestowed on the rising city the title of colony, the first and most favoured daughter of ancient Rome. The walls, porticoes, and principal edifices of this city, were completed, as some say, in a few years, or, according to others, in a few months; and the founder soon prepared to celebrate the dedication of his city, a ceremony which was attended with pompous games, and munificent largesses. As often as the birth day of the city returned, the statue of Constantine, framed by his order, of gilt wood, and bearing in its right hand a small image of the genius of the place, was enriched on a triumphal car. The guards, carrying white tapers, and clothed in their richest apparel, accompanied the solemn procession as it moved through the Hippodrome. When it was opposite to the throne of the reigning emperor, he rose from his seat, and with grateful reverence adored the memory of his predecessor. At the festival of dedication, an edict, engraved on a column of marble, bestowed the title of *SECOND*, or *NEW ROMAN*, on the city of Constantine. But the name of Constantinople has prevailed over that honourable epithet, and, after the revolution of fourteen centuries, still perpetuates the fame of its author.

It has been conjectured, that the removal of the imperial residence from Rome, contributed to hasten the downfall of the empire: but it is certain, that the fixing of it at Constan-

tinople, put a final period to the passage of the Barbarians, through the Bosphorus. They could never after force that insurmountable barrier, and Greece, as well as Asia Minor, felt secure from their ravages, until Valens unadvisedly suffered the Goths to pass the Danube, and received their armed bands into the heart of the empire.

Constantine the Great did not long enjoy his new residence. He died the 22d May, 337, and by his will divided his vast empire among his three sons, Constantius, Constant, and Constantine. Within three years after their father's death, Constant invaded the dominions of his brother Constantine, who, being drawn into an ambush and slain, left Constant in possession of two-thirds of the Roman empire. But Magnentius revolting soon after against Constant, surprised him hunting, and pursuing him in his flight, put him to death. Magnentius being in the next place defeated by Constantius, terminated his life by suicide; and thus, by the disastrous fate of his brothers, Constantius became sole emperor in 353; three and twenty years after the seat of the empire had been removed to Constantinople.

At the death of Constantius, which happened in the year 361, Julian, commonly called the Apostate, son of Julius Constantius, and nephew to Constantine the Great, assumed the imperial purple. He marched soon after against the Persians, and was so infatuated by his expectations of conquest, as to destroy the fleet of boats which he had upon the Tigris. Allured by spies who pretended to be deserters, he advanced far into an unknown country. His army found itself at last in the midst of sandy deserts, and felt the dreadful effects of famine. The guides suddenly disappeared, and the Persian monarch approaching, with the whole military force of his kingdom, want of provisions rendered a retreat necessary, in which the troops were continually harassed by the Persians, who carefully avoided any close engagement. In spite of the incessant attacks of the Persian cavalry, the Romans succeeded in gaining the banks of the Tigris, but for want of their boats they could not pass the river. Exhausted with fatigue, and perishing with hunger, they still repulsed the attack which the Persian king made on their camp. In the confusion of the battle, Julian received a mortal wound, of which he died in a few hours, on the 26th of June, 363.

This emperor had conceived the project of extirpating the Christian religion; and if he had appointed, or if the army had elected an emperor equally averse to Christianity, his death would not have dispelled the storm that was gathering over Christendom. Fortunately, Jovian, a Christian officer, was chosen emperor. Forced to conclude a disadvantageous peace with Persia, he purchased a safe retreat by the cession of Mesopotamia, and the strong cities of Nisibis and Singara.

Jovian dying in 364, soon after the conclusion of the peace with Persia, Valentinian, another Christian commander, was decorated with the imperial purple. He named his brother Valens his colleague in the empire, assigning him the eastern part, whilst he himself ruled the west. It was in this reign that the first step towards the subversion of the western empire took place. The Huns, a Tartar nation, being driven out of their own country, rushed like a torrent upon the Goths, on the north side of the Danube, who, seeing their possessions invaded, presented themselves in immense crowds on the banks of the river, and requested an asylum in the Roman dominions. They delivered up their children, at least those of rank, as hostages; but were unfortunately suffered to retain their arms. The number of Goths who passed the Danube on the occasion, was computed at about 200,000 armed men, with their wives and children

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children along with them. A second army of Goths, coming to the banks of the Danube with the same request, was refused: but they passed without leave, and being ill supplied with provisions, they joined their countrymen, and commenced a war against the empire. After various skirmishes, Valens, without writing for his nephew Gratian, who was on his march to join him, gave battle to the Goths, in the plains of Adrianople, A. D. 378, and was totally defeated. The loss on the side of the Romans was so great, that this defeat was considered as the most severe since the battle of Cannæ. Valens was never more seen. It is supposed that he was consumed in the flames of a cottage where he had taken refuge.

By the death of Valens, the empire fell into the hands of his nephew Gratian, who had some time before succeeded to Valentinian in the west. But at the end of the year 378, he declared Theodosius his partner in the empire, and committed the East to his care.

Theodosius was a native of Spain. In four years and a half he terminated the Gothic war. The Goths had lands assigned to them in the Roman provinces, and submitted to the Roman sceptre on condition of being governed by their own laws.

Theodosius was in every respect a second Constantine the Great. Like him he rendered the empire triumphant over all its enemies, extinguished intestine commotions, established Christianity upon a solid basis, and divided the empire between his two sons Arcadius and Honorius, assigning to the former the eastern, and to the latter the western part. From that period, the two monarchies, forming two separate and independent states, gradually became strangers to each other, and even regarded each other's prosperity with a jealous eye. Rome fell a prey to the Goths, whilst Constantinople appeared totally unconcerned at the event. Theodosius died at Milan, the 17th of January 395, in the sixteenth year of his reign, and the sixtieth of his age.

After the death of Theodosius, the history of Constantinople affords nothing remarkable, until the total destruction of the Roman empire in the west by the Goths. Towards that time Basiliscus usurped the Eastern empire. Assisted in his conspiracy by the empress Verina, his sister, he drove out Zeno, the lawful emperor, who fled into Isauria, whither he was pursued by Ius and Trecondes, two of the usurper's generals, and forced to shut himself up in a castle. But Basiliscus having lost his popularity by his cruelty, his generals joined Zeno and restored him to the throne. Basiliscus perished in a dungeon in the year 467. He had reigned about twenty months. During his usurpation, a dreadful fire happened at Constantinople; together with a considerable part of the city, it consumed the imperial library which is supposed to have contained 120,000 volumes.

Zeno had the good fortune to escape other conspiracies that were formed against him: but he was unsuccessful in the wars which he waged against the Ostrogoths, and purchased a short peace at the expence of the provinces of Lower Dacia and Mæsia. Theodoric, king of the Ostrogoths, soon renewed his irruptions into Thrace, and advanced within fifteen miles of Constantinople, which he was expected to besiege, when he suddenly turned his arms against Odoacer, king of Italy, whom he subdued. Theodoric himself was proclaimed king of Italy in his room, two years after the death of Zeno, which happened in 491.

The administration of Athanasius, Zeno's successor, was equally weak. Theodoric, however, reigned in Italy under the sanction of the imperial court of Constantinople, and still acknowledged himself a vassal of the eastern emperor.

But on his death the kingdom of Italy devolved upon his beautiful and accomplished daughter, Amalontha; and at her demise, which happened in the year 535, the Goths of Italy refused to acknowledge the paramount authority of the imperial court, and renounced all dependence on the empire. Justinian was then reigning at Constantinople. His uncle Justin, who ascended the throne in 518, after Athanasius, had named him his colleague in the year 527, and dying soon after, had left him sole master of the empire. He first turned his whole force against Chosroes, king of Persia, dispatched his general Belisarius against him, and after a severe defeat, forced him to sue for peace.

About this time, a great tumult happened at Constantinople. It began among the different factions in the circus. Hypatius, nephew to Athanasius, was proclaimed emperor. To crush this sedition, Justinian sacrificed two of his ministers who were most obnoxious to the people; but the multitude grew the more outrageous, and several senators having joined the rebels, the emperor felt so much alarmed that he thought of abandoning the city, and making his escape by sea. Encouraged, however, by his empress Theodora, he resolved to defend himself to the last with the few senators who had not yet abandoned him. In the mean time, Hypatius was carried in triumph to the circus, where he was beholding the sports from the imperial throne, among the acclamations of the populace, when Belisarius on his return from Persia entered the city with a considerable body of troops. He immediately marched to the circus, fell sword in hand upon the disarmed multitude, and took Hypatius the usurper, and Pompey, another of the nephews of Athanasius, prisoners. They were both beheaded, and their estates, as well as those of the senators who had joined them, confiscated.

Justinian now turned his arms against the Vandals in Africa, and the Goths in Italy. Belisarius entered Rome A. D. 536, where he was besieged by the Goths. His gallant defence, with only five thousand veterans, against a numerous army of Goths, commanded by Vitiges their king, during the space of a whole year, is deemed one of the most signal military exploits recorded in history. He made many successful sallies. In one single assault the Goths are reported to have lost 30,000 men. They were obliged to raise the siege on the arrival of fresh troops from Constantinople. At length the Gothic kingdom of Italy was completely subdued. Vitiges the king was sent to Constantinople. Justinian assigned him for maintenance a rich estate in Asia Minor, and on his conforming to the Athanasian creed, conferred upon him the rank of Patrician and Senator, which still continued as an honorary title in the empire. Gelimer, king of the Vandals, over whom Justinian also triumphed, had likewise an ample estate assigned to him, but could not enjoy any honorary title on account of his professing Arianism.

In the year 546, the Goths again revolted under the command of Totila, whom they had elected king. Belisarius a second time entered Italy, and retook Rome in 547, but at his recall it was again captured by the Goths. The command of the army of Italy was then conferred on Narses, an eunuch of great military skill and the most daring courage. This general defeated and slew Totila the Gothic king, and made himself master of Rome in 552. He likewise defeated and slew Teias, who had succeeded Totila as king of the Goths, and made a prodigious slaughter of the Franks and Allemanni, who invaded Italy soon after. Italy was then made a province of the eastern or Byzantine empire, and a government established under the denomination of the Exarchate, of which Narses was the first exarch.

By the conquest of Italy and Africa, Justinian gave to the eastern empire an aggrandizement which it had never before possessed. He displayed consummate political abilities, during a reign of thirty-eight years, and exhibited, during a life of eighty-three, a singular instance of long continued personal prosperity. He has left a noble monument of his legislative talents in his code of laws, and a no less noble one of his skill in architecture, in the magnificent cathedral of St. Sophia at Constantinople, now a Mahometan mosque. His reign is also the important era of the transplantation of the silk-worm from China to Constantinople. The brilliancy of Justinian's reign was however in some degree clouded by great calamities of a physical nature. Tremendous earthquakes happened almost every year throughout the whole extent of the empire. A dreadful pestilence spread from Pelusium in Egypt, over the greatest part of Asia, Africa, and Europe. During the space of three months, from five to ten thousand individuals died daily in Constantinople. Many cities in the East were almost depopulated, and in some parts of Italy, the harvest rotted on the ground. This contagion, which began in the fifteenth year of Justinian's reign, was not extinguished in less than fifty-two years.

Justinian died in the year 527. Soon after his death the Eastern empire began to decline. After the successive reigns of Justin II. and of Tiberius, which filled up the interval, from the death of Justinian to the accession of Maurice in 582, a spirit of revolt manifested itself in Constantinople, and terminated in the assassination of Maurice, and election of Phocas the centurion in 602. Phocas was in his turn deposed and put to death by Heraclius, A. D. 610, whose reign is remarkable for a most obstinate contest with Persia, to which country it proved finally fatal.

During a period of twelve years, from 610 to 622, the Eastern empire exhibited a scene of almost unexampled distress. From the Adriatic to the suburbs of Constantinople, the provinces were ravaged by the Chan of the Avars, who had subdued the Huns and resided in the royal village of Attila, in the great plain of Hungary; and a Persian army was encamped at Chalcodon, now Scutari, on the brink of the Bosphorus, directly opposite to Constantinople. The general consternation was so great that the emperor was about to leave the city, and transport himself with the treasures of the imperial palace to Carthage, when the patriarch of Constantinople led him to the altar of the church of St. Sophia, and made him take a solemn oath that he would live and die with his people. Heraclius having thus solemnly bound himself to the defence of his country, carried devastation to the very centre of the Persian dominions. He every where defeated the numerous forces of Chofroes, whose continual disasters excited a general revolt of the Persians. Chofroes was deposed A. D. 628, and Siroes his son proclaimed king. The latter put to death his father and eighteen brothers, and then concluded with Heraclius a treaty of peace, in consequence of which, the former boundaries of the Byzantine and Persian empires were restored.

The northern nations, which had overthrown the Roman empire in the West, were yet in an unsettled state, and Europe exhibited the most disgusting scene of barbarism and anarchy, whilst Constantinople was triumphing in the successful termination of a war, which had threatened the extinction of its empire. It was, however, soon to witness horrors similar to those with which the West had been familiarized for the space of two centuries.

About the year 609, Mahomet, an Arabian, assumed the character of a prophet, and assembling together a determined and daring band, in whom he excited military enthusiasm by means of religious tenets, calculated to flatter their passions,

he subdued one after another, all the Arabian tribes, and attacked the Eastern empire three years before his death. His successor, Abubeker, preferred, however, turning his arms towards Persia, which had not yet recovered from the confusion into which it had been thrown, by the dreadful contest between Heraclius and Chofroes. But after the death of Abubeker, which happened in 634, Omar, who succeeded him, assailed the Byzantine empire, with renovated ardour. In the course of a very few years, both Syria and Egypt acknowledged the sway of the conqueror. The loss of Egypt was severely felt by the people of Constantinople; that country having always been esteemed the granary of the city, and Syria, being in possession of an enemy, laid all the Asiatic provinces open to invasion.

In the year 644, this new Saracen empire devolved to the Caliph Othman, who completed the conquest of Persia, and subdued all that part of Africa, which had successively been under the dominion of the western and eastern empire, and which extended from Egypt to the Atlantic, and from the Mediterranean to the Great Desert.

But during the whole period of the existence of the Saracen empire, Constantinople still resisted all the attacks of these Arabian conquerors. They twice laid siege to the city. In their first attempt their fleet blockaded Constantinople, on the side of the Propontis, from 668 to 675. Their second siege in 716, was rendered memorable by the invention of the Greek fire, which totally destroyed the Saracen fleet, whilst the army which attacked the city on the land side, was compelled to raise the siege with prodigious loss.

If the progress of Mahometanism was hurtful to the interests of Christianity, and to the splendour of the Byzantine empire, the contest between the advocates of the use of images in Christian temples and their opponents, which violently agitated the church, proved equally fatal in its consequences. It occasioned the first schism between the Greek and Latin churches, and was the origin of those differences which in the end produced their total separation, and hastened the fall of Constantinople.

This dispute broke out about the year 720, in the reign of Leo, the Maurian, who is distinguished in history as the first of the Iconoclast emperors. A council was held at Constantinople in 754, by 333 prelates of the eastern empire, who condemned all visible representations of Christ and his apostles, as heretical. This decision immediately caused the secession of Italy. A new Roman republic was established; but not being able to maintain its independence against the Lombards, it was delivered from their oppression by Pepin, king of France, whose son and successor Charlemagne received from the pope Adrian IV. the title of emperor of the Romans, and founded the Holy Roman or German empire.

The decree of the council of Constantinople did not, however, maintain its authority for more than thirty years. Irene, an Athenian female, who for her beauty had been advanced to the imperial bed and throne, began to reign in conjunction with her son Constantine VI. in the year 780. Her ambition incited her to cause the eyes of her son to be put out that she might reign sole empress of the East. She strongly exerted herself in favour of the restoration of images, which the second council of Nice, condemning that of Constantinople, effected in 787. Still the two churches of the East and West, were never more cordially united.

During the four centuries which elapsed between the death of Theodosius the Great and the reign of Charlemagne, Europe was in a state of anarchy and barbarism: the eastern empire alone exhibited marks of civilized society, and for a while flourished in power, till it was curtailed of

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half of its possessions by the conquests of the Mahometan caliphs. Under Charlemagne the whole world was divided into the Eastern, Saracen, and new Western empire. Of these the Saracen empire, under the caliphs, stood the highest in literary attainments; Constantinople, though much declined, still held the second rank; and the rest of Europe was making some advances towards the restoration of learning, when Charlemagne, by dividing his new empire among his sons, repunged it into barbarism.

In the ninth century, the Bulgarians, who had commenced their attacks towards the latter end of the seventh, and renewed their inroads at different periods, continued to be formidable enemies. They were completely subdued by Basilus II. towards the end of the tenth century. It was about the same time that the empire of the Saracens, being, like that of Charlemagne, split into a number of independent states, by the revolt of factious and ambitious chiefs, fell a prey to the Seljukian Turks and other barbarous nations of Asia. This subversion of the caliphate was attended with the complete wreck of Arabian learning; and the Byzantine empire remained the sole depository of all that was worthy of notice in literature, commerce, and the arts and embellishments of civilized society. Thus the tenth century, which, in the western countries, was one of the darkest periods of Gothic ignorance, constituted the most flourishing era of the Byzantine learning, under the reigns of Leo the philosopher and his son Constantine Porphyrogenitus.

About the year 1063 the emperor Constantine XI. Ducas left, at his death, the empire to his three sons, Michael, Andronicus, and Constantine XII., and appointed the empress Eudocia regent during their minority, on condition that she should not marry again. But having been released from her engagement, through a stratagem practised upon the patriarch, who absolved her of the oath she had taken, Eudocia married an officer of great military merit, named Romanus Diogenes, who was proclaimed emperor. After various successes against the Turks, who were continually encroaching upon all sides of the empire, Romanus was wounded in a desperate engagement, and taken a prisoner. Before his return to Constantinople, Eudocia was driven from the throne by John, the brother of Constantine Ducas, and her eldest son, Michael Ducas, proclaimed emperor. Romanus was besieged in a strong castle, whither he had retired, and killed in the year 1067, after a reign of three years and eight months.

Immediately after the death of Romanus, the empire was again invaded by the Turks. In less than ten years they made themselves masters of all Media, Lycaonia, Cappadocia, and Bithynia. At last Alexius Comnenus, having wrested the empire from Nicephorus Botaniates, who had deposed Michael Ducas, prepared for war with so much vigour, that Solyman the Turkish sultan made proposals of peace, to which Alexius acceded, in order to defend himself in the west against the Italians, under Robert Guiscard, duke of Puglia and Calabria, whom he defeated, with the assistance of the Venetian fleet. He also forced the Scythians, who had laid waste great part of Thrace, to submit on his own terms.

The war with the Turks was renewed in 1083, and carried on with various success. But about the year 1095, a romantic scene of religious enthusiasm and military enterprise began to display itself; and though it threatened the utter ruin of the Turkish nation, proved finally fatal to Constantinople.

Under the polished empire of the caliphs, the frequent pilgrimages of Christians to the holy sepulchre at Jerusalem had been encouraged; but the barbarians who had overturned the caliphate oppressed the pilgrims with unreason-

able impositions, and often added insult to injustice. Inspired at these outrages, Peter, a hermit, who had visited the holy sepulchre, preached a crusade for the recovery of the holy land from the infidels. The pope approved the project, and the princes and nobles of Europe readily entered into the measure.

This religious war was carried on, with some intervals, during the space of almost two hundred years, from the setting out of the first crusade in 1095, to the loss of Acre and all Palestine in 1291. Innumerable armed hordes were collected out of England, France, Germany, the Netherlands, and Italy. Yet these tremendous efforts were not attended with effects of such permanency as might have been expected. But one of the most remarkable events which occurred in the course of the crusades, was the capture of the city of Constantinople by the Latins.

The emperor, Isaac Angelus, having been deposed and deprived of sight by his inhuman brother, his son, Alexius, who was only a youth, made his escape into Italy, and met with a number of the barons of France and Flanders, who were come to Venice to contract with the republic for the ships necessary to facilitate one of those crusading enterprises. He concluded with them a treaty, whereby they engaged to restore his father to the imperial throne of the East, and he promised to unite the Greek to the Latin church. The French and Venetians, changing the destination of their armament, sailed up the Hellespont to Constantinople, broke the chain of the harbour, and assaulted the city. When they were almost ready to enter the town, the usurper made his escape. Isaac Angelus and his son, the young Alexius, were proclaimed joint emperors. A cessation of arms took place; but as soon as the clergy understood the terms of the treaty concluded by young Alexius, they reprobated the idea of an union with the see of Rome, and excited the people to fly to arms. The insurrection was also fomented by Alexus Mourzoufle, of the family of Ducas, who assumed the purple, imprisoned the blind emperor Isaac, and put young Alexius to death. The legal succession of the Greek empire being thus overturned, the French and Venetians recommenced the war. After a siege of more than three months, they assaulted the city from the harbour, and carried it by storm, eight hundred and eighty years after its foundation by Constantine. The city being given up to pillage, the plunder was valued at 400,000 marks, nearly equivalent to 800,000 sterling, the greatest sum ever found in any captured city previous to that period; and notwithstanding the penalties of excommunication, and even of death, denounced against any one who should secrete any part of the spoil, the secret plunder is supposed to have exceeded what was produced in public. Baldwin, earl of Flanders, was elected emperor, with one-fourth part of the empire for his share: the rest was divided among the barons and knights, into fiefs, held under the emperor.

The Greeks, after this disaster, established independent states at Nice, Trebisonde, and Epirus. The Latins were not prosperous in their newly-acquired empire. The dissensions which prevailed among the barons, laid their dominions open to the attacks of the Greeks. They continually gained ground. The Bulgarians also revolted, and the emperor, Baldwin of Flanders, being defeated and taken prisoner by them, died in captivity. He was succeeded by his brother Henry, who shewed himself of equal capacity for peace and war.

Henry checked the proceedings of the popish legate, in the persecution of the Greek schismatics. But after his death, which happened in 1216, the Latin empire of Constantinople rapidly declined: and so pressing were the exigencies of the state, that Baldwin II., the last emperor of the

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the Latin dynasty, pledged to the Venetians the crown of thorns pretended to have been worn by Christ.

At last Michael Paleologus, having usurped the Greek empire of Nice, his general, Alexius Strategopulus, with an inconsiderable force, surpris'd and recovered Constantinople in 1261: and thus, after a period of 57 years, that metropolis returned under the dominion of the Greeks. But a considerable part of the city had been destroyed in the three dreadful conflagrations which happened at the time of the siege and capture by the Latins: Constantinople never more regained that splendour which it had all along maintained. The imperial palace, which, during eleven centuries, had been the admiration of all who visited the East, was in ruins. It stood between the Hippodrome and the magnificent church of St. Sophia. Its superb gardens descended, by several rows of terraces, to the shore of the Propontis. The primitive edifice, erected by Constantine, rivalled the palace of the Cæsars on the Palatine Mount. The improvements made by his successors still added to its magnificence; and the emperors of the Comnenian dynasty had taken particular delight in embellishing this imperial residence.

The inveterate enmity of the clergy and people of Constantinople against the Latin church still subsisted. To avert a crusade, which the Latins were meditating against Constantinople, Michael Paleologus negotiated with the pope, and concluded a concordat between the Greek and Latin churches; but at his death, in the year 1282, the union was dissolved. His son Andronicus, who succeeded him, restored the ancient Greek ceremonies, and by this imprudent step threw the empire into a new ferment.

In the mean time Constantine his brother successfully opposed the Turks, who continued their encroachments: but his valour rendered him suspected by the emperor. Constantine was thrown into prison. On his removal from the army, the Turks under the famous Othoman made themselves masters of several places. Philantropenus and Libadarius, two officers of great merit, were sent to oppose them. The former gained some advantages over the enemy: but elated with his success he caused himself to be proclaimed emperor. This rebellion however was soon suppressed. Philantropenus was betrayed by his own men: but the Turks taking advantage of these intestine commotions extended their dominions in Asia, conquered most of the islands in the Mediterranean, and infested the coasts of the empire. Andronicus, not trusting his subjects, hired the Massagetes to assist him: but they being defeated, turned their arms against him. He next applied to the Catalans who behaved in the same manner, and, in 1292, assailed the empire in conjunction with the Turks. This was their first appearance in Europe. Their enterprize this time proved unsuccessful.

New commotions having taken place in the empire, the Turks returned to the charge in 1327. The next year, however, Othoman, who may be styled the founder of the Turkish monarchy, being dead, the emperor recovered Nice and some other places, which were again lost the year following; and, in 1330, a peace was concluded, which left the Turks in possession of their conquests.

This peace the Turks broke in 1357. Having reduced all Asia, they passed the Hellespont, and took a strong castle on the European side. Soon after sultan Amurath, advancing still farther, made Adrianople the seat of his empire. He was slain by treachery, and succeeded by his son Bajazet, who levied a yearly tribute on the emperor of Constantinople, and commanded him to send him his son Manuel to attend him in his military expeditions. This

demand was complied with. But the emperor dying in 1392, Manuel hastened to Constantinople without taking leave of the sultan. This incensed Bajazet so highly, that he passed with great expedition into Thrace, ravaged the country adjoining Constantinople, and at last invested the city both by sea and land. In this extremity, Manuel had recourse to the western princes, who sent him an army of 130,000 men, under the command of Sigismund, king of Hungary, and John count of Nevers. After a few successes they were defeated with great slaughter by Bajazet, who resumed the siege of the city, and would infallibly have accomplished the conquest of Constantinople had he not been obliged to turn his forces against Tamerlan the victorious Tartar, by whom he was overcome in battle, and confined in an iron cage against the bars of which he beat out his brains in the year 1399.

But as this relief could not be expected to be of long duration, Manuel Paleologus set sail for Venice, and from thence visited London and Paris in the year 1400. in the reign of Henry IV. of England and Charles VI. of France, with the view of procuring some assistance, which the circumstances of those countries did not permit them to grant. He also endeavoured to negotiate an union with the Latin church; but the negotiation broke off. His son John Paleologus, who succeeded him, was more fortunate. He concluded a treaty at Florence with pope Eugenius IV.; but it was universally reprobated by the whole body of the clergy of Constantinople, and the emperor was obliged to renounce it. He did not long survive these unhappy disturbances, and, in 1448, left the empire now confined almost within the walls of Constantinople to the last Constantine.

Upon the near prospect of being besieged in his capital by the Tatar Turks, Constantine Paleologus renewed the concordat with the Latin church. A cardinal legate from Rome was admitted at Constantinople; but after he had officiated in the cathedral of St. Sophia, the Greek clergy abandoned it as a polluted temple, and the whole city of Constantinople displayed every extreme of fanaticism and aversion against the Latin church. Though reduced to a narrow corner between the Propontis and the Euxine, the Byzantine empire continued the theatre of crimes and political as well as fanatical factions, until the 29th of May, 1453, when, after a siege of 53 days, Constantinople was taken by the Turks under Mahomet II. Whatever may have been the strength of the army which the Turks brought against that celebrated metropolis, the force, which the minister was able to enrol by the emperor's command for its defence, was inconsiderable. There were only 4970 volunteers, and including the Italian auxiliaries, the emperor's troops did not exceed 8000 men.

Constantine Paleologus made a vigorous defence, and rashly refused advantageous terms of capitulation. When the city was at last carried by assault, he nobly fell in the breach by which the enemy entered Constantinople. A shocking scene now followed. The persons and property of the citizens were given up to the disposal of the conquering army. The terrified people fled to the cathedral of St. Sophia and other asylums, from whence they were dragged forth, and without any distinction of sex or rank, chained together, driven through the streets like beasts, and more than sixty thousand of them sold into slavery. Mahomet, at the expiration of the three days allotted for pillage, made his triumphal entry into Constantinople, which has ever since the capital of the Ottoman empire, and which has never since held that station. See *Turks*.

Such was the dreadful catastrophe of Constantinople, once the metropolis and long the sole existing remnant of the

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the Roman empire. It fell a prey to the Turks 1043 years after Rome was taken by Alaric, and 977 years after the entire subversion of the western empire. Gibbon's Hist. of the Decline and Fall of the Roman Empire, *passim*. Le Beau, Histoire du Bas Empire. Bigland's Letters on Ancient and Modern History.

Constantinople is called by the Turks *Stampol*, *Istampol*, or (according to Thornton's present State of Turkey, p. 79.) *Istambol*, *abounding in faith*. It is situated at the eastern extremity of the province named Romania, or Romelia, on the European side of the Bosphorus, or straits of Constantinople, which separates Europe from Asia; in N. lat. 41° 10'. 830 miles S. E. of Vienna and 500 E. of Rome. It rises gradually from the shore in the form of an amphitheatre; but the streets are narrow, and the houses, in general, mean; the most spacious not exceeding two stories in height. The street called Adrianople is the longest and broadest in the city. The public buildings, such as the palaces, the mosques, bagnios, bazars, and caravanerais or khans, for the entertainment of strangers, are many of them very magnificent. On one point of the triangle, on which the city is built, is the seraglio from whence there is a charming prospect of the delightful coast of Asia Minor. This inclosure of the Ottoman palace is separated from Constantinople by a wall thirty feet high with battlements, embrasures, and towers, in the style of ancient fortifications. Its circumference is above six miles. There are in it nine gates, but only two of them remarkable for their size and beauty. It is from one of these the *Baba Hoama-jun*, or *Sublime Porte*, that the Ottoman court is supposed to have taken the name of the *Porte*, or *Sublime Porte*, in all public transactions and records. But Mr. Thornton, in his present State of Turkey, page 117, contends that the palace of the grand vizir, by a metaphor familiar to most of the Eastern languages, is called the *Porte* or King's gate, in Persian *Der*, being, as it were, the door of communication between the sultan and his subjects, and corresponding with the European appellation of a court which follows the person of the sovereign.

The seraglio is so extensive, that it is supposed to occupy the whole of the ground on which the ancient city of Byzantium stood, and to contain 10,000 inhabitants. That wing of the seraglio which is exclusively appropriated to the ladies of the Grand Signor, is called the *Harem*. Among the ancient monuments preserved in the seraglio, is the tomb of Constantine the Great. Of the mosques, or Turkish churches, the most celebrated is that of St. Sophia, which fronts the great gate of the seraglio, and is thought, in some respects, to exceed in grandeur and architecture St. Peter's at Rome. Round it are several chapels, which serve as burial-places for the imperial family. The other mosques of sultan Achmet, sultan Mahomet, sultan Selim, sultan Solyman, and sultan Bajazet, are also very fine. These imperial mosques are founded chiefly by sultans, who have obtained victories, and devote the spoils of war, gained from the enemies of their religion, to the service of public worship, the instruction of youth, and the relief of the poor. Foundations of this kind are annexed to every mosque. There are in Constantinople 518 seminaries of learning, and 1250 primary schools. The Greeks, besides their patriarchal church, dedicated to St. George, have 22 others. The palace of their patriarch is on a hill, about two hundred paces from the harbour. The Armenians have an archbishop and three churches; the Roman Catholics have six convents, and the Jews several synagogues. There is also a Swedish Lutheran church.

The bazars, or beshikins, answer to our markets. They are squares enclosed within gates, where merchants meet for

traffic, having generally two rows of shops built under piazzas. The market of female slaves, *Avrat Bazar*, is a quadrangle, surrounded by a covered gallery, and ranges of small and separate apartments; but Malometans only are admitted.

The bagnios, or public baths, are elegant and noble structures, built with hewn stones; the inner chambers are capacious, and paved with slabs of the rarest and most beautiful marble.

At the fourth end of the city, is the formidable flate prison of the seven towers, built of fine free-stone, and surrounded by a wall, with several smaller towers.

There are no theatres at Constantinople; the *Ombres Chinoises*, which are sometimes exhibited in the streets, supply the want of dramatic exhibitions. Of other public amusements, the principal are wrestling, and throwing the javelin, on horseback, in the ancient Hippodrome, an oblong square, called by the Turks *Alweidan*.

Constantinople counts 35 public libraries, some of which contain 15,000 volumes. That which was founded under Mustafa III. by the vizir Racub Pacha, is the most modern. A renegade, of the name of Ibrahim, encouraged by the grand vizir, Ibrahim Pasha, and the Mufti Abd'ullah Effendi, introduced the first printing-press at Constantinople, in the year 1727. It was afterwards destroyed by some fanatics, but Abdul Hamid restored it. Only the Koran, and books treating of the law and the doctrines of the prophet, are forbidden to be printed. These circulate in manuscripts, and afford a comfortable subsistence to 20,000 individuals who live by copying them.

The trade of Constantinople is chiefly in the hands of the Jews, Armenians, and Greeks; and its commerce is carried on by foreigners of all nations, who are confounded under the general name of Franks. No restrictions are laid on commerce, except in the articles necessary for the support of human life; the exportation of which is sometimes prohibited, especially from Constantinople, where alone the prohibition is rigorously enforced. Besides silk, cotton, wool, flax, drugs, coffee, sugar, wax, honey, fruits, hides, and tobacco, Constantinople exports its own printed muslins, the fatins, silk stuffs, and velvets, of Brusa and Aleppo, the ferges and camelots of Angora, the crapes and gauzes of Salonica, the sword-blades of Damascus, and the carpets of Smyrna. The harbour is spacious, and supposed capable of holding 1200 ships. Near it is *Galata*, a suburb chiefly inhabited by Greeks, Armenians, Jews, and Franks, who have their warehouses here. Beyond this is *Pera*, which may be considered as the suburb of Galata, where the foreign ambassadors reside. The air is uncommonly healthy, and the prospect delightful. Near Pera is the quarter called *Tophana*, from its canon foundery.

According to Mr. Dallaway, the population of Constantinople, including its suburbs, does not exceed 400,000 souls, of whom 200,000 are Turks, 100,000 Greeks, and the remainder Jews, Armenians, and Franks, or strangers from all the European nations. Mr. W. Eton (in his Survey of the Turkish Empire, second edition, page 287.) brings it down to less than 300,000. But this computation is evidently too low. At the time of its capture by the Latins, Constantinople is supposed by Villehardouin to have contained 400,000 effective men; this, however, must be regarded as an exaggeration. Mr. Le Beau, in his Histoire du Bas Empire, supposes that it contained then about one million of inhabitants, and that its present population amounts to 400,000, which, by all accounts, is the most probable computation.

Constantinople is frequently visited by the plague, which, however, excites but little alarm, and Turkish indifference

counteracts all efforts to subdue this dreadful epidemical disorder. From the year 1783 to 1785, it swept away 100,000 children and young people. The city has also often been exposed to great conflagrations. In 1782 a fire consumed from 7 to 8000 houses, among which were some belonging to the first officers of the state. On the 5th of August, 1784, more than 10,000 buildings were laid in ashes, and towards the end of the same year, 1600 houses and mosques were burnt down. In 1788 there was to be extensive a conflagration as to threaten the entire destruction of the city. They generally originate in the discontents of the Janizaries, or other military bodies. In the last revolution, which they effected on the 28th of May, 1807, when they forced Selim III. to abdicate the throne, and proclaimed Moutapha IV. emperor; they contented themselves with cutting off the heads of a few ministers and military chiefs. But between the fifth and sixth day of August following, three great fires reduced several hundred houses to ashes, and are supposed to have proceeded from the strong dissatisfaction that prevailed in the mutinous army against the new grand signor, for having issued an order to pay the troops only in the camp. In time of peace the Janizaries watch over and secure the public tranquillity, and exercise all the functions of police officers. A foreigner, who would be insulted if seen alone in the streets of Constantinople, may walk any where without the least molestation if accompanied by a Janizary. See JANIZARIES. (D'Ossion Tableau General de l'Empire Ottoman. Eton's Survey of the Turkish Empire. Thornton's present State of Turkey.)

CONSTANTINOPLE, *Patriarch of*. See GREEK CHURCH. CONSTANTIUS, FLAVIUS VALERIUS, in *Biography*, surnamed *Chlorus* from the paleness of his complexion, was son of Eutropius, a Dardanian noble, but his education did not correspond with the style of his birth. Under the emperors Aurelian and Probus, he had learned the military art, and by the emperor Carus, he was appointed governor of Dalmatia in the year 282. Ten years afterwards, in conjunction with Galerius, he was made Cæsar, and associated with the emperors Diocletian and Maximian. To Constantius were assigned the provinces of Gaul, Britain, and Spain. At this time Carausius, an ambitious general, had excited a revolt in Britain, and carried matters so far as to assume the imperial authority; he was also in possession of the port and fleet of Boulogne. To oppose the usurper, Constantius first attacked Boulogne, which surrendered to his arms, together with a great part of the naval strength of the place. After this, Constantius employed three years in preparing a fleet for the conquest of Britain; he scoured the coast of Gaul, invaded the country of the Franks, and deprived the usurper of the assistance of those allies. Before the preparations were finished, Carausius was deposed and murdered by his own servants. Allectus, his prime minister, succeeded to his power and to his danger. But he did not possess equal abilities, either to exercise the one or to repel the other. Constantius, under favour of a thick fog, escaped the British fleet, and landed in safety on the western coast, where an engagement took place, in which Allectus was slain; a single battle decided the fate of this great island, and when Constantius landed afterwards on the shores of Kent, he found them covered with obedient subjects. He now had occasion only to exert his talents in establishing a regular government; to which he appears to have been fully competent; he reigned with mildness, and was anxious not to oppress his subjects by heavy taxes; his court was distinguished by simplicity and great frugality, and he himself was a decided enemy to the persecutions which disgraced the reigns of Diocletian and Maximian; but in which, as their superior, he was obliged occasionally to join. When, how-

ever, he rose to the supreme power of Augustus, he banished persecution entirely from the provinces over which he governed. That event occurred in 305. Finding his health declining, he sent, as we have seen, (see CONSTANTINE the Great,) for his son Constantine to join him at Boulogne, thence they sailed to Britain, where the Picts had made an incursion into the northern part of the Roman province. This expedition, and an easy victory over the barbarians of Caledonia, were the last exploits of the reign of Constantius. He closed his days in the imperial palace of York, fifteen months after he had received the title of Augustus, and near fifteen years after he had been promoted to the rank of Cæsar. His death was immediately succeeded by the elevation of Constantine the Great; besides whom, he left three sons and as many daughters, by a second wife. Moreri. Gibbon.

CONSTANTIUS II, FLAVIUS JULIUS, was the second son of the great Constantine, by Fausta, and born in 317. At a very early period of his life he was declared Cæsar: when even a stripling, the care of the East was committed to him. On the death of his father, being then in his twentieth year, he repaired to Constantinople where he took a solemn oath that his kinsmen, who were already in discredit with the soldiery, should be permitted to remain in safety. He is however accused of an utter disregard to the sanction of the oath, and of having excited the massacre in which his two uncles, and seven of his cousins, were put to death. In a new division of the empire, in the year 338, Asia, Syria, Egypt, and Thrace were allotted to Constantius. From this period he was involved in wars with various nations; of which the most important was that with Magnentius, in Lower Pannonia. In the first campaign Constantius was so far unsuccessful, that he offered terms of accommodation, and a partition of his dominions, which his opponent haughtily refused, proposing as the only ground of solid peace the abdication of Constantius. A very bloody and decisive battle ended in a signal defeat of Magnentius, who with difficulty escaped to Italy. Constantius spent the winter in Sirium, the place of his birth, and in the spring of the following year 352, he passed the Alps, and proceeded to the conquest of Italy, a task of no great difficulty on account of the enmity which the cruelties of Magnentius had excited against him and his cause. He now attempted to treat, but his overtures were not listened to: from Italy he passed to Gaul, and made a stand at Lyons, Africa, Sicily, and Spain, declared for his rival. Another victory over Magnentius, rendered Constantius, in 353, the sole master of the Roman empire; but Magnentius, and his brother Decentius, chose death by their own hands, rather than run the chance of falling into those of their conquerors.

The conduct of Constantius upon this important change, has been variously represented; but there is no doubt that measures of the severest kind were carried on against those who had engaged against him, or had rendered themselves liable to suspicion. Notwithstanding his talents and success as a general, he was by no means equal to the duties attaching to the high office of emperor, and he dread too much a rival, to place the government under the auspices of a vigorous mind. His chief advisers were eunuchs, with whom his court was crowded, and to whom he committed the fortunes and lives of his numerous subjects. Constantius had already declared his nephew Gallus, Cæsar, and to him was given the care of the East, where he displayed the most atrocious acts of tyranny, and exhibited an intention of assuming an independent sovereignty. By the advice of Eusebius, the chamberlain of the eunuchs, Gallus was recalled, imprisoned, and executed. Those who write favourably of Constantius, assert, that he had no sooner signed

the warrant, than he relented, and endeavoured to recal the Bloody mandate; but that the second messenger entrusted with the reprieve, was detained by the eunuchs, who dreaded the unforgiving temper of Gallus, and were likewise desirous of reuniting to their empire the wealthy provinces of the East. Some time after this event, Sylvanus, a Frank, who had been in the confidence of the emperor, and who had been of the utmost importance to him in his contels with Magnentius, was, by false accusations, driven into rebellion. He assembled an army at Cologne, but was assassinated before it could be properly organized. The barbarian tribes of Germany, resolving to be revenged for his death, burst into the province, destroyed many cities, and among the rest Cologne itself, and reduced the empire to the most alarming danger. Julian, the remaining nephew of the emperor, was sent against them, and returned victorious. In 357, Constantius paid a visit to Rome, where he was received with the highest honours. He displayed his regard for the ancient capital, by adding to its ornaments an obelisk of granite in a single piece, brought from Egypt, and set up in the Circus Maximus. After this, he engaged in other wars, and was in general successful. His nephew Julian became now his rival; his high reputation in the army, induced the soldiers to proclaim him Augustus, but the emperor refused to acknowledge him as partner in the empire, and began to make preparations to assert his own rights over those of his aspiring relation. Julian had anticipated him, and had already seized upon Illyricum; in pursuit of him there, Constantius was seized with a fever, which at first threatened no serious consequences, but which terminated his life, and thus delivered the country from the horrors of a civil war. He died in November 361, having reigned twenty-four years. He obtained the character of a zealous Christian, and is applauded for having discouraged Pagan rites and ceremonies. He built many churches, and behaved with great respect towards the clergy; in matters of speculation and theological controversy, he considered himself an adept; was himself a favourer of the Arian party, and the persecutor of Athanasius, and of those who maintained his doctrines. It must be confessed that the genuine principles of Christianity were never understood by any of the Roman emperors; and their support of it, however laudable their motives might be, was highly injurious to its progress in the world. Gibbon. Univer. Hist.

CONSTAT, in *Law*, the name of a certificate, which the clerk of the pipe, and auditors of the exchequer, make at the request of any person, who intends to plead or move in that court for the discharge of any thing; and the effect of it is, the certifying what (appears) *constat* upon record, touching the matter in question. 3 & 4 Edw. VI. cap 4. and 13 Eliz. cap. 6.

A *constat* is held to be superior to an ordinary certificate; because this may err or fail in its contents, that cannot, as certifying nothing but what is evident upon record. Also the exemplification under the great seal of the enrolment of any letters patent, is called a *constat*. Coke on Littl. 225.

CONSTELLATION, in *Astronomy*, an assemblage or system of several stars, expressed and represented under the name and figure of some animal, or other thing: this assemblage is by some called also an *asterism*.

The ancients portioned out the firmament into several parts, or constellations; reducing a certain number of stars under the representation of certain images, in order to aid the imagination, and the memory, to conceive and retain their number, disposition, and even to distinguish the virtues, which astrologers attributed to them: in which sense a man is said to be born *under a happy constellation*, i. e. under a happy configuration of the heavenly bodies. The division

of the heavens into constellations is very ancient, and, probably, as old as astronomy itself; at least, it was known to the most ancient authors extant, whether sacred or profane. In the book of Job, mention is made of the names of some of them: as in chap. ix. 9. "Which maketh Arcturus, Orion, and Pleiades, and the chambers of the south." By the "chambers of the south," some have understood the constellations near the south pole, which are invisible to the inhabitants of the northern hemisphere. From the manner in which Job speaks of commerce, we may infer that he lived in a country frequented by merchants, who imported thither the rarities of the south. To this purpose Sir Isaac Newton suggests, (*Chronology*, p. 157.) that Job, who lived in Arabia Petraea, among the merchants, might have derived from them his knowledge of the constellations. And again, mention of them occurs in that sublime expostulation, chap. xxxviii. 31, 32. "Canst thou restrain the sweet influence of the Pleiades, or loosen the bands of Orion? Canst thou bring forth Mazzarath, (by which some understand the twelve signs, or zodiac,) or canst thou guide Arcturus with his sons?"

The first of the three constellations, mentioned by Job, is *אֵיֶשׁ* *aisch*, or *אֵיֶשׁ* *aisch*, by which some have thought that he meant the constellation, now called the "Great Bear." The root of *aisch* is *אֵשׁ* *ouch*, which, in Hebrew, signifies, "to gather together, or to assemble;" and in Arabic, "to make a circuit, or to describe a circle." These two significations may very well be applied to the Great Bear, which is a group of stars making a remarkable circuit round the pole. "Canst thou guide (or feed) *Aisch* with his sons?" (chap. xxxviii. v. 32.) is an expression which figuratively represents the stars that compose the Great Bear, collected together, like a flock which feeds in a meadow. In the same strain Virgil says, (*Bn* l. 1. v. 611.) "Polus dum sidera pacet." It has been further observed, that *Aisch* is the first star named in Job; and that *אֵשׁ*, or the Great Bear, is the first constellation mentioned by Homer, in his description of the shield of Achilles. The second constellation or group of stars mentioned by Job is *כִּמָּב* *kimab*. From the different passages in which this term occurs, we may reasonably conclude, that it must be understood of some constellation remarkable for its relation to an agreeable season. God says to Job, "Canst thou bind up the sweet influences of *Kimab*? i. e. Canst thou bind up or restrain the fertility of the earth, for producing fruits and flowers, when *Kimab* appears?" The different significations of this word, both in the Hebrew and Arabic, concur in pointing out the same sense of the term. *Kimab* may be derived from *כָּמַח* *kamah*, which, in Hebrew, signifies, "to desire, or to rejoice." Of all the seasons the spring is the most desirable, and the most productive of delight and joy. If we deduce the word *kimab* from the Arabic root *kevuam*, or *kam*, this characterizes the spring as distinctly as the former. *Kam*, in Arabic, signifies, "subigere mulierem," and "to become warm." Accordingly, the earth, at the approach of spring, begins to become warm, and to open its bosom: this is also the time when the females of most kinds of animals become pregnant. It remains only to know, what was the constellation which in the time of Job introduced the spring; and this, as we have sufficient reason for believing, was the Pleiades. *Kam* also signifies a "troop, number, or multitude;" and this etymology agrees perfectly well with the Pleiades, on account of the number of stars included in this collection, or in the constellation of the Bull.

The third constellation mentioned by Job is *כְּפִיל* *kefil*; the root of which word is *כָּפַל* *kafal*, which, in Hebrew, signifies, "to be inconstant or changeable;" and in Arabic,

“to be benumbed, to be idle, to be cold.” By *Kesfil*, therefore, it is supposed that Job means the Scorpion. God says to Job, “Canst thou loosen the bands of *Kesfil*?” i. e. “Canst thou loosen and open the earth, which is shut up and benumbed when *Kesfil* appears? Canst thou then make it produce flowers and fruits?” Adverting to the interpretation already given of *kimab*, we shall perceive, by the contrasted characters which distinguish them, that they are two constellations of the zodiac, pointing out two very opposite seasons. If by *kimab* Job designed the Pleiades, it is not improbable that by *kesfil* he meant the Scorpion, a constellation opposed to Pleiades by almost one-half of the circuit of the heavens, and which then announced the approach of winter. Accordingly, Aben-Ezra understood by *kesfil* that star of the first magnitude, known by the name of the Scorpion’s heart, or Antares. In his commentary on Job he thus explains himself: “*Kimab*,” says he, “is the northern star, and *Kesfil* is a southern star. *Kimab* produces fruits, which are the delight of man; and *Kesfil* does the contrary. *Kimab* is a great star, called the Bull’s eye, that is to say, Hyades; and *Kesfil* is a great star, called the Scorpion’s heart, that is to say, Antares.” Rabbi Levi Ben-Gerson says also, in his commentary on Job, that *Kesfil* is one of the southern constellations; and that when the sun enters into the sign where this star is found, the trees can no longer bring forth fruit, on account of the cold which this star brings with it. *Kesfil* has been supposed, by some learned commentators and critics, to denote the constellation Orion, which, at the time of its rise, portends clouds and tempests; and they derive it from *קסל* *kasal*, denoting inconstancy. See Schultens’s Commentary on Job, vol. i. p. 239, &c. vol. ii. p. 186. Goguet’s Origin of Laws, &c. vol. i. Dissert. 3.

In the prophecy of Amos, who is supposed to have lived 790 years B. C., we have the following animated exhortation (chap. v. 7, 8.): “Ye who turn judgment into wormwood, and leave off righteousness in the earth; seek him that maketh the seven stars and Orion, and turneth the shadow of death into the morning, and maketh the day dark with night; that calleth for the waters of the sea, and poureth them out upon the face of the earth: the Lord is his name.” In this passage, the seven stars and Orion are mentioned as being well known, both by Amos, who was a herdsman of Tekoa, and the common people, to whom this exhortation was addressed; and we may hence infer, that the constellations had been invented for some time before that period. Some of the constellations are also occasionally mentioned by Hesiod and Homer, who flourished above 900 years before Christ; and Aratus of Tarsus, the astronomical poet, who lived about 277 years B. C., in his “Phenomena,” professedly treats of them all, except some few which were invented after his time; shewing how each constellation is situated with regard to those that are near it, the sphere on it bears with respect to the principal circles of the world, and what other constellations rise or set with it. Hipparchus, the Bithynian, has shewn, that Aratus followed the descriptions of Eudoxus, who flourished about 366 years B. C.; and it is very probable that the Greek astronomer who succeeded him continued to use the same figures of the constellations till the time of Ptolemy, though not without some variations and additions. Ptolemy’s Almagest (see ALMAGEST) has been in such esteem among astronomers, that almost all who have written since his time have agreed in drawing the figures of the constellations, or supposing them to be drawn, so as to answer his description, as far as possible; and indeed this is necessary, in order to avoid confusion, when ancient and modern observations are compared.

The division of the ancients only took in the visible firmament, or so much as came under their notice: they distributed into forty eight constellations, those being reckoned ancient constellations which have been received from the Greeks, and particularly from Ptolemy; twelve of these took up the zodiac: the names they gave them are, *Aries*, *Taurus*, *Gemini*, *Cancer*, *Leo*, *Virgo*, *Libra*, *Scorpio*, *Sagittarius*, *Capricornus*, *Aquarius*, *Pisces*: from whence the signs of the ecliptic and zodiac take their names; though they are now no longer contiguous to the constellations which denominate them; e. g. the constellation Aries, about 2020 years ago, occupied the place of the first sign of the ecliptic; but, on account of the precession of the equinox, it is now removed to the second; and so of the others. See SIGN.

The other stars, on the northern side of the zodiac, were disposed into twenty-one constellations; viz. *Ursa major* and *minor*, *Draco*, *Cepheus*, *Bootes*, *Corona Septentrionalis*, *Heracles*, *Lyra*, *Cygnus*, *Cassiopeia*, *Perseus*, *Andromeda*, *Triangulum*, *Auriga*, *Pegasus*, *Equuleus*, *Delphinus*, *Sagitta*, *Aquila*, *Ophiureus* or *Serpentarius*, and *Serpens*: to which have been since added *Antinous*, and *Coma Berenices*, and some others.

The stars on the southern side of the zodiac were distributed into fifteen constellations: their names are, *Cetus*, *Eridanus flavivus*, *Lepus*, *Orion*, *Canis major* and *minor*, *Argo*, *Hydra*, *Crater*, *Corvus*, *Centaurus*, *Lupus*, *Ara*, *Corona Meridionalis*, and *Piscis australis*: to which have been since added several others, viz. *Phoenix*, *Grus*, *Indus*, *Pavo*, *Apus* or *Avis Indica*, *Apis Musca*, *Chamaeleon*, *Triangulum australe*, *Piscis volans*, *Toucan*, *Hydrus*, *Xiphiæ* or *Dorado*, *Columba Noachi*, and *Robur Carolinum*, &c. &c. See each constellation under its proper head, *ARIES*, *TAURUS*, &c.

The other stars, not comprehended under these constellations, yet visible to the naked eye, the ancients called *infirmos*, or *sporades*, some of which the modern astronomers have since reduced into new figures, or constellations.

Thus, Hevelius, v. g. between *Leo* and *Ursa major*, makes *Leo minor*; and between *Ursa minor*, and *Auriga*, over *Gemini*, makes *Lynx*; under the tail of *Ursa major*, *Canes venatici*, *Cerberus*, *Vulpecula*, and *Anser*, *Scutum Sobieski*, *Laerta*, *Camelopardalus*, *Monoceros*, and *Sextans*. See also *ANTINOUS*, *BERENICE*, and *COR CAROL*.

In these constellations, the stars are ordinarily distinguished by that part of the image wherein they are found. Bayer distinguishes them farther by the letters of the Greek alphabet: and many of them, again, have their peculiar names, as *Arcturus*, between the knees of *Bootes*; *Gemina*, or *Lucida*, in the *Corona septentrionalis*; *Pollitium*, or *Aldebaran*, in the Bull’s eye, *Pleiades* in the neck, and *Hyades* in the forehead of the Bull: *Castor* and *Pollux* in the heads of *Gemini*; *Capella*, with the *Hædi*, in the shoulder of *Auriga*; *Regulus*, or *Cor Leonis*; *Spica Virginis* in the hand, and *Vindemiatrix* in the shoulder of *Virgo*; *Antares*, or *Cor Scorpionis*; *Fomabant*, in the mouth of *Pisces-australis*; *Regel*, in the foot of *Orion*; *Sirius*, in the mouth of *Canis major*; *Procyon*, in the back of *Canis minor*; and the *Pole-star*, the last in the tail of *Ursa minor*.

The knowledge of the stars has become more extensive; the number of constellations has increased; and a greater number of stars has been introduced into each constellation; as their positions, by more accurate observations, have been ascertained.

The following tables exhibit the names of the constellations, and the number of stars in each, including all to the sixth magnitude: and also some of the most remarkable stars in each constellation.

CONSTELLATION.

TABLE I. *Constellations in the Zodiac.*

Names of Constellations.	Number of the Stars.					Chief Stars.	
	Ptolemy.	Tycho.	Hevelius.	Flamsteed, &c.		Magn.	
Aries, the Ram - - -	18	21	27	66			
Taurus, the Bull - - -	44	43	51	141	Aldebaran -	1	
Gemini, the Twins - - -	25	25	38	85	Castor and Pollux -	2	
Cancer, the Crab - - -	13	15	29	83			
Leo, the Lion - - -	with Coma } Berenices } 35	30	49	95	Regulus -	1	
Virgo, the Virgin - - -	32	33	50	110	Spica Virginis -	1	
Libra, Chelæ, the Scales - - -	17	10	20	51	Zubenich Meli -	2	
Scorpio, the Scorpion - - -	24	10	20	44	Antares -	1	
Sagittarius, the Archer - - -	31	14	22	69			
Capricornus, the Goat - - -	28	28	29	51			
Aquarius, the Water-bearer - - -	45	41	47	108	Scheat -	3	
Pisces, the Fishes - - -	38	36	39	113			

TABLE II. *Constellations northward of the Zodiac.*

Names of the Constellations.	Number of Stars.					Chief Stars.	
	Ptolemy.	Tycho.	Hevelius.	Flamsteed, &c.		Magn.	
Ursa minor, the Little Bear - - -	8	7	12	24	Polestar -	2	
Ursa major, the Great Bear - - -	35	29	73	87	Dubhe -	1	
Perseus - - -	29	29	46	59	Algenib -	2	
Auriga, the Waggoner - - -	14	9	40	66	Capella -	1	
* Bootes - - -	23	18	52	54	Arcturus -	1	
Draco, the Dragon - - -	31	32	40	80	Rastaber -	3	
* Cepheus - - -	13	4	51	35	Alderamin -	3	
* Canes Venatici, viz. Asterion, et Chara, the Greyhounds - - -	-	-	23	25			
* Cor Caroli - - -	-	-	-	3			
* Triangulum, the Triangle - - -	4	4	12	16			
Triangulum minus - - -	-	-	-	10			
* Mufca - - -	-	-	-	6			
* Lynx - - -	-	-	19	44			
* Leo minor, the Little Lion - - -	-	-	-	53			
* Coma Berenices, Berenices' hair - - -	-	14	21	43			
* Camelopardalus - - -	-	-	32	58			
* Mons Menclaus - - -	-	-	-	11			
Corona Borealis, the Northern Crown - - -	8	8	8	21			
Serpens, the Serpent - - -	13	13	22	64			
Scutum Sobieski, Sobieski's Shield - - -	-	-	7	8			
Hercules cum Ramo & Cerbero, Hercules, since called Engona- fia - - -	29	28	45	113	Ras Algiatha -	3	
* Serpentarius, five Ophiuchus - - -	29	15	40	74	Ras Alhagus -	3	
* Taurus Poniatowski - - -	-	-	-	7			
Lyra, the Harp - - -	10	11	17	22	Vega -	1	
* Vulpeculus & Anser, the Fox and Goose - - -	-	-	27	37			
Sagitta, the Arrow - - -	5	5	5	18			
Aquila, the Eagle, } - - -	-	12	23	71	Altair -	1	
— with Antinous, } - - -	-	3	19	-			
Delphinus, the Dolphin - - -	10	10	14	18			
Cygnus, the Swan - - -	19	18	47	81	Deneb Adige -	1	
Cassiopea, the Lady in her chair - - -	13	26	37	55			
Equulus, the Horse's head - - -	4	4	6	10			
* Lacerta, the Lizard - - -	-	-	-	16			
Pegasus, the Flying Horse - - -	20	19	58	80	Markab -	2	
Andromeda - - -	23	23	47	66	Almaac -	2	

CONSTELLATION.

TABLE III. *Constellations southward of the Zodiac.*

Names of the Constellations.	Number of the Stars.					Chief Stars.	
	Ptolemy.	Tycho.	Hevelius.	Flamsteed, &c.	Magn.	Magn.	
* Phoenix - - - - -	-	-	-	-	13		
* Officina Sculptoria - - -	-	-	-	-	12		
Eridanus - - - - -	34	10	27	84	10	Achernar - - 1	
* Hydrus, the Water-snake - -	-	-	-	-	10		
Cetus, the Whale - - - - -	22	21	45	97	10	Menkar - - 2	
* Fornax Chemica - - - - -	-	-	-	-	14		
* Horologium - - - - -	-	-	-	-	12		
* Reticulus Rhomboidalis - -	-	-	-	-	10		
* Xiphias, Dorado, the Sword-fish	-	-	-	-	7		
* Celapraxitellis - - - - -	-	-	-	-	16		
Lepus, the Hare - - - - -	12	13	16	19	10		
* Columba Noachi, Noah's Dove -	-	-	-	-	10		
Orion - - - - -	38	42	62	78	10	Betelgeuse - - 1	
Argo Navis, the Ship - - - -	45	3	4	64	10	Canopus - - 1	
Canis Major, the Great Dog - -	29	13	21	31	10	Sirius - - 1	
* Equuleus Pictorius - - - -	-	-	-	-	8		
* Monoceros, the Unicorn - -	-	-	19	31	10		
Canis Minor, the Little Dog - -	2	2	13	14	10	Procyon - - 1	
* Chanæleon - - - - -	-	-	-	-	10		
* Pyxis Nautica - - - - -	-	-	-	-	4		
* Pifcis Volans, <i>Paffer</i> , the Flying Fish - - - - -	-	-	-	-	8		
Hydra - - - - -	27	19	31	60	10	Cor Hydræ - - 1	
* Sextans - - - - -	-	-	11	41	10		
* Robur Carolinum, the Royal Oak -	-	-	-	-	12		
* Machina Pneumatica - - - -	-	-	-	-	3		
Crater, the Cup - - - - -	7	3	10	31	10	Alkes - - 3	
Corvus, the Crow - - - - -	7	4	-	9	10	Algorab - - 3	
* Crochens, el Cruzero - - - -	-	-	-	-	6		
* Apis Mufca, the Bee or Fly - -	-	-	-	-	4		
* Apus or Avis Indica, the bird of Paradise - - - - -	-	-	-	-	11		
* Circinus, the Compass - - - -	-	-	-	-	4		
Centaurus, the Centaur - - - -	37	-	-	35	10		
Lupus, the Wolf - - - - -	19	-	-	24	10		
* Quadra Euclidis - - - - -	-	-	-	-	12		
* Triangulum Australe, the South- ern Triangle - - - - -	-	-	-	-	5		
Ara, the Altar - - - - -	7	-	-	9	10		
* Telescopium - - - - -	-	-	-	-	9		
Corona Australis, the Southern Crown - - - - -	13	-	-	12	10		
* Pavo, the Peacock - - - - -	-	-	-	-	14		
* Indus, the Indian - - - - -	-	-	-	-	12		
* Microscopium - - - - -	-	-	-	-	10		
* Octans Hadleianus - - - - -	-	-	-	-	43		
* Grus, the Crane - - - - -	-	-	-	-	14		
* Toucan, the American Goose -	-	-	-	-	9		
Pifcis Australis, the Southern Fish	18	-	-	24	10	Fomelhaut - - 1	

N. B. In the preceding Tables the new Constellations are distinguished from the ancient by a star, *.

CONSTELLATION.

TABLE IV. *Number of Stars of each Magnitude.*

	MAGNITUDES.						
	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Total.
Constellations in the Zodiac - 12	5	16	44	120	183	646	1014
In the Northern Hemisphere 34	6	24	95	200	291	635	1251
In the Southern Hemisphere 45	9	36	84	190	221	323	863
	20	76	223	510	695	1604	3128

There are several ways of delineating the constellations and stars, so that an observer may be able to distinguish them in the heavens. The most eligible method of all is to construct a hollow globe of such a large size as to admit the observer to stand on a frame near its centre; and then to paint the stars and constellations in its inner surface, in their proper situations with regard to one another. If such a globe, elevated according to the latitude, were made to turn on its poles, the observer near the centre would behold the motions and aspects of the stars as they really are in the heavens, and soon obtain a correct idea of the whole. A machine of this kind, however, could not be constructed without a very considerable expence as well as ingenuity. Large machines on this plan have been made at Gottorp, at the expence of Frederick III. duke of Holstein; and at Paris by the direction of cardinal d'Etrees; but these are far inferior in size to one erected at Pembroke college, in Cambridge, under the direction of Dr. Long. The description of this curious machine is here subjoined in the doctor's own words. "I have, in a room lately built in Pembroke hall, erected a sphere of 18 feet diameter, wherein 30 persons may sit conveniently: the entrance into it is over the south pole by six steps:—the frame of the sphere consists of a number of iron meridians, not complete femicircles, the northern ends of which are screwed to a large round plate of brass with a hole in the centre of it; through this hole, from a beam in the ceiling, comes the north pole, a round iron rod about three inches long, and supports the upper parts of the sphere to its proper elevation for the latitude of Cambridge; the lower part of the sphere, so much of it as is invisible in England, is cut off; and the lower or Southern ends of the meridians, or truncated femicircles, terminate on, and are screwed down to a strong circle of oak, of about thirteen feet diameter, which, when the sphere is put into motion, runs upon large rollers of lignum vitæ, in the manner that the tops of some wind-mills are made to turn round. Upon the iron meridians is fixed a zodiac of tin, painted blue, whereon the ecliptic and heliocentric orbits of the planets are drawn, and the constellations and stars traced:—the great and little bear, and draco, are already painted in their places round the north pole; the rest of the constellations are proposed to follow: the whole is turned round with a small winch, with as little labour as it takes to wind up a jack, though the weight of the iron, tin, and wooden circle, is about a thousand pounds. When it is made use of, a planetarium will be placed in the middle thereof. The whole, with the floor, is well supported by a frame of large timbers." In 1758, the constellations and chief stars visible at Cambridge, were painted in their proper places upon plates of iron joined together, which form one concave surface. We here add with regret, that this curious machine has been much neglected and is so far decayed as to answer none of the purposes which the ingenious contriver proposed. The constellations and stars might also be drawn in two concave

hemispheres, which would contain them all, or segments of spheres might be made of brass or pasteboard, of such dimension that each segment should contain a single constellation upon its concave surface. Sometimes the constellations are drawn upon two planispheres projected upon a great circle, which give us the pictures of the two concave hemispheres in plano. See our *Plates of Constellations*. The constellations and stars may be also depicted on a celestial globe.

The first use of all these concave spheres, planispheres, and globes is, by comparing them with the originals, to know the stars in the heavens; but as the rotation of the earth round its axis causes the heaven and stars, &c. apparently to move the contrary way; and thus the sphere of the fixed stars is made to change its position, with respect to us, every moment of the natural day: it will be necessary, in order to compare the stars upon a concave hemisphere, globe, or planisphere, with the stars in the heaven, to place the globe, hemisphere, &c. in such a position as to correspond with the situation of the heavens at the time of observation. The method of rectifying the celestial globe for any hour of the night, or so to place it that every star on the globe may point at the corresponding star in the heavens, will be shewn under the article *CELESTIAL GLOBE*; and when this is done, the constellation may be known, by comparing the heavens and the globe with one another. *E. G.* If I would find a star called Arcturus in the heavens, the globe being rectified for the hour, I find Arcturus upon it; then if I imagine a line to be drawn from the centre of the globe through that star, that line continued will point at Arcturus in the heavens. Suppose, on the other hand, I see some bright star in the heavens which I want to find upon the globe, I first rectify the globe for the hour of the night, and then if I imagine a line to be drawn from the star to the centre of the globe, it will point at the corresponding star on the surface of the globe. Maps of the concave surface of the heavens, especially such as take in only one constellation, with some parts of those which surround it, are very useful for the purpose of becoming acquainted with the stars. Of this sort are the figures given by Beyer in his "Uranometria," and those of Flamsteed, published after his death by Hodgson. See our *Plates of Constellations*. The manner of using these maps will be seen by the following example. If I would know the stars in the Great Bear, I turn the figure about, till the principal stars of it are in the same situation with regard to upper or under, right or left, as they appear in the heavens, at the time of making my observation: when this is done, it is easy, by looking first on the heavens and then upon the map, to discover to what parts of the figure, whether to the eye, snout, &c. the rest of the stars are to be referred.

It is very probable that the stars, and more especially some of the most remarkable collections of them, such as Charles's Wain, the Pleiades, Orion, &c. were formed into constellations.

lations and had names given them, in the early ages of the world. Some of them, by their different appearances, serve to mark out the different seasons of the year, and on that account they were not only taken notice of as a kind of directory for the commencement of ploughing, sowing, and other operations of husbandry (see Hesiod, *Op. et Dies*, l. ii. v. 1 and 2.), but were also thought to have a great influence on the temperature of the air and the fertility of the earth. Hence, from their being *signs*, pointing out the times of the year when heat or cold, dryness or moisture, are usually predominant, they were also regarded as the causes of those qualities in natural bodies, and imagined to have dominion over minerals, vegetables, and animals, over the complexions, and constitutions, and even the dispositions of mankind. This opinion obtained credit the more easily, because the sun, moon, planets, and stars, were believed to be of a divine nature; inasmuch that some conceived they were inhabited by an inferior kind of deities, which governed their motions and directed their influences; whilst others thought that they were animals, each of which had a living soul, which was guided by an intelligence, and others again suppose that they were animated by a part of the substance of the supreme Being. Each of these notions led mankind to pay them a sort of religious worship. The most ancient idolaters are with great probability thought by some learned men to have received the name of Zabu from their worship of the host of heaven; and this they could hardly do, without dividing the stars into parcels, as we find their aptest scholars in idolatry, the Egyptians, did, who divided the heavens into several regions, which they called the habitations or mansions of their gods. The Egyptians worshipped the heavenly bodies; and more especially the sun and moon, which they called their great gods, denominated the sun Osiris, and the moon Isis. They also found, or imagined that they found, in various animals, some properties or qualities corresponding to the motions, appearances, or influences of the sun, moon, and some of the stars: hence they were induced not only to use those animals in their hieroglyphic representations of their deities, but also to pay them divine honours. Thus by the *ram*, *aries*, a prolific animal, they represented the genial fertilizing warmth of the sun in the spring, as they did his violent scorching heat in the summer, by the hot and furious beast, the *lion*. The *bull* was regarded by them as another emblem of the various powers of the sun in forwarding the operations of agriculture, to which this animal is subservient; and hence were derived their *Apis* or *Mnevis*. The *goat* had divine honours paid him in some parts of Egypt, as a representative of the tendency of universal nature to propagate the several species of beings; whence the Greeks took their image of *Pan*. *Virgo* was a representation of their goddess Isis: the *Scorpion* was an emblem of the destructive power of the malignant genius Typhon; the *triangle* was a picture of the land of Egypt, which is of this shape; the *balance* was the hieroglyphic of justice, and therefore *Libra* was thought to be a proper constellation for that part of the heavens wherein the sun appears at one of the equinoxes, where he distributes equal day and night to the whole earth: or, in its relation to the land of Egypt, it may intimate the equal distribution of the Nile to the several parts of the country, by the genius of the waters; for the figure of this constellation was among the Egyptians a man holding a pair of scales. The Egyptians worshipped *serpents* and *fishes*: and the *altar* is said to have been an hieroglyphic of the land of Egypt. Many other similar instances might be adduced, as most of the animals and other figures that occur among our present constellations were

originally Egyptian. The Greeks, who learned astronomy of the Egyptians, retained several of their figures, as the ram, the bull, the lion, the dog, the triangle, &c.; but accommodated almost all of them to the fabulous history of their gods and heroes, whom they thus placed among the stars. Accordingly the Greek and also the Roman poets, from the ancient theology, have given us wild and romantic fables about the origin of the constellations, probably derived from the hieroglyphics of the Egyptians, and transmitted, with some alterations, from them to the Greeks; which may be seen in Hyginus's Poeticum Astron. and Ricciolus's *Almagest*, lib. vi. cap. 3, 4, 5; and Sherburne's notes upon Manilius.

Sir Isaac Newton observes, (see his *Chronology*, apud *Oper. vol. v. p. 64.*) that Musæus, one of the Argonauts, was the first among the Greeks who made a sphere; and the sphere itself, he says, shews that it was delineated in the time of the Argonautic expedition; for that expedition is delineated in the *Asterisms*. Thus we have the golden *Ram*, the ensign of the vessel in which Phryxus fled to Colchis; the *Bull* with brazen hoofs tamed by Jason; and the twins, *Castor* and *Pollux*, two of the Argonauts, with the *Swan* of Leda their mother. We have also the ship *Argo*, and *Hydrus* the watchful dragon: with Medea's *cup*, and a *Raven* upon its carcass, the symbol of death. We have *Chiron* the master of Jason, with his *altar* and *sacrifice*; the Argonaut *Hercules* with his *club* and *sulture* falling down, and the *Dragon*, *Crab*, and *Lion*, which he slew; and the *Harp* of the Argonaut Orpheus. All these, says Sir Isaac, relate to the Argonauts. We have also *Orion*, the son of Neptune, or, as some say, the grandson of Minos, with his *Dogs*, and *Hare*, and *River*, and *Scorpion*. We have the story of Perseus in the constellations of *Perseus*, *Andromeda*, *Cepheus*, *Cassiopea*, and *Cetus*; that of Callisto, and her son Arcas, in *Ursa major* and *Arctophylax*; that of Icarus and his daughter Erigone in *Bootes*, *Plautium*, and *Virgo*. *Ursa minor* relates to one of the nurses of Jupiter; *Auriga* to Erechthonius; *Ophiuchus* to Phorbias; *Sagittarius* to Crolus the son of the nurse of the Muses; *Capricorn* to Pan; and *Aquarius* to Ganimedee. We have Ariadne's *Crown*, Bellerophon's *Horse*, Neptune's *Dolphin*, Ganimedee's *Eagle*, Jupiter's *Goat*, with her *Kids*; Bacchus's *Asses*, the *Fishes* of Venus and Cupid, and their parent the *South-fish*. These with *Delton* are the old constellations mentioned by Aratus; and they all relate, says Newton, to the Argonauts and their contemporaries, and to persons one or two generations older; and nothing later than that expedition was delineated there originally. Antinous and Coma Berenices are novel. Although it be true, as Sir Isaac Newton affirms, that none of the figures on this sphere bear relation to any transaction of later date than the Argonautic expedition; yet the great disagreement that subsists among mythologists in their accounts of these figures shews them to be of greater antiquity, and that the constellations were received for some time among the Greeks, before their poets, according to their several fancies, applied them to different fables. See Long's *Astronomy*, vol. i. p. 162.

As the stars grouped in our constellations are capable of being reduced to very different figures, those of the Chinese and Japanese are very different from ours; and some superstitious Arabians, though they received their astronomy from the Greeks, have given some of their constellations different figures; because they thought it unlawful to draw any human figure; and therefore they changed all such on the celestial globe into some other form. Some Christian astronomers, displeas'd to see the heavens of the fixed stars occupied by the fabulous heathen deities and heroes have proposed,

proposed, from superstitious zeal but without a due regard to the science of astronomy, to introduce a reformation in this respect; and whilst they retained the ancient figures, to refer them to some scripture history. With this view they would have *Aries*, or the ram, to be a memorial of that which was offered instead of Isaac, *Virgo* to represent the blessed Virgin, &c. Thus, venerable Bede, instead of the profane names and figures of the twelve constellations of the zodiac, substituted those of the twelve apostles; whose example being followed by Julius Schillerius, in 1627, he completed the reformation, and gave scripture names to all the constellations in the heavens. Thus, *Aries*, or the ram, became converted into St. Peter; *Taurus*, or the Bull, into St. Andrew; *Andromeda* into the sepulchre of Christ; *Lyra* into the manger of Christ; *Hercules* into the Magi coming from the East; *Canis major* into David, &c. Weigelius, professor of mathematics in the university of Jena, made a new order of constellations; converting the firmament into a *calum heroidicum*; and introducing the arms of all the princes in Europe, by way of constellations. Thus, *Ursa major*, he transformed into the elephant of the kingdom of Denmark; the *Swan* into the Ruta with swords of the house of Saxony; *Ophiuchus* into the cross of Cologne; the *Triangle* into the compasses, which he calls the *symbol of artificers*; and the *Pleiades* into the *Abacus Pythagoricus*, which he calls that of merchants, &c. However, the more intelligent among astronomers never approved of innovation; as serving no purpose but to introduce confusion into astronomy. The old constellations, therefore, are still retained; both because better could not be substituted, and likewise to keep up the greater correspondence and uniformity between the old astronomy and the new. See CATALOGUE.

CONSTERNATION is defined by ethical writers to be an excess of horror, owing to the ill government of our admiration and fear: or such an immoderate degree of fear as confounds the faculties, and incapacitates a person for consultation and execution. It denotes a strong foreboding of tremendous evils, that are likely to follow misfortunes which have already taken place.

CONSTIPATION, in *Medicine*, is synonymous with *costiveness*, and signifies a retention of the stools beyond the usual period; which likewise implies, in general, a dry and hardened condition of the excrements, and some difficulty in discharging them.

The proximate cause of constipation of the bowels may consist in an unusual slowness of the peristaltic motion, or in an obstruction to the passage of the feces, while the proper peristaltic motion continues to propel them. The natural motion of the bowels is considerably different in individuals of different constitutions, and even in the same individuals at different periods: so that it is not easy to say when the peristaltic motion can be considered as preternaturally slow, while the general health continues good. But it is probable that a stool should occur once in 24 hours, in most habits, although there are many persons who retain the feces much longer without inconvenience. Dr. Cullen affirms, that he is clearly of opinion, that every deviation from a diurnal stool is an approach to an unnatural state. The accumulation and induration of the feces in the great intestines not only often produces many diseases in the lower part of the canal, but even occasions disorders in distant organs, and deranges the system in general.

The occasional causes of an inefficient peristaltic motion are various. A weakness of the muscular coat of the bowels appears to be, in some cases, the origin of costiveness, which is then accompanied with other marks of de-

bility; hence costiveness is not unfrequent in the female sex, who suffer considerable inconveniences from it. A cause of a contrary nature seems likewise to give rise to constipation, namely, a rigour and rigidity of the alimentary canal. In such cases there is necessarily a degree of immobility or torpor, so that the stimulus of the passing feces excites the intestines to less active motions, than in the more irritable habits; at the same time digestion is more perfectly performed, and a smaller proportion of feces therefore is produced: the absorption of the liquid parts too is more complete, and hence the feces are not only smaller, but drier, and pass less easily. In rigid and robust persons therefore habitual constipation is not uncommon. And in those of hypochondriacal or melancholic habits, a similar torpor in the motions of the whole system, and particularly of the intestinal canal, produces a similar disposition to costiveness. Another cause of the slowness of the peristaltic motion may be a deficiency of *Life* in the intestines, which is considered as one of the principal stimuli in maintaining the motion of the canal downwards. It is not indeed always in our power to ascertain the occurrence of this circumstance; but we know that, where the bile is withheld from the intestines, as in jaundice, there is commonly constipation. It is not quite evident in what manner a regular and constant exercise of gestation, as in a carriage or on the water, produces costiveness, rather than any considerable bodily activity, which is accompanied by much perspiration; Dr. Cullen is disposed to attribute it to the abstraction of the other intestinal fluids, secreted from the mucous glands and exhalant arteries. See *Materia Med.* vol. ii. p. 496.

The causes which may obstruct the passage of the fecal matter, occur either in the intestines themselves, or in the neighbouring parts. In the intestines, a mechanical impediment is sometimes occasioned by a thickening of the coats, which straitens the passage, or by scirrhous tumours, especially near the lower extremity of the canal. Sometimes the cavity of the intestine is partly filled by calculous concretions. A temporary diminution of the calibre of the canal is also occasioned by spasmodic contractions in the coats, as occurs in colic, or by the occurrence of inflammation, as in *enteritis*, and *dysentery*; in all of which the fecal matter is retained. Tumours in the neighbouring parts, compressing the intestines, necessarily impede the passage of the contained feces. Hence obstinate constipation has sometimes been occasioned by a scirrhus tumour in the omentum; and a very frequent cause of costiveness is the compression of the distended uterus upon the rectum, or lower gut, in pregnant women.

When, from neglect of evacuation, or other circumstances, an accumulation of feces to a considerable extent takes place in the rectum, or lower intestines, this collection of matter itself becomes a cause of a most painful and distressing constipation, attended with peculiar symptoms, and sometimes terminating fatally. This disorder was first described by an anonymous writer in the *Medical Observations and Inquiries*, vol. iv. p. 123, and other cases have since been recorded by other practitioners. (See *Duncan's Medical Commentaries*, vol. x. p. 255, and vol. xiii. p. 282.) It is the more important to attend to this complaint, because it assumes the appearance of a *diarrhea*, or rather a chronic dysentery, and has been often mistaken for the former, and erroneously treated with astringents and opiates in consequence. The patient complains of severe pain about the lower region of the belly, remitting and again returning after frequent, but short intervals, and accompanied with a perpetual bearing down, and almost continual inclination to evacuate the contents of the intestines; but only a trifling quantity

quantity of thin discharge is expelled, sometimes mixed with small knobs of hardened excrement, or scybala; after which the pain abates. A fresh spasmodic effort succeeds, and with similar success. It may be considered as a kind of spontaneous spasm of all the parts in, or connected with, the pelvis, for the exclusion of this irritating substance. When, from a previous costiveness, from the acuteness of the pain and *teneismus* (or bearing down), and the obstruction of formed and feculent stools, this state of the rectum is to be suspected, the gut should be examined *per anum*, when the feces will be readily detected in general, and must be broken down and removed by the finger, or some other mechanical means. The accumulation, which thus takes place, is sometimes very great. The following account from an apothecary, is given by Dr. Warren of Taunton:—"the evening you left us, I extracted from our patient (a lady, aged 65, who had laboured under this disease for five months,) four large balls of hardened excrementitious matter, about the size of hen's eggs; the next morning she discharged near twenty, and has continued to pass more or less of them every day, until about a week ago, when she took a larger dose than ordinary of castor oil, which evacuated 18 lumps of the same size as formerly; since that her stools have been natural, none of the balls having appeared." See Duncan's Med. Com. vol. x. p. 259. This disorder is peculiar to persons in advanced life, when a degree of atony often exists in the bowels; and it is more frequently observed in the female, than in the male sex. Whatever tends to lessen the peristaltic motion of the bowels, must induce a predisposition to it; and it is said to have been frequently occasioned by a long continued use of bark, opium, and other astringent medicines.

The consequences of a constipated state of the bowels, however, though in a comparatively trivial degree, whether idiopathic, or as a concomitant of other diseases, are frequently extremely injurious to the constitution; producing, when it is idiopathic, a variety of disorders; and aggravating, when symptomatic, the diseases of which it is a symptom.

The stomach and intestines, being a continuation of the same canal, reciprocally affect each other, when disordered. Hence, complaints of the stomach are frequent consequences of costiveness of the bowels; such as flatulence, stomach iclic, or gastrodynia, heart-burn, indigestion, &c. Another affection of the canal is frequently produced by constipation, namely, the appearance of hemorrhoidal tumours, or piles, at the lower extremity of the rectum, about the anus. See HÆMORRHOIS. Sometimes from a sympathy of the head with the stomach, and sometimes probably from the pressure of the loaded intestines on the great vessels, impeding the circulation of the blood downwards, and therefore determining it more copiously towards the head, a pain of the head is excited by a constipated condition of the bowels. This head-ache is various in different instances, but most commonly is confined to the forehead, or to the *occiput*, or nape of the neck: occasionally the hemicrania, or intermitting head-ache, appears to arise from constipation. In those whose habits predispose them to apoplectic, paralytic, or lethargic attacks, a loaded state of the bowels, by obstructing the circulation downwards, increases the predisposition, and occasionally even becomes the exciting cause of these diseases.

There are, besides, many disorders both acute and chronic, which, although they cannot be said to be produced by constipation of the bowels, are nevertheless greatly aggravated by it; and the constipation is frequently a leading symptom of these disorders. Thus in all acute febrile complaints,

and particularly in idiopathic and eruptive fevers, such as the synochus, or summer-fever, typhus, scarlet-fever, small-pox, &c. constipation is liable to occur, and when occurring at any period of the fever, tends to aggravate its symptoms, and to prolong its duration: and if, on the contrary, the bowels are freely opened in the commencement of these disorders, their severity is mitigated, and their duration frequently abridged. This is more especially the case in synochus and typhus, and in the febrile complaints of children. In a certain set of chronic diseases, which have heretofore been considered as unconnected with the condition of the bowels, such as many hysterical affections, chlorosis, and particularly chorea, or St. Vitus's dance, constipation has lately been shewn to be a source of much mischief, if not frequently the exciting cause. (Hamilton on Purgatives.) See CHOREA, and CATHARTICS. In short, a constipated state of the bowels is at all times liable to produce injurious effects on the constitution: in health it is a common exciting cause of various complaints; and in all states of diseases, whether acute or chronic, it tends to aggravate the symptoms, and to prevent the beneficial operation of remedies.

The mode of obviating constipation must be varied, according to the nature of the cause, and the constitution of the patient. Where it is slight and accidental, any of the milder cathartics, such as *magnesia vitriolata*, or Epsom salt, castor oil, (*oleum ricini*), rhubarb, or small doses of calomel, will generally answer the purpose of removing it: if these fail, the more active purgatives must be resorted to, especially in strong habits, such as jalap, aloes, extract of colocynth, calomel in larger doses, and combined with some of the preceding substances. Calomel, or the other mild mercurial preparations, appear to be peculiarly useful, when the constipation is occasioned by a torpor of the hepatic system, and a consequent deficiency, or morbid change in the quality of the bile, as they appear to stimulate more particularly the biliary ducts and vessels. The colour and fætor of the stools should be noticed with care, since the quality and condition of the bile, which is the principal colouring matter of the feces, may be thus most easily ascertained. In acute diseases this observation is more peculiarly important, as the sensible qualities of the feces frequently indicate a loaded and morbid condition of the alimentary canal, and the necessity of laxatives, when the number of motions does not appear to require such evacuation. See Hamilton; also Abernethy, Surgical Observations, vol. ii.

When constipation is habitual, some gently stimulating or cooling laxative, according to circumstances, may be required to be given daily, until the habit be removed. Much may be done for the relief of this by diet; as by eating a large proportion of vegetables, or by the free use of fruits, even those which are dried, or preserved with sugar; and by avoiding such articles as manifestly tend to constringe the body. And the advice of Mr. Locke should be steadily followed; *i. e.* the patient should go regularly to stool at the same hour daily: for such is the periodical regularity of all the functions of the body, that they are more perfectly performed at the accustomed hours than at any other period. Thus sleep, and the appetite for food, often forsake us altogether, if we delay the gratification beyond the usual hour.

In states of extreme constipation it is very common among the vulgar to resort to a medicine which appears to have been first employed from the most absurd and false notions of its powers, namely, crude mercury, or quicksilver. Whether it may have been supposed to open the bowels by some self-

moving power, or by its mechanical weight, the theory is equally absurd: and what is worse, the practice is not only useless, but dangerous. There are cases on record, in which the quicksilver, thus administered, had accumulated in the intestines, formed itself a sac by its weight, and at length produced death, by passing into the cavity of the abdomen, in consequence of the rupture of this sac. It is obvious, indeed, that the medicine could not ever force a passage by its weight, along the course of the bowels, since it must ascend occasionally, if the body is erect; and the whole passage must be nearly horizontal, if the patient be in a recumbent posture.

In the worst degrees of constipation, glysters consisting of an infusion of tobacco, or the smoke of tobacco, have been thrown into the bowels with advantage. And when all other expedients have failed, the affusion of cold water on the lower extremities while the patient is placed with his feet on a cold hearth, has been found to excite the propulsion of the feces. See COLIC. A glyster consisting of Venice turpentine, suspended in water by means of mucilage, or the yolk of an egg, was a favourite remedy with Dr. Cullen for severe constipation; and it is undoubtedly an efficacious expedient, more especially if administered a few hours after an active cathartic has been taken internally.

Where the constipation is occasioned by a mechanical obstruction, it can of course be alleviated only by the removal of the obstruction. If it arises from the presence of tumours or concretions external to the bowels, it may be considered as incurable; and can only be alleviated by keeping the bowels lax, and the feces in as liquid a state as possible. Strictures of the lower intestine have been frequently relieved by the introduction of a bougie, mechanically enlarging the passage. An intelligent writer remarks, that "strictures take place in different situations; but they occur frequently about the sigmoid flexure of the colon, near its termination in the rectum, that this part should be carefully examined in every case of a total obstruction of the bowels." The insertion of an unyielding tallow candle, though often practised, has been generally found painful and inefficient. It is requisite for the purpose to employ a bougie thirteen inches long, and of a proportionate strength; which should also be directed, with a nice hand, by a skilful surgeon. "I lately saw a lady," he adds, "thus relieved, who had been twenty-six days without any evacuation from the bowels, and who seemed nearly exhausted by violence of pain, and distension of the abdomen, hiccough, cold sweat, &c. It is remarkable how long patients subsist under these distressing circumstances. In one instance the time was twenty-nine days; in another patient thirty-three days. As the latter recovered after enduring every torture such a disorder could inflict, practitioners may be encouraged to persevere steadily in their attentions, and to retain some hopes even in the greatest extremity." Willan on Diseases in London, page 185.

CONSTITUENT PARTS, in Chemistry. The constituent parts of bodies are their dissimilar parts, or principles, into which they may be resolved, by the rules of that art. They are thus called in distinction from the integrant parts of bodies, which are parts of the same nature and properties with the bodies themselves. Thus quicksilver, dissolved by aqua fortis, may be separated from the diluted menstruum, by means of a copper plate, in its own form; this therefore was only divided into its integrant parts; but cinnabar resolved by chemistry into sulphur and mercury, is divided into its constituent parts, neither of these, nor any particle of them, being cinnabar, or having its properties. Shaw's Lectures, p. 15.

CONSTITUTION, an establishment, ordinance, decision, regulation, or law, made by authority of a prince, or other superior, ecclesiastical or civil.

The constitutions of the Roman emperors make a part of the civil law. The constitutions of the church make a part of the canon law. Some of the papal constitutions are in form of *bulls*, others of *briefs*. See each article.

CONSTITUTIONS of Clarendon. See CLARENDON.

CONSTITUTIONS, Clementine. See CANON LAW.

CONSTITUTIONS, Legatine, were ecclesiastical laws enacted in national synods, held under the cardinals Otho and Othobon, legates from pope Gregory IX. and pope Clement IV., in the reign of Henry III., about the years 1237 and 1268.

Cardinal Otho arrived in England, as a legate from the pope, in the year 1237, where he continued about three years, receiving many valuable presents from the bishops, monasteries, and clergy. This legate held a council at London, A. D. 1237, in which a great number of canons were framed, which were called "the Constitutions of Otho." These constitutions do not contain many things new or remarkable. By the second canon, the sacraments are declared to be seven in number; the fifteenth is against the clandestine marriages of the clergy; and the sixteenth against their keeping concubines publicly: both which practices were still very frequent in England. This legate convened two other assemblies of the clergy, with no other view but to make exorbitant demands of money. After the restoration of the royal authority, by the victory of Evesham, the pope sent his legate Othobon into England, who held a national council, A. D. 1268, at St. Paul's in London. In this council many canons were made, much the same in substance with those of the former council of London, in 1237, under the legate Otho.

CONSTITUTIONS, Provincial, are principally the decrees of provincial synods, held under several archbishops of Canterbury, from Stephen Langton, in the reign of Henry III. to Henry Chicheley, in the reign of Henry V., and adopted also by the province of York in 1463, under Henry VI.

CONSTITUTIONS of 1603. See CANON LAW.

CONSTITUTIONS, Apostolical, in Ecclesiastical History, denote a collection of regulations attributed to the apostles, and supposed to have been collected by St. Clement, whose name they likewise bear.

These are divided into eight books; consisting of a great number of rules and precepts, relating to the duties of Christians, and particularly to the ceremonies and discipline of the church.

Mr. Robert Turner, in his "Discourse of the pretended Apostolical Constitutions," maintains, that these eight books seem to have been made out of several doctrines, constitutions, canons, travels, and traditions, ascribed to the apostles, and out of some of the ancient liturgies, and the discipline and practice of the Greek church, only blended together, adulterated, and changed, by some ignorant Arian, in the fifth century. Bishop Pearson was of opinion, that the Apostolical Constitutions were formed out of several lesser works, called Doctrines and Constitutions, said to be written by Clement, Ignatius, Hippolytus, and others, but altered and interpolated by the author of this collection; and that the eight books of the Constitutions, as we now have them, were not composed and finished till after the time of Epiphanius.

Authors, however, are divided about the genuineness of these Constitutions: the generality hold them spurious, and endeavour to prove them posterior to the apostolic age; maintaining they were unknown till the fourth century;

which, if this be the fact, shews, that St. Clement had no concern in them. It is certain, that no such book is quoted as Scripture by any Christian writer of the three first centuries. The first who cites a work under this title is Epiphanius, and yet he speaks of it as of doubtful authority; and some modern writers are of opinion, that the Constitutions quoted by Epiphanius were different from the present Constitutions. When he says, that it was "doubted by many," he himself intimates, that some suspected it to be the work of some heretic; in opposition to which he says, it ought not to be rejected, as, from its contents, it appeared to be the work of some honest, orthodox, or Catholic Christian.

It is not easy to say, what respect Epiphanius himself had for this work. He quotes things from it as ordinances of the apostles, and as the divine word or doctrine; but it is not mentioned in any of the passages, where he gives the catalogues of the books of Scripture. Besides, his expressions just taken notice of seem to imply no more, than that the book was an ecclesiastical or orthodox writing; and we may observe farther, either that his Constitutions were not the same as ours, or that he had no great regard for them. For in our Constitutions, several early heretics are named, and they are condemned and confuted; of which passages, nevertheless, Epiphanius has made no use in his history of those heretics, or in his arguments against them: which every one must think he would have done, if the Constitutions which we have had been then in being, and had been esteemed by him as of authority. Whatever might be his opinion concerning this work, we have no good reason for supposing that it was a book of sacred Scripture; because no such book is quoted as Scripture by Irenæus, Clement of Alexandria, Origen, Eusebius, or any other Christian writer of the first three centuries. It is more than probable that the eight books, as we have them, were not composed and finished till after the time of Epiphanius, towards the middle, or before the end, of the fifth century. Cotelerius (Ap. Patr. Apoll. t. i.) says, it is certain, that the work of the Apostolical Constitutions, in eight books, is apocryphal and pseudo-apocryphal, not composed by the apostles, nor by the apostolical Clement. Tillemont concurs in opinion with Cotelerius. Daillé thinks, that the Constitutions were composed after the council of Nice, and before the end of the fifth century; and bishop Pearson supposes, that the eight books of the Constitutions, as we now have them, were not composed and finished till after the time of Epiphanius. Le Clerc mentions some things in the Constitutions exceedingly unsuitable to the character of the apostles of Christ, and says, that they well represent the ecclesiastical discipline of the fourth century, but not of earlier times. He thinks, they were composed by some Arian of the fourth century; and seems to imagine, there may be some probability in the conjecture of another learned man, viz. Thomas Bruno or Brown, that they are the work of Leontius, bishop of Tripoli in Lydia.

Mr. Whiston has ventured to oppose the general opinion: and with some reason, much learning, and more warmth, asserted the Apostolical Constitutions to be one of the sacred writings, dictated by the apostles in their meetings, written down from their mouths by St. Clement, and intended as a supplement to the New Testament; or, rather, as a scheme and system of Christian faith and polity. See his Essay on the "Apostolical Constitutions," and his historical preface; wherein the several steps he made in his fancied discovery are traced.

Dr. Lardner, after citing several opinions of learned men concerning this work, offers his own sentiments in his usual judicious and impartial manner. In his investigation of its

contents and authority, he observes, that the whole of the work, and all the ordinances in it, from beginning to end, are delivered in the name of all Christ's apostles, and as from God himself; and moreover, that they assume not only the names of the apostles, but also their characters and actions. Hence, according to the whole tenor of the work, they are rightly termed "Apostolical." Dr. Lardner next proceeds to inquire, both from external testimony and internal evidence, how far the authority claimed by these constitutions, and by the advocates of their antiquity, is well founded. To this purpose he observes, that Daillé, after having examined all the several ecclesiastical writers of the first three centuries. Barnabas, Clement of Rome, Justin Martyr, Athenagoras, Irenæus, Clement of Alexandria, Tertullian, Origen, Cyprian, Dionysius, Peter of Alexandria, and some others, has shewn, with great probability, that the constitutions were unknown to all these writers. In this opinion Mr. Turner, already cited, concurs. Moreover, the constitutions contain a long history of Simon Magus, and an account of divers other heretics, such as Cleobius, Dositheus, the Ebionites, Cerinthus, Marc, Menander, Basilides, Saturninus, the Nicolaitans, and Hæmorrhoids. The evil of heresies is shewn; the causes of them are ascertained and enumerated; they are condemned and confuted. Nevertheless, no notice is taken of all this by Irenæus, Tertullian, Clement of Alexandria, or Eusebius; nor even by Epiphanius; though it would have been much more to their purpose. In short, says Dr. Lardner, they could not have omitted it in their censures of the ancient heresies, or in their arguments against them, if they had been acquainted with it; for, certainly, the express authority of the apostles would have been of great advantage to them. As to Clement of Alexandria, though he quotes Clement of Rome, Barnabas, and other Christian authors, and had many occasions for quoting the constitutions, if he had been acquainted with them, yet he does not take the least notice of them. Besides, the constitutions absolutely forbid the reading of heathen authors; nevertheless, the fore-mentioned Clement, who was himself a man of extensive reading, and a great master of heathen learning, frequently cites in his works all sorts of authors, and has recommended the reading of heathen authors, and the study of philosophy; which he would not have done, if he had been acquainted with these constitutions, and had acknowledged them to be apostolical. Tertullian, Origen, and many more justify and recommend the reading of heathen compositions, which could not have been the case, if in doing this they would have violated an apostolical constitution. If, indeed, there had been a constitution of the Christian church, which forbade the reading of such books, the emperor Julian would have had no occasion to make the same prohibition. In the third century a dispute occurred about baptism; in which Cyprian and the African bishops maintained against Stephen bishop of Rome, that the baptism of heretics was null and void, and therefore that those who came over from them were to be re-baptized; this controversy is decided in the constitutions agreeably to the judgment of Cyprian and his colleagues; and yet it was not appealed to at that time, because, probably, it was not then extant. Dionysius, who was bishop of Alexandria about the year 248, appears to have been altogether unacquainted with our apostolical constitutions. When a controversy occurred about the time of keeping Easter, which commenced in the second century, and lasted till the sitting of the council of Nice, no appeal was made to the constitutions, which would have served to decide the dispute, if they had actually existed or had been received as apostolical. If an appeal be made to the writers of the fourth and the former part of the fifth century, such as Gregory Nazianzen, Basil, Chryso-

ton, the Cyrils of Jerusalem and Alexandria, Jerom, Augustine, &c.; they give us no intelligence concerning the apostolical constitutions; having neither cited nor mentioned them in any of their writings. The first (Epiphanius excepted) who has mentioned them, as divided into several books, is the author of the imperfect work upon St. Matthew, probably a Latin writer, and plainly an Arian, who wrote some time after the reign of Theodosius the Great; probably not till after the end of the fifth century. Upon the whole, the constitutions are destitute of all external evidence, that should entitle them to the character of apostolical. As to the internal evidence, they evidently bear many marks of a later age than that of the apostles, and unfit to be their character. Their manner of quoting the books of the New Testament does not suit the apostles, of which Dr. Lardner has given several instances; many things occur in these books, that refer to a later period than that of the apostles: e. g. they mention several heretics, as we have already observed, that did not appear before the end of the apostolical age; they also record various circumstances, which seem to shew, that the reign of heathenism in the Roman empire had terminated, and that Christians enjoyed ease and prosperity; and they write in a style, make use of terms and appellations, and refer to practices and observances, and offices of the church, which did not obtain till a much later period than the age of the apostles. Several things in the constitutions appear to be unworthy of the apostles of Christ; of which numerous instances are cited by Dr. Lardner, and also by Dr. Jortin, *ubi infra*. Moreover, this work is not free from inconsistencies, which are a disparagement to any writings, and they use a mode of expression that betrays a later time than is pretended. From a recital and ample illustration of the several particulars, above cursorily mentioned, by the two learned writers already named, and of others which our limits will not allow us to introduce, we may justly conclude, that the constitutions, in eight books, are not a work of the apostles, and since they bear their names without sufficient authority, they must be referred to the class of impostures. Although the exact time when this work was compiled, cannot be determined, and learned men have offered various conjectures, Dr. Lardner inclines to the opinion of those, who think that it was composed in the latter part of the fourth, or the beginning of the fifth century. "The author," probably, says Dr. Lardner, "was a bishop of a proud and haughty spirit, who was fond of church-power, and loved pomp and ceremony in religious worship." To this purpose Dr. Jortin says, that the constitutions repeatedly assert, "that a bishop is a God, a God upon earth, and a king, and infinitely superior to a king, and ruling over rulers and kings. They command Christians to give him tribute as to a king, and to reverence him as a God, and to pay him tithes and first-fruits, according, say they, to God's command; and they strictly forbid Christians to make any inquiry, and to take any notice, whether he dispose of these revenues well or ill." Sentiments these which seem to have been dictated at a time when there were Christian emperors.

Many learned moderns, says Dr. Lardner, "think the author was an Arian; but I do not concern myself about that: the passages, which have been supposed to favour Arianism, make a very small, or no part of the preceding collections; I have no reason, therefore, to bring that point into the conclusion. But I presume, that none ever suspected the author to be a Homotian." The author of this work, whoever he was, bears testimony to the scriptures; and appears to have received all those books of the New Testament, which were all along generally received by Christians. Lard-

ner's works, vol. iv. part 2. ch. 35. p. 320—354. Jortin's Remarks on E. H. vol. i. p. 228—275.

CONSTITUTION, in a *Physical Sense*, is used to denote the general condition of the body, as evinced by the peculiarities in the performance of its functions: such are, the peculiar pre-disposition to certain diseases, or liability of particular organs to disease: the varieties in digestion, in muscular power and motion, in sleep, in the appetites, &c. &c. Some marked peculiarities of constitution are observed to be accompanied with certain external characters, such as a particular colour and texture of the skin, and of the hair, and also with a peculiarity of form and disposition of mind; all of which have been observed from the earliest times, and divided into classes, which have received names, during the prevalence of the humoral pathology, which they still retain, in consequence of the neglect of this important study by modern physicians. See TEMPERAMENT.

CONSTITUTION, in *Political Economy*, is frequently used in common language as synonymous with government; but the constitution and the government of a country have different meanings, and are actually distinguished by accurate writers. "By constitution we mean," says lord Bolingbroke, in his "Dissertation on Parties" (Works, vol. ii. p. 130.), "whenever we speak with propriety and exactness, that assemblage of laws, institutions, and customs, derived from certain fixed principles of reason, directed to certain fixed objects of public good, that compose the general system, according to which the community hath agreed to be governed. Whereas by government we mean, whenever we speak in the same manner, that particular tenor of conduct which a chief magistrate, and inferior magistrates under his direction and influence, hold in the direction of public affairs." (See GOVERNMENT.) Constitution, says the same writer, in reference to our own country, is the rule by which our princes ought to govern at all times: government is that by which they actually do govern at any particular time. One may remain immutable; the other may, and as human nature is constituted, must vary. One is the criterion by which we are to try the other; for surely we have a right to do so, since, if we are to live in subjection to the government of our kings, our kings are to govern in subjection to the constitution; and the conformity or non-conformity of their government to it prescribes the measure of our submission to them, according to the principles of the revolution, and of our present settlement, in both of which, though some remote regard was had to blood, yet the preservation of the constitution manifestly determined the community to the choice then made of the persons who should govern. In order further to evince the difference between the constitution and the government of a country, lord Bolingbroke observes that "kings may have preceded lawgivers, for ought I know, or have possibly been the first lawgivers, and government by will have been established before government by constitution. Theseus might reign at Athens, and Eurytion at Sparta, long before Solon gave laws to one, and Lycurgus to the other of these cities. Kings had governed Rome, we know, and consuls had preceded kings, long before the decemviri compiled a body of law; and the Saxons had their monarchs before Edgar, though the Saxon laws went under his name." These examples plainly prove, "that however men might submit voluntarily in the primitive simplicity of early ages, or be subjected by conquest to a government without a constitution, yet they were never long in discovering, that (as Hooker observes, Eccles. Pol. l. 1. § 10.) "to live by one man's will became the cause of all men's misery;" and therefore "they soon rejected the yoke,

or made it fit easy on their necks." By the *constitution* of a country, says archdeacon Paley (*Princ. of Moral and Political Philos.* vol. ii. chap. 7.), is meant so much of its law, as relates to the designation and form of the legislature; the rights and functions of the several parts of the legislative body; the construction, office, and jurisdiction of courts of justice. Accordingly, the constitution is one principal division, section, or title of the code of public laws; distinguished from the rest only by the superior importance of the subject of which it treats: and therefore the terms *constitutional* and *unconstitutional*, mean legal and illegal. In England the system of public jurisprudence is made up of acts of parliament, of decisions of courts of law, and of immemorial usages: consequently, these are the principles of which the English constitution itself consists; the sources from which all our knowledge of its nature and limitations is to be deduced, and the authorities to which all appeal ought to be made, and by which every constitutional doubt and question can alone be decided. This plain and intelligible definition will serve to discover the error of those writers who absurdly confound what is constitutional with what is expedient, and what is unconstitutional with any measure which they adjudge in any respect to be detrimental or dangerous; and also of others, who ascribe a kind of transcendent authority, or mysterious faculty, to the constitution, as if it were founded in some higher original than that which gives force and obligation to the ordinary laws and statutes of the realm, or were inviolable on any other account than its intrinsic utility. An act of parliament, in England, can never be unconstitutional, in the strict and proper acceptation of the term; but in a lower sense it may, *viz.* when it militates with the spirit, contradicts the analogy, or defeats the provision of other laws, made to regulate the form of government. Most of those, says our author, who treat of the British constitution, consider it as a scheme of government formerly planned and contrived by our ancestors, in some certain era of our national history, and as set up in pursuance of such regular plan and design. This is intimated in the expressions of those who speak of the "principles of the constitution," of bringing back the constitution to its "first principles," of restoring it to its "original purity," or "primitive model." This, in his opinion, is an erroneous conception of the subject. No such plan was ever formed; consequently no such first principles, original model, or standard exist; that is, as he conceives, there never was a date, or point of time in our history, when the government of England was to be set up anew, and when it was referred to any single person, or assembly, or committee, to frame a charter for the future government of the country; or when a constitution, so prepared and digested, was by common consent received and established. The great charter, and the bill of rights, were wise and strenuous efforts to obtain security against certain abuses of regal power, by which the subject had been formerly aggrieved; but these were, either of them, much too partial modifications of the constitution to give it a new original. The constitution of England, like that of most countries in Europe, hath grown out of occasion and emergency; from the fluctuating policy of different ages; from the contentions, successes, interests, and opportunities of different orders and parties of men in the community. It resembles one of those old mansions, which, instead of being built all at once, after a regular plan, and according to the rules of architecture, at present established, has been reared in different ages of the art, has been altered from time to time, and has been continually receiving additions and repairs suited to the taste, fortune, or convenience of its successive proprietors; to such a building

we look in vain for the elegance and proportion, for the just order and correspondence of parts, which we expect in a modern edifice; and which external symmetry, after all, contributes much more perhaps to the amusement of the beholder, than the accommodation of the inhabitant.

Some of our approved historians, and political writers, have discovered, as they conceive, the origin of the British constitution in the government of the Anglo-Saxons, brought hither from Germany and the northern countries. To this purpose, it is alleged, that the government of the northern nations, which established themselves on the ruins of Rome, was always extremely free; and that the free constitutions then introduced, however impaired by the encroachments of preceding princes, still preserve an air of independence and legal administration, which distinguishes the European nations; and in this part of the globe maintains sentiments of liberty, honour, equity, and valour, superior to the rest of mankind, it is said to have owed these advantages chiefly to the seeds implanted by the generous barbarians of the north. The Saxons who subdued Britain in the 5th century, as they enjoyed great liberty in their own country, obstinately retained that invaluable possession in their new settlement; and they imported into this island the same principles of independence, which they had inherited from their ancestors. The chieftains, (for such they were, more properly than kings or princes,) who commanded them in their military expeditions, still possessed a very limited authority; and as the Saxons exterminated, rather than subdued, the ancient inhabitants; they were indeed transplanted into a new territory, but preserved, without alteration, all their civil and military institutions. Their manners and customs were wholly German; and the same picture of a fierce and bold liberty, which is drawn by the master pencil of Tacitus, will suit those founders of the English government. The king, so far from being invested with arbitrary power, was only considered as the first among the citizens; and his authority depended more on his personal qualities, than on his station. The Anglo-Saxons, being an independent people, little restrained by law, and cultivated by science, were not very strict in maintaining a regular succession of their princes. Although they paid great regard to the royal family, and ascribed to it an undisputed superiority, they either had no rule, or none that was steadily observed, in filling the vacant throne; and present convenience, in that emergency, was more attended to than general principles. We are not, however, to suppose, that the crown was considered as altogether elective; and that a regular plan was traced by the constitution for supplying, by the suffrages of the people, every vacancy made by the demise of the first magistrate. All the changes which occurred in the royal succession, and indeed the ordinary administration of government, required the express concurrence, or at least the tacit acquiescence of the people. The Anglo-Saxon monarchies were not, strictly speaking, either elective or hereditary; and though the destination of a prince might often be followed in appointing his successor, they could not be regarded as wholly testamentary. The states by their suffrage might sometimes establish a sovereign; but they more frequently recognized the person whom they found established. Our knowledge of the Anglo-Saxon history is so imperfect, that it is not easy to ascertain all the prerogatives of the crown and privileges of the people, or to give an exact delineation of that government. It is probable, that the constitution might be somewhat different in the different kingdoms of the HEPTARCHY, and that it changed considerably during the course of six centuries, which elapsed from the first invasion of the Saxons, till the Norman conquest. It appears, however, that at all

times, and in all the kingdoms, there was a national council, called a *wittenagemot*, or assembly of the wise men, as the term imports, whose consent was requisite for enacting laws, and for ratifying the chief acts of public administration. The preambles to all the laws of Ethelbert, Ina, Alfred, Edward the Elder, Athelstan, Edmund, Edgar, Ethelred, and Edward the Confessor; even those to the laws of Canute, though a kind of conqueror, supply unquestionable proofs every where of a limited and legal government. But who were the constituent members of this *wittenagemot*, is a question that has not been determined with certainty by antiquarians. (See *WITTENAGEMOT*.) Nevertheless, it is certain, that whatever we may determine concerning the *wittenagemot*, in whom, with the king, the legislature resided, the Anglo-Saxon government, in the period preceding the Norman conquest, was become extremely aristocratical; the royal authority was very limited; and the people, even if admitted to that assembly, were deemed of little or no importance and consideration. Upon the whole, notwithstanding the seeming liberty, or rather licentiousness, of the Anglo-Saxons, the great body even of the free citizens, in those ages, really enjoyed much less true liberty, than where the execution of the laws is the most severe, and where subjects are reduced to the strictest subordination and dependence on the civil magistrate. But though the general strain of the Anglo-Saxon government seems to have become aristocratical, there were still considerable remains of the ancient democracy, which, though insufficient to protect the lowest of the people, without the patronage of some great lord, might nevertheless give security, and some degree of dignity, to the gentry or inferior nobility. The administration of justice, in particular, by the courts of the decenary, the hundred, and the county, was well calculated to defend general liberty, and to restrain the power of the nobles. The county courts, in particular, where all the freeholders were admitted, formed a wide basis for the government, and furnished considerable checks on the aristocracy. However, the great influence of the lords over their slaves and tenants, the clientship of the burghers, the total want of a middle class of men, the extent of the monarchy, the loose execution of the laws, and the continued disorders and convulsions of the state, sufficiently evince, that the Anglo-Saxon government became at last extremely aristocratical; and the events, during the period immediately preceding the conquest, confirm this inference or conjecture. If we direct our views to a period much more ancient than that of the establishment of the Anglo-Saxon government, and prior to the invasion of the Romans, we shall find that the governments of the Britons, who were divided into many small nations or tribes, though monarchical, were free, as well as those of all the Celtic nations; and the common people seem to have enjoyed more liberty among them, than among the nations of Gaul, from whom they were descended.

Other writers have maintained, that the government, established by the Anglo-Saxon princes, had little more affinity with the present constitution, than the general relation common indeed to all the governments founded by the northern nations, that of having a king and a body of nobility; and the ancient Saxon government is said to be "left us in story," (according to the statement of sir William Temple—Int. to the Hist. of England,) but like to many antique, broken, or defaced pictures, which may still represent something of the costume and fashions of those ages, though little of the true lines, proportions, or resemblance." According to these writers, it is at the era of the conquest, that we are to look for the real foundation of the English constitution. From that period, says Spelman, "novus seclorum

nascitur ordo." William of Normandy, it is said, having defeated Harold, and made himself master of the crown, subdued the ancient fabric of the Saxon legislation; he exterminated, or expelled, the former occupiers of lands, in order to distribute their possessions among his followers, and established the feudal system of government, as better adapted to his situation, and indeed the only one of which he possessed a competent idea. A distinction, however, ought to be made between the government of William I., which was very tyrannical, and the constitution established under him in this kingdom, which was no absolute monarchy, but an ingraftment of the feudal tenures and other customs of Normandy upon the ancient Saxon laws of Edward the Confessor. He more than once swore to maintain those laws, and in the 4th year of his reign, confirmed them in parliament; yet not without great alterations, to which the whole legislature agreed, by a more complete introduction of the strict feudal law, as it was practised in Normandy.

But that the liberty of the subject was not destroyed by these alterations to the degree which some writers have supposed, plainly appears, says lord Lyttelton, (Hist. Henry II. vol. i. p. 59.) by the very statutes which William enacted; in one of which we find an express declaration, "that all the freemen in his kingdom should hold and enjoy their lands and possessions free from all unjust exactions and from all tallage; so that nothing should be exacted or taken of them but their free service, which they by right owed to the crown, and were bound to perform." It is further said, "that this was ordained and granted to them as an hereditary right for ever, by the common council of the kingdom; which very remarkable statute is justly styled by a learned author (Nathanael Bacon) *the first Magna Charta of the Normans*; and it extended no less to the English than to the Normans. But it was ill observed by William, who frequently acted as if his will had been the only law to both nations. It must be also allowed, that by the interposition of many *Mesne Lords* between the crown and the people, and by many offices of judicature and military command being rendered hereditary, which under the Saxons had been either elective, or granted for a short time, the constitution became more aristocratical than before, more unequally balanced, and, in some respects, more oppressive to the inferior orders of freemen. Nor was the condition of the nobles themselves to be envied. For there were certain burthens annexed to their system of fiefs, which, as they naturally grew out of that policy, were imposed on the highest vassals as well as on the lowest, and were more grievous than any which the Saxons had borne under their constitution. In process of time the excessive power arrogated and exercised by the king contributed to establish and guard the freedom of the British constitution; because this excess gave rise to the spirit of union and of concerted resistance. Possessed of extensive demesnes, the king found himself independent; and vested with the most formidable prerogatives, he crushed at pleasure the most powerful barons in the realm. It was, therefore, only by close and numerous confederacies that those barons could resist the tyranny of the sovereign; and for this purpose they were constrained to associate the people with themselves, and to render them partakers of public liberty. As acts and instances of tyranny on the part of the conqueror were multiplied, the confederacies of the barons and of their vassals became more general and more vigorous; and the people at large, instructed and inspired by their leaders, stipulated conditions for themselves, and insisted that, for the future, every individual should be intitled to the protection

tion of the laws. Thus did those rights, with which the lords had flung themselves, in order to oppose the tyranny of the crown, become a bulwark, which was, in time, to restrain their own. It was in the reign of Henry I., about forty years after the conquest, that the operation of these causes produced effect. As the nation had resolved to bestow the crown on a prince, who should acquire and hold it under no other claim than a *compact* with his people, the title of the king became thus a kind of security for the liberty of the subject. In order to give that liberty a more solid and lasting establishment, they demanded a charter; which Henry granted soon after his coronation, as he had sworn to do before he was crowned. By this he restored the Saxon laws which were in use under Edward the Confessor, 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 sanctions, by which the realm had been unjustly oppressed. Some of those 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 theirs, which were either the most burthenfome 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. "This," says Sir Henry Spelman, "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." These are therefore much mistaken, who have supposed 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 rights 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 Lord Lyttelton, this charter of Henry I. was more advantageous to liberty than *Magna Charta* itself. Henry II. in a parliament held in London, A. D. 1155, granted a charter of liberties confirming that of his grandfather, Henry I., already mentioned. In consequence of the legal rights established by this excellent prince and the mixture of Saxon customs, which mitigated and tempered the Norman institution, the constitution of England was the best feudal system subsisting, at that time, in any part of the world. The honour of establishing in the English constitution itinerant judges belongs to Henry II., by whom this institution was revived and regularly settled in the 22d year of his reign, with the advice and concurrence of his parliament held at Northampton. The extension of trials by juries to civil causes may also be well esteemed a principal glory of this reign. Although some vestiges of that method of trial appear among the Anglo-Saxons; yet Spelman says, that the use of trials by 12 men before the conquest was rare, and did not prevail in any great degree, till the reign of Henry II. (See *JURY* and *Grand Assize*.) The despotic reign of king John excited through the kingdom a general conse-

deracy against him and constrained him, A. D. 1215, to sign the famous deed, commonly called the great charter or *Magna Charta*, which either granted or secured very important liberties and privileges to every order of men in the kingdom; to the clergy, to the barons, and to the people. (See *MAGNA CHARTA*.) By this charter, the rigour of the feudal laws was greatly mitigated in favour of the lords; and conditions were also stipulated in favour of the numerous body of the people, who had concurred to obtain it, and who claimed, with sword in hand, share in that security which it was designed to establish. This charter was confirmed in parliament by king Henry III., A. D. 1217, with the addition of some articles to prevent the oppressions by sheriffs; and also with an additional charter of forests. Accordingly, these famous charters have subsisted nearly in their original form, during many generations, as the peculiar favourites of the English nation; and they have been justly esteemed as the most sacred rampart to national liberty and independence. As they secured the rights of all orders of men, they were anxiously defended by all, and became the basis, in a manner, of the English constitution, and a kind of original contract, which both limited the authority of the king, and ensured the conditional allegiance of his subjects. King Edward I. who made it a rule in his own conduct to observe, except on extraordinary occasions, the privileges secured to the barons by the great charter, acquired a right to insist upon their observance of the same charter towards their vassals and inferiors. By the statute (25 Edw. I.) called *Confirmatio Chartarum*, (the confirmation of which was renewed eleven times in the course of his reign,) he directed the great charter to be allowed as the common law; all judgments contrary to it are declared void; copies of it are ordered to be sent to all cathedral churches, and read twice a year to the people; and sentence of excommunication is directed to be as constantly denounced against all those, who by word, deed, or counsel, act contrary to it, or in any degree infringe it. He also, in the statute *De Tallagio non Concedendo*, (24 Edw. I.) decreed, that no tax should be laid, nor imposed levied, without the joint consent of the lords and commons. This important statute, in conjunction with *Magna Charta*, forms the basis of the English constitution. Under Edward II. the commons, feeling their importance, began to annex petitions to the bills by which they granted subsidies; and this was the dawn of their legislative authority. Under Edward III., they declared they would not, in future, acknowledge any law to which they had not expressly assented. Soon after this, they exercised a privilege, in which consists, at this time, one of the great balances of the constitution: they impeached, and procured to be condemned, some of the first ministers of state. Under Henry IV., they refused to grant subsidies before an answer had been given to their petitions. In a word, the fundamental articles of our free constitution have been asserted and confirmed by a multitude of statutes, (Sir Edward Coke is said to reckon thirty-two,) from Edward I. to Henry IV. Then, after a long interval, they were corroborated by the *petition of right*, which was a parliamentary declaration of the liberties of the people, assented to by king Charles I., in the beginning of his reign. This famous act was soon followed by the still more ample concession made by that unhappy prince to his parliament, before the fatal rupture between them; and by the many salutary laws, particularly the *habeas corpus*, passed under Charles II. To these succeeded the *bill of rights*, or declaration delivered by the lords and commons to the prince and princess of Orange, 13th February, 1688; and afterwards enacted in parli-

ment, when they became king and queen: which declaration terminates with these remarkable words: "And they do claim, demand, and insist upon, all and singular, the premises, as their undoubted right and liberties." And the act of parliament itself (t W. & M. ft. 2. c. 2.) recognises "all and singular the rights and liberties, asserted and claimed in the said declaration, to be the true, ancient, and indubitable rights of the people of this kingdom." The Révolution of 1688 may, therefore, be justly deemed the third grand epoch in the history of the English constitution. The great charter had marked out the limits within which the royal authority ought to be confined; some outworks were raised in the reign of Edward I.; but it was at the Revolution that the circumvallation was completed. "It was at this era," says De Lolme, "that the true principles of civil society were distinctly specified and fully established. By the expulsion of a king, who had violated his oath, the doctrine of Resistance, that ultimate resource of an oppressed people, was confirmed beyond a doubt. By the exclusion of a family, hereditarily despotic, it was finally determined, that nations are not the property of kings. The principles of Passive Obedience, the divine and indefeasible right of kings; in a word, the whole scaffolding of false and superfluous notions, by which the royal authority had till then been supported, fell to the ground: and in the room of it were substituted the more solid and durable foundations of the love of order, and a sense of the necessity of civil government among mankind." The liberty of the press, the bulwark and guardian of a free constitution, was, properly speaking, established four years afterwards, in consequence of the refusal of the parliament to continue any longer the restrictions to which it had before been subject. Finally, the liberties of the British constitution were again asserted at the commencement of the last century, in the *act of settlement*, (12 & 13 W. III. c. 2.) by which the crown was limited to his present majesty's illustrious house; and some new provisions were added, at the same fortunate era, for better securing our law, religion, and liberties, which the statute declares to be "the birth-right of the people of England," according to the ancient doctrine of the common law.

The distinguishing excellence of the British constitution, which has been sometimes called a mixed government, and sometimes a limited monarchy, consists in its being formed by a combination of the three regular species of government, *viz.* the monarchy, residing in the King; the aristocracy, in the House of Lords, and the democracy or republic being represented by the House of Commons. To this purpose Cicero declares himself of opinion, (in his *Fragmenta, de rep.* l. 2.) "esse optimè constitutum rempublicam, quæ ex tribus generibus illis, regali, optimo, et populari, sit modicè confusa." As the executive power of the laws, in the British constitution, is lodged in a single person, they have all the advantages of strength and dispatch, that are to be found in the most absolute monarchy: and as the legislature of the kingdom is entrusted to three distinct powers, entirely independent of each other; and as this aggregate body, actuated by different springs, and attentive to different interests, composes the British parliament, and has the supreme disposal of every thing; no inconvenience can be attempted by either of the three branches, which will not, according to the theory of the constitution, be withstood by one of the other two: each branch being armed with a negative power, sufficient to repel any innovation which it shall think inexpedient or dangerous. Whereas, if the supreme power were lodged in any one of the branches separately, we must be exposed to the inconveniences of

either absolute monarchy, aristocracy, or democracy; and so want two of the three principal ingredients of good polity, either virtue, wisdom, or power. If it were lodged in any two of the branches, *e.g.* in the king and house of lords, our laws might be providently made, and well executed, but they might not have always the good of the people in view: if lodged in the king and commons, we should want that circumspection and mediatory caution, which the wisdom of the peers is to afford: if the supreme rights of legislature were lodged in the two houses only, and the king had no negative on their proceedings, they might be tempted to encroach upon the royal prerogative, or perhaps to abolish the kingly office, and thereby weaken (if not totally destroy) the strength of the executive power. But the constitutional government of this island is so admirably tempered and compounded, that nothing can endanger or hurt it, but destroying the equilibrium of power between one branch of the legislature and the rest. For if events should happen, that the independence of any one of the three should be lost, or that it should become subservient to the views of the other two, there would soon be an end of our constitution. The legislature would be changed from that, which (upon the supposition of an original contract, either actual or implied) is presumed to have been originally set up, by the general consent and fundamental act of the society: and such a change, however effected, is, according to Mr. Locke, (on Government, part ii. § 212.) who, says judge Blackstone, perhaps carries his theory too far, at once into an entire dissolution of the bands of government; and the people thereby reduced to a state of anarchy, with liberty to constitute to themselves a new legislative power.

Archdeacon Paley, in his discussion of this subject, has stated the expedients by which the British constitution provides for the interest of its subjects, and for its own preservation. With a view to the first of these purposes, it promotes the establishment of salutary public laws, by rendering every citizen of the state capable of becoming a member of the senate, and by investing every senator with the right of propounding to the deliberation of the legislature whatever law he pleases. In order to the attainment of this object, it provides such representatives of the people, with respect to their rank, condition, and character, the mode of their election, as well as the publicity and utility of their parliamentary deliberations, as shall be most likely to answer the end of their appointment, and to satisfy their constituents. (See COMMONS and PARLIAMENT.) For preventing destructive contentions for the supreme power, and for securing the advantages of decision, secrecy, and dispatch, which belong to the resolutions of monarchical councils, and other important objects, the constitution has committed the executive government to the administration and limited authority of our hereditary king. (See KING.) The British constitution has also guarded the safety of the people in the two articles of *taxation* and *punishment* by the most studious precautions. With regard to *taxation*, this business is exclusively reserved to the popular part of the constitution, who, it is presumed, will not tax themselves, nor their fellow-subjects, without being first convinced that the aids which they grant are necessary. The application of the public supplies is also watched with the same circumspection as the assessment. The national expenditure is accounted for in the house of commons, and computations of the charge, appropriated to any particular purpose, are previously submitted to the same tribunal. In the infliction of *punishment*, the power of the crown, and of the magistrate appointed by the crown, is confined by the most precise limitations: the offender's guilt, being submitted to the judg-

ment of 12 men, of his own order, and the nature and degree of the punishment being ascertained by fixed laws. In order to prevent arbitrary or clandestine confinement, with all its injurious consequences, the constitution has provided with extreme solicitude. The ancient writ of habeas corpus; the habeas corpus act of Charles II., and the practice and determinations of our sovereign courts of justice founded upon these laws, afford a complete remedy for every conceivable case of illegal imprisonment. (See these articles; and see also TREASON.) The constitution has also provided for its own preservation, by securing each part of the legislature in the exercise of the powers assigned to it, from the encroachment of the other parts. This security is sometimes called the *balance of the constitution*; and the political equilibrium, which this phrase denotes, consists in two contrivances—a balance of power, and a balance of interest. By the former is meant, that one part of the legislature possesses no power, the abuse, or excess of which, is not checked by some antagonistic power residing in another part. Thus, the power of the two houses of parliament to frame laws, is checked by the king's negative; and, on the other hand, the application of this negative is checked by the privilege which parliament possesses, of refusing supplies of money to the exigencies of the king's administration. The constitutional maxim "that the king can do no wrong," is balanced by another maxim, not less constitutional, "that the illegal commands of the king do not justify those who assist, or concur, in carrying them into execution;" and also, "that the acts of the crown acquire not any legal force, until authenticated by the subscription of some of its great officers." In connection with this maxim, we might mention the check which parliament holds over the administration of public affairs, in the practice of addressing the king, for the purpose of knowing by whose advice he resolved upon a particular measure, and of punishing the authors of that advice for their pernicious counsel. Again, the power of the crown to direct the military force of the kingdom, is balanced by the annual necessity of reporting to parliament for the maintenance and government of that force. The prerogative of the king, in declaring war, is checked by the privilege which the house of commons possesses, of granting or withholding supplies for carrying it on. The king's choice of his ministers, is controlled by the obligation he is under of appointing those men to offices in the state, who are found capable of managing the affairs of his government, with the two houses of parliament.

By the *balance of interest*, which accompanies and gives efficacy to the *balance of power*, is meant this, that the respective interests of the three estates of the empire, are so disposed and adjusted; that whichever of the three shall attempt any encroachment, the other two shall unite in resisting it. The exercise of arbitrary power, on the part of the king, would contract the power and privileges of the commons, degrade their dignity, and endanger their independence. It would also be no less formidable to the grandeur of the aristocracy than fatal to the liberty of the republic; as it would reduce the nobility from their hereditary participation in the national councils, which constitutes their true greatness, to the low and servile state of making a part of the empty pageantry of a despotic court. On the other hand, if the commons should trench upon the crown, the house of lords, attached to the monarchy which gives them their distinction, would instantly receive an alarm from every new stretch of popular power. If the nobles themselves should attempt to revive the superiority, which was exercised by their ancestors under the feudal constitution, the king and the people would alike remember how the one had been

insulted, and the other enslaved, by that barbarous tyranny. After all it should be remembered, that there is a wide difference between the constitution, or the theory of government, and the actual exercise of it, nor should those anomalies, or irregularities, which occur in peculiar circumstances, or periods of the public administration, be charged on the constitution itself. It is a well-known, and often cited observation of Montesquieu, in reference to the British constitution, "as all things have an end, the state we are speaking of (viz. England,) will lose its liberty, and perish. Have not Rome, Sparta, and Carthage perished? It will perish when the legislative powers shall be more corrupt than the executive." Lyttelton's Hist. of Hen. [II. Hume's Hist. vol. i. ii. and iii. De Lolme's Constitution of England. Blackst. Com. v. i. Paley's Principles, vol. ii. ch. 7. Rapin's Hist. of Eng. vol. i. Montefq. Spirit of Laws, vol. i. b. xi. chap. 6.

CONSTRUCTION, compounded of *con*, together; and *stringere*, to tie or close up; the act of binding, or drawing the parts of a thing close together.

CONSTRUCTOR CUNNI, in *Myology*, a name applied to the sphincter muscle of the vagina. See GENERATION, organs of.

CONSTRUCTOR IJHNI FAUCIUM, one of the muscles belonging to the soft palate. See DEGLUTITION.

CONSTRUCTOR NASI. See COMPRESSOR.

CONSTRUCTOR ORIS. See ORBICULARIS ORIS.

CONSTRICTORES PHARYNGIS. See DEGLUTITION.

CONSTRUCTION, in *Geometry*, the art or manner of drawing, or describing a figure, scheme, the lines of a problem, or the like. The equality of the lines of such a triangle, &c. is demonstrated from their construction.

CONSTRUCTION OF EQUATIONS, is the method of reducing a known equation into lines and figures; whereby the truth of the rule, canon, or equation, may be demonstrated geometrically. Or, it is the method of finding the roots or unknown quantities of an equation, by the geometrical constructions of right lines or curves, according to the order or rank of the equation. The roots of any equation may be determined; that is, the equation may be constructed, by the intersections of a straight line with another line or curve of the same dimensions with those of the equation to be constructed; for the roots of the equation are the ordinates of the curve at the points of intersection with the right line; and it is well known, that a curve may be cut by a right line in as many points as its dimensions amount to. Thus, a simple equation will be constructed by the intersection of one right line with another: a quadratic equation, or an affected equation of the second rank, by the intersections of a right line with a circle, or any of the conic sections, which are lines of the second order, and which may be cut by the right line in two points, which will give the two roots of the quadratic equation. A cubic equation may be constructed by the intersection of the right line with a line of the third order, &c. &c. But if, instead of the right line, some other line of a higher order be used; then the second line, whose intersections with the former are to determine the roots of the equation, may be taken as many dimensions lower as the former is taken higher. And, in general, an equation of any degree may be constructed by the intersections of two lines whose dimensions, multiplied together, produce the dimension of the given equation. Thus, the intersections of a circle with the conic sections, or of those with each other, will construct the biquadratic equations or those of the fourth power, because $2 \times 2 = 4$; and the intersections of the circle or conic sections with a

line of the third order, will construct the equations of the fifth and sixth powers, &c. &c. Hence it appears, that the method of constructing equations is different, according to the diversity of equations.

To construct a simple equation. The whole mystery consists in this, that the fractions, to which the unknown quantity is equal, be resolved into proportional terms: the method of which will be better shewn by examples than it can be taught by many rules.

1. Suppose $x = \frac{ab}{c}$, or $cx = ab$; then will $c : a :: b : x$, to be determined by the method of finding a fourth proportional.

2. If $x = \frac{b^2}{a}$, or $ax = b^2$; then $a : b :: b : x$, a third proportional to a and b .

3. Suppose $x = \frac{abc}{de}$; let $d : a :: b : \frac{ab}{d}$. This fourth proportional found, being called g ; $x = \frac{g \cdot c}{e}$, which is therefore found as in the first case.

4. Suppose $x = \frac{a^2 - b^2}{c}$, or $cx = a^2 - b^2$. Since $a - b$ is a fourth proportional to c , $a + b$ and $a - b$.

5. Suppose $x = \frac{ab}{c} + \frac{ad}{be}$. Find, as before, $g = \frac{ab}{c}$, and $f = \frac{ad}{be}$. Then will $x = g + f$ be the sum of the lines g and f .

6. Suppose $x = \frac{a^2b + bcd}{af + cg}$. Seek $\frac{cg}{a}$, and let $f + \frac{cg}{a} = b$; then will $af + cg = ab$; consequently, $x = \frac{a^2b + bcd}{ab}$. Thus is the present case brought to the preceding one.

7. Suppose $x = \frac{a^2b - bad}{af + bc}$. Find $\frac{af}{b}$, and make $\frac{af}{b} + c = b$; then will $af + bc = bb$. Hence, $x = \frac{a^2b - bad}{bb} = \frac{a^2 - ad}{b}$. Consequently, $bx = a^2 - ad = a \times a - d$; and $b : a :: a - d : x$.

8. Suppose $x = \frac{a^2 + b^2}{c}$, or $cx = a^2 + b^2$. Construct the triangle ABC (*Plato's Analysis, fig. 8.*) whose side $AB = a$, $BC = b$; then will $AC = \sqrt{a^2 + b^2}$. Let $AC = m$; then will $a^2 + b^2 = m^2$. And therefore $x = \frac{m^2}{c}$; consequently, $c : m :: m : x$, a third proportional to c and m .

9. Suppose $x = \frac{a^2 - b^2}{c}$. On AB (*fig. 9.*) = a , describe a semicircle, and therein set off $AC = b$. Since the triangle ACB is rectangular; $CB = \sqrt{a^2 - b^2}$. Let $CB = m$; then will $x = \frac{m^2}{c}$; consequently, $c : m :: m : x$.

10. Suppose $x = \frac{a^2b + bcd}{af + bc}$. Say, $b : a :: f : \frac{fa}{b}$; and let $\frac{fa}{b} + c = b$; then will $bc + af = bb$. Hence, $x = \frac{a^2b + bcd}{bb} = \frac{a^2 + cd}{b}$. Find betwixt $AC = c$ (*fig. 10.*) and $CB = d$,

a mean proportional $CD = \sqrt{cd}$. Let $CE = a$; then will $DE = \sqrt{a^2 + cd}$. Call this m ; then will $x = \frac{m^2}{b}$; consequently, $b : m :: m : x$.

To construct a quadratic equation geometrically. Since quadratic equations may be reduced to simple ones, those may likewise be constructed from the methods already laid down: for if the equation be pure, $x^2 = ab$; then will $a : x :: x : b$; wherefore we shall find $x = \sqrt{ab}$; and therefore if between $AC = a$, and $BC = b$, we find a mean proportional DC , this will be equal to x .

If the quadratic be affected, *e. g.* $x^2 + 2ax = b^2$, then form the right-angled triangle ACB (*fig. 11.*), whose base AB is a , and perpendicular BC is b ; and on the centre A , with the radius AC , describe the semicircle DCE , then will DB and DE be the two roots, *viz.* the affirmative and the negative, of the given quadratic equation. For by resolving the quadratic, we shall have $x = a \pm \sqrt{b^2 + a^2} = AB \pm \sqrt{BC^2 + AB^2} = AB \pm \sqrt{AC^2} = AB \pm AC$, *i. e.* DB or BE , with their proper signs. If the quadratic be $x^2 - 2ax = b^2$, then the construction will be the same with that of the preceding one, $x^2 + 2ax = b^2$. But if the form be $2ax - x^2 = b^2$; form a right-angled triangle FGH (*fig. 12.*), whose hypotenuse FG is a , and perpendicular GH is b ; then with the radius FG and centre F describe a semicircle IGK ; and IH and HK will be the two roots of the given equation $2ax - x^2 = b^2$, or $x^2 - 2ax = b^2$. *Maclaurin's Algebra, part iii. chap. 2. and Simpson's Algebra, p. 269.*

To construct cubic and biquadratic equations. The roots of a biquadratic equation may be determined by the interfections of two conic sections; for the equation by which the ordinates from the four points in which these conic sections may cut one another can be determined, will arise to four dimensions; and the conic sections may be assumed in such a manner, as to make this equation coincide with any proposed biquadratic: so that the ordinates from these four interfections will be equal to the roots of the proposed biquadratic.

If one of the interfections of the conic section falls upon the axis, then one of the ordinates vanishes, and the equation by which these ordinates are determined, will then be of three dimensions only, or a cubic; to which any proposed cubic equation may be accommodated. So that the three remaining ordinates will be the three roots of that proposed cubic. The conic sections for this purpose should be such as are most easily described. The circle may be one, and the parabola is usually assumed for the other.

Let APE (*fig. 13.*) be the common Apollonian parabola. Take on its axis the line AB = half of its parameter. Let C be any point in the plane of the parabola, and from it as a centre describe, with any radius CP , a circle meeting the parabola in P . Let PM , CD , be perpendiculars on the axis in M and D , and let CN , parallel to the axis, meet PM in N .

Then will always $C P^2 = C N^2 + N P^2$ (47 E. 1.)

Put $C P = a$, the parameter of the parabola = b , $A D = c$, $D C = d$, $A M = x$, $P M = y$.

Then $C N^2 = (x + c)^2$, $N P^2 = (y + d)^2$; and $x + c + y + d = a$. $(x - c)^2 = a^2$. ($x - c$ is the difference of x and c indefinitely, whichever of the two is greatest. That is, $x^2 \pm 2cx + c^2 + y^2 \pm 2dy + d^2 = a^2$. But from the nature

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ture of the parabola, $y^2 = bx$, and $x^2 = \frac{y^4}{b^2}$; substituting therefore these values for x^2 , and x , it will be $\frac{y^4}{b^2} \pm \frac{2cy^2}{b} + y^2 \pm 2dy + c^2 + d^2 - a^2 = 0$. Or, multiplying by b^2 , $y^4 \pm 2bc + b^2 \times y^2 \pm 2d^2 \times y + c^2 + d^2 - a^2 \times b^2 = 0$. Which may represent any biquadratic equation that wants the second term; since such values may be found for a, b, c , and d , by comparing this with any proposed biquadratic, as to make them coincide. And then the ordinates from the points, P, P, P, P, on the axis will be equal to the roots of that proposed biquadratic. And this may be done, though the parameter of the parabola (*viz.* b) be given: that is, if you have a parabola already made or given, by it alone you may resolve all biquadratic equations, and you will only need to vary the centre of your circle and its radius.

If the circle described from the centre, C, pass through the vertex A, (*fig.* 14.) then $CP^2 = CA^2 = CD^2 + AD^2$, that is, $a^2 = d^2 + c^2$; and the last term of the biquadratic ($c^2 + d^2 - a^2$) will vanish; therefore, dividing the rest by y , there arises the cubic, $y^3 \pm 2bc + b^2 \times y \pm 2d^2 = 0$. Let the cubic equation proposed to be resolved be $y^3 \pm py \pm r = 0$. Compare the terms of these two equations, and you will have $\pm 2bc + b^2 = \pm p$, and $\pm 2d^2 = \pm r$, or, $\mp c = \frac{b}{2} \mp \frac{p}{2b}$, and $d = \pm \frac{r}{2b}$. From which you have this construction of the cubic $y^3 \pm py \pm r = 0$, by means of any given parabola APE.

From the point B take in the axis (*forward, if the equation has -p, but backwards, if p is positive*) the line BD = $\frac{p}{2b}$; then raise the perpendicular DC = $\frac{r}{2b}$, and from C describe a circle passing through the vertex A, meeting the parabola in P, so shall the ordinate PM be one of the roots of the cubic $y^3 \pm py \pm r = 0$.

The ordinates that stand on the same side of the axis with the centre C are negative or affirmative, according as the last term r is negative or affirmative; and those ordinates have always contrary signs that stand on different sides of the axis. The roots are found of the same value, only they have contrary signs, when r is positive as when it is negative; the second term of the equation being wanting.

A cubic equation, that has all its roots equal, may be constructed by a circle. Let the radius OB (*fig.* 15.) = R, the sine EF = s , GH the sine of the arc GB or 3 BE. Then, by trigonometry, $3s - \frac{4s^3}{3R} = GH$. Draw CD parallel to AB, and put SF = c , ES = x , GH = b ; then $c + x = s$, whence $3 \times c + x - \frac{4}{3R} \times (c + x)^3 = b$; and this reduced will give $x^3 + 3cx^2 + 3ccx + c^3 - \frac{3}{4}RR + \frac{1}{4}bRR = 0$.

$$-\frac{3}{4}RR + \frac{1}{4}bRR = 0.$$

$$-\frac{3}{4}RR$$

Suppose this cubic equation to be given; *viz.* $x^3 + px^2 + qx + r = 0$. Comparing this with the former, and equating the coefficients, we shall have $p = 3c$, and $c = \frac{1}{3}p$; also $q = 3cc - \frac{3}{4}RR = \frac{1}{3}p^2 - \frac{3}{4}RR$; whence

$$R = \frac{2}{3} \sqrt{pp - 3q}, \text{ and } r = c^2 + \frac{1}{4}bRR - \frac{3}{4}cRR,$$

and $b = \frac{9r - pq}{pp - 3q} + \frac{2}{3}p$. Hence we obtain the following rule for the solution of the given equation $x^3 + px^2 + qx + r = 0$. With the radius $\frac{2}{3} \sqrt{pp - 3q}$ describe the circle BGA K (*fig.* 16.) Draw the diameter AB, and CD parallel to it at the distance of $\frac{1}{3}p$; above it, if it be $+p$, but below it, if it be $-p$. Draw also ZG parallel to AB, at the distance $\frac{9r - pq}{pp - 3q} + \frac{2}{3}p$, above it, if it be affirmative, or below it, if negative. Let it cut the circle in G.

Take the arc BP = $\frac{1}{3}BG$, and make PQ = QK = KP. From the points P, Q, K, let fall perpendiculars upon the line CD, which will be the roots of the equation; the affirmative above the line, and the negative below it. N. B. If $3q$ be greater than pp , the equation is impossible; for in this case the equation has two impossible roots. Also,

if $p = 0$, then the radius of the circle OB = $\frac{2}{3} \sqrt{-3q}$, and CD coincides with AB; and the distance of ZG from AB is $-\frac{3r}{q}$. And if q be affirmative, the equation is impossible. These constructions are easy: *e.g.* 1. Let $x^3 + 9x^2 - 22x - 120 = 0$. Here the radius OB = $\frac{2}{3}$

$\sqrt{pp - 3q} = \frac{2}{3} \sqrt{81 + 60} = 8.0829$, and $\frac{1}{3}p = 3$, the distance of CD above AB. And $\frac{9r - pq}{pp - 3q} + \frac{2}{3}p = \frac{-1080 + 198}{81 + 66} + \frac{2}{3} \times 6 = -6 + 6 = 0$, the distance of GZ from AB, which therefore coincides with it; and the arc BG, and also its third part is 0, and P falls on B; and making PQ = QK = KP, and letting fall perpendiculars on CD, we shall have PS = -3, QT = +4, and KT = -10, the three roots required.

E. G. 2. Suppose $x^3 - 17x^2 + 82x - 120 = 0$. The radius OB (*fig.* 18.) = $\frac{2}{3} \sqrt{289 - 246} = 4.37$; $\frac{1}{3}p = -5.66$, the distance of CD below AB, and $\frac{9r - pq}{pp - 3q}$

$+\frac{2}{3}p = \frac{-1080 + 1394}{289 - 246} - \frac{34}{3} = 7.302 - 11.333 = -4.031$, the distance of GZ below AB. Take BP the third part of BG, and making PQ = QK = KP; and measuring the perpendiculars upon CD, we have PS = +4, QT = +10, and KV = +3, the roots of the equation.

E. G. 3. Let $y^3 - 13y + 12 = 0$. In this example $p = 0$, and therefore CD (*fig.* 19.) coincides with AB; and the radius OB = $\frac{2}{3} \sqrt{-3q} = \frac{2}{3} \sqrt{39} = 4.18$; and $-\frac{3r}{q} = \frac{-36}{-13} = 2.77$, the distance of ZG above AB. Take the arc BP = $\frac{1}{3}$ arc BG, and make PQ = QK = KP, and let fall perpendiculars on AB; then PS = +1, QT = +3, and KV = -4, will be the roots required. ff

CONSTRUCTION.

If the roots of a cubic equation, $x^3 - qx + r = c$, be possible, they may be found by means of a table of cosines. Let $\triangle DAC$ (fig. 20.) be an angle whose cosine, to the radius m , is x ; in AD take $AB = m$; from B , as a centre, with the radius BA , describe a circle cutting AM in C , and from C , with the same radius, describe a circle cutting AD in D ; join BC , CD , and draw BK , DM , at right angles to AM , and CL at right angles to AD . Then, the triangles BAC and BCD being isosceles, the angles BAC and BCA are equal, as also CBD and CDB ; and the perpendiculars BK , CL , bisect the bases AC , BD . Also, the angle $DBC = BAC + BCA = 2BAC$; and the angle $DCM = CAD + CDA = CAD + CBD = CAD + 2CAD = 3CAD$. Let CM , the cosine of the angle DCM to the radius m , be called c ; thence, from the similar triangles ABK , ACL ,

$$AB : AK :: AC : AL, \text{ or } m : x :: 2x : \frac{2x^2}{m} = AL;$$

$$\text{and } AL - AB = \frac{2x^2}{m} - m = BL; \text{ hence } AD, \text{ or } AL + BL = \frac{4x^2}{m} - m;$$

$$\text{Again, } AB : AK :: AD : AM, \text{ or } m : x :: \frac{4x^2}{m} - m : \frac{4x^3 - m^2x}{m^2} =$$

$$AM, \text{ and } AM - AC = CM = \frac{4x^3}{m^2} - 3x = c; \text{ therefore } 4x^3 - 3m^2x = m^2c, \text{ and } 4x^3 - 3m^2x - m^2c = 0.$$

Let the equation $4x^3 - 3m^2x - m^2c = 0$, or $x^3 - \frac{3m^2}{4}x - \frac{m^2c}{4} = 0$, be made to coincide with the equation

$$x^3 - qx + r = 0; \text{ that is, let } \frac{3m^2}{4} = q, \text{ and } \frac{m^2c}{4} = -r, \text{ or } m = \sqrt{\frac{4q}{3}} \text{ and } c = -\frac{3r}{q}; \text{ then, from a table of}$$

cosines, find the angle whose cosine is $-\frac{3r}{q}$ to the radius

$$\sqrt{\frac{4q}{3}}, \text{ and the cosine of one-third of this angle, to the same radius, is one value of } x. \text{ Hence it follows, 1. That if } A \text{ be the arc whose cosine is } c, \text{ and } P \text{ the whole circumference, } c \text{ is also the cosine of } A + P, \text{ or } A + 2P; \text{ therefore the cosines of } \frac{A + P}{3}, \text{ and } \frac{A + 2P}{3}, \text{ are also values}$$

of x . 2. Since the radius is greater than the cosine,

$$\sqrt{\frac{4q}{3}} \text{ is greater than } -\frac{3r}{q}, \text{ or } \frac{4q}{3}; \text{ is greater than } \frac{9r^2}{q^2}; \text{ that is, } \frac{q^3}{27} \text{ is greater than } \frac{r^2}{4}; \text{ therefore this solution can only be}$$

applied when the roots of the cubic equations are possible.

Vieta's in his "Canonica Rerensioe affectuum geometricarum," and Ghettaldus, in his "Opus posthumum de Resolutione et Compositione Mathematica," and also Des Cartes, in his "Geometria," have shewn how to construct simple and quadratic equations. Des Cartes has also shewn how to construct cubic and biquadratic equations, by the intersection of a circle and parabola, and the same has been done by Baker in his "Clavis Geometrica," or "Geometrical Key." (See the article BAKER.) But the genuine foundation of all their constructions was first laid and explained by Salsus in his "Mesolabium," pars 2. This doctrine is also treated of by De la Hire, in a small treatise, entitled, "La Construction des Equations Analytiques," annexed to his "Conic Sections." Sir Isaac Newton, at

the end of his "Algebra," has given the construction of cubic and biquadratic equations mechanically; and also by the conchoid and cissoid, as well as the conic sections. See also Dr. Halley's construction of cubic and biquadratic equations, and Colson's in the Philosophical Transactions; the Marquis de l'Hospital's "Traité Analytique des Sections Coniques," lib. iv.; and Maclaurin's "Algebra," part iii. chap. 3. However, the intent of these geometrical constructions is more readily answered by the method of extracting roots by converging series and approximation; and therefore this mode of obtaining them is very much less safe.

CONSTRUCTION, or *Syntax*, in *Grammar*, denotes the arranging and connecting of the words of a sentence, according to the rules of the language. See SYNTAX.

The construction is generally more simple, easy, and direct, in the modern tongues than in the ancient: we have very few of those inversions which occasion so much embarrassment and obscurity in the Latin: our thoughts are usually delivered in the same order in which the imagination conceives them: the nominative case, for instance, always precedes the verb, and the verb goes before the oblique cases it governs.

The Greeks and Latins, M. St. Evremont observes, usually end their periods, where, in good sense and reason, they should have begun them; and the elegance of their language consists, in some measure, in this capricious arrangement, or rather in this transposal and disorder of the words.

Construction is either *simple* or *figurative*. *Simple*, is that wherein all the terms, or parts of the discourse, are placed in their natural order.

Figurative construction, is that wherein we recede from this simplicity, and use certain expressions, shorter, and more elegant than nature affords.

The syntax, or construction of words, is distinguished into two parts, *concord* and *government*, or *regimen*.

CONSTRUCTION of *deeds* and *wills*, in *Law*, is regulated by some general rules and maxims, which have been laid down by courts of justice. These are, 1. That the construction be favourable, and as near the minds and apparent intents of the parties, as the rules of law will admit. For the maxims of law are, that "verba intentioni debent inferri;" and "benigne interpretatur chartas propter simplicitatem laicorum." And therefore the construction must also be reasonable, and agreeable to common understanding. 2. That "quoties in verbis nulla est æquivocitas, ibi nulla expositio contra verba fienda est;" but that where the intention is clear, too minute a strictness is not laid on the strict and precise signification of words; "nam qui interpret in litera, hæret in cortice." Therefore, by a grant of a remainder a reversion may well pass, and *in converso*. Another maxim of law is, that "mala grammatica non vitiant chartas;" neither false English nor false Latin will destroy a deed. 3. That the construction be made upon the entire deed, and not merely upon disjointed parts of it. "Nam ex antecedentibus et consequentibus fit optima interpretatio." And therefore that every part of it be (if possible) made to take effect; and no word but what may operate in some shape or other. "Nam verba debent intelligi cum effectu, ut res magis valeat quam pereat." 4. That the deed be taken most strongly against him that is the agent or contractor, and in favour of the other party. "Verba fortius accipiuntur contra proferentem." As, if tenant in fee-simple grants to any one an estate for life, generally, it shall be construed an estate for the life of the grantee. 5. That, if the words will bear two senses, one agreeable to, and another

other against law, that sense be preferred which is most agreeable to it. As, if tenant in tail lets a lease to have and to hold during life generally, it shall be construed to be a lease for his own life only, for that stands with the law; and not for the life of the lessee, which is beyond his power to grant. 6. That, if there be in a deed two clauses to totally repugnant to each other, that they cannot stand together, the first shall be received, and the latter rejected. In this respect it differs from a will: for there, of two such repugnant clauses the latter shall stand. In both cases, however, we should endeavour to reconcile them. 7. That a devise be most favourably expounded, to pursue if possible the will of the donor, who, for want of advice or learning, may have omitted the legal or proper phrases. Hence the law often dispenses with the want of words in devises, that are absolutely requisite in all other instruments. Thus, a fee may be conveyed without words of inheritance; and an estate-tail without words of procreation. By a will also an estate may pass by mere implication, without any express words to direct its course. With regard to a will, in this respect, there is no distinction between the rules of law and of equity; for the will, being considered in both courts in the light of a limitation of uses, is construed in each with equal favour and benignity, and expounded rather on its own particular circumstances, than by any general rules of positive law. Blackit. Comm. b. ii. ch. 23.

CONSTRUCTION of Statutes, comprehends the following rules: 1. In the construction of remedial statutes there are three points which require consideration, *viz.* the old law, the mischief, and the remedy; that is, how the common law stood at the making of the act: what the mischief was, for which the common law did not provide; and what remedy the parliament hath provided to cure this mischief. And it is the business of the judge so to construe the act, as to suppress the mischief and advance the remedy. An instance may be specified in the restraining stat. of 13 Eliz. c. 10. By the common law, ecclesiastical corporations might let as long leases as they thought proper; the mischief was, that they let long and unreasonable leases, to the impoverishment of their successors: the remedy applied by the statute was the making void all leases by ecclesiastical bodies for longer terms than three lives, or 21 years. In the construction of this statute, it is held, that leases, though for a longer term, if made by a bishop, are not void during the bishop's continuance in his see; or, if made by a dean and chapter, they are not void during the continuance of the dean: for the act was made for the benefit and protection of the successor. The mischief is, therefore, sufficiently suppressed, by vacating them after the determination of the interest of the grantors; but the leases, during their continuance, being not within the mischief, are not within the remedy. 2. A statute, which treats of things or persons of an inferior rank, cannot, by any *general words*, be extended to those of a superior. Thus, a statute, treating of "deans, prebendaries, parsons, vicars, and others having spiritual promotion," is held not to extend to bishops, though they have spiritual promotion; deans being the highest persons named, and bishops being of a still higher order. 3. Penal statutes must be construed strictly. Thus, by the statute 14 Geo. II. c. 6. stealing sheep, or other cattle, was made felony, by benefit of clergy: but *other cattle* being considered as too loose an expression for creating a capital offence, the act was held to extend to nothing but mere sheep. In the next sections it was therefore found necessary to make another statute, 15 Geo. II. c. 34. extending the former to bulls, cows, oxen, steers, bullocks, heifers, calves, and lambs, by name. 4. Statutes against frauds are to be

liberally and beneficially expounded. 5. One part of a statute must be so construed by another, that the whole may (if possible) stand: "ut res magis valeat, quam pereat." As if land be vested in the king and his heirs by act of parliament, saving the right of A.; and A. has at that time a lease of it for three years; here A. shall hold it for his term of three years, and afterwards it shall go to the king. 6. A saving, totally repugnant to the body of the act, is void. If, therefore, an act of parliament vests land in the king and his heirs, saving the right of all persons whomsoever; or vests the land of A. in the king, saving the right of A.: in either of these cases the saving is totally repugnant to the body of the statute, and (if good) would render the statute of no effect or operation; and therefore the saving is void, and the land vests absolutely in the king. 7. Where the common law and a statute differ, the common law gives place to the statute; and an old statute gives place to a new one: and this upon a general principle of universal law that "leges posteriores priores contrarias abrogant;" consonant to which it was laid down by a law of the Twelve Tables at Rome, that "quod populus postremum jussit, id jus ratum esto." This is to be understood only when the latter statute is couched in negative terms, or where its matter is too clearly repugnant, that it necessarily implies a negative. But if both acts be merely affirmative, and the substance such that both may stand together, here the latter does not repeal the former, but they shall both have a concurrent efficacy. 8. If a statute, that repeals another, is itself afterwards repealed, the first statute is hereby revived, without any formal words for that purpose. 9. Acts of parliament, derogatory from the power of subsequent parliaments, bind not. 10. Acts of parliament, that are impossible to be performed, are of no validity; and if out of them arise collaterally any absurd consequences, manifestly contradictory to common reason, they are, with regard to those collateral consequences, void. Some have laid down this rule more largely, alleging that acts of parliament, contrary to reason, are void. We may further observe, that equity is frequently called in to assist, to moderate, and to explain positive laws. Nevertheless, our courts of equity are only conversant in matters of property. For the freedom of our constitution will not allow, that in criminal cases a power should be lodged in any judge, to construe the law otherwise than according to the letter. This caution, while it admirably protects the public liberty, can never bear hard upon individuals. A man cannot suffer more punishment than the law assigns, but he may suffer less. The laws cannot be strained by partiality to inflict a penalty beyond what the letter will warrant; but in cases where the letter induces any apparent hardship, the crown has the power to pardon. Blackit. Com. vol. i. Introd. § 3.

CONSTRUCTION MILITARY. This term, in its general and unlimited acceptance, extends to the constructing of every sort of military work. But it is commonly and peculiarly applied to the construction of the different parts of the various systems of fortification that have been delivered by writers on the subject in different nations and languages. And to this application of it we shall chiefly attend.

Fear and necessity must have first given rise to works of defence or fortification, of which the object originally was safety or security. And although there must have been quarrels ever since there have been men, we have every reason to suppose that the erection of works of defence, even of the simplest kind, were subsequent to the sithing and hunting state of society, and even in a great measure to that of the pastoral.

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The discovery of America, which exhibited men in a much simpler state of society than any that was recorded prior to that event in history, sacred or profane, afforded no specimens or traces of such works among tribes who had not formed some sort of villages, and become partly, at least stationary, by paying some attention to agriculture. The form and structure of works of defence, varied gradually with the means and the modes of attacking them. At first, a simple row of pickets, or a ditch, with that addition, was deemed sufficient. Afterwards, in woody countries (and all countries have been more or less covered with woods) an enceinte or enclosure of solid timber was made use of. Sometimes the walls round towns were raised with beams, earth, and stones. This mode of erecting them appears to have prevailed among the Gauls, in the time of Julius Cæsar, who, in the 23d chapter or section of his seventh book, "De Bello Gallico," expresses himself on the subject in the following words.

"*Maris autem omnibus Gallicis hæc fere forma est. Trabes directæ perpetuæ in longitudinem, paribus intervallis, distantes inter se binos pedes, in solo collocantur. Eæ revincuntur introrsus, et multo aggere vestiuntur. Eæ autem, quæ diximus intervalla grandibus in fronte faxis efficiuntur. Iis collocatis et coagmentatis, alius insuper ordo adijcitur, ut idem illud intervallum fervetur. neque inter se contingant trabes, sed paribus intermissis spatiiis singulæ singulis faxis intersectis arte continentur: sic deinceps omne opus contextitur dum juxta muri altitudinem expleatur. Hoc quum in speciem varietateque opus deforme non est, alternis trabibus aut faxis, quæ rectis lineis suos ordines servant, tum ad utilitatem et defensionem urbium summam habet opportunitatem, quod et ab incendio lapis, et ab ariete matris defendit, quæ perpetuis trabibus pedes quadragenos, per unquam introrsus revincta, neque perrumpi neque dirahi potest.*"

In some parts of Russia, there are even at this day towns defended by wooden walls; and in America there are some works, even with small bastions, composed entirely of wood or timber.

In countries, however, either considerably cleared, or not abundantly supplied with timber, stones come chiefly, and almost solely, to be made use of for erecting walls round their towns and cities. These walls were at first simple stone enclosures, of a sufficient height to prevent surprises, and thickness at top for three or four men to walk a-breast. But having no flanking defences, they occasioned dead or unsafe parts throughout their whole extent; by which means the assailants, as soon as they got near the foot of them, were almost as much screened or covered from the view of those who defended them, as they on the other hand were from theirs. To remedy this inconvenience and defect, openings were made on the top of such a wall, and loopholes. This contrivance, however, did not afford a complete remedy, or entirely remove the defect. For the opposite sides of every adjacent two of these openings and loopholes, which were wider within than without, produced, formed with the front of the wall a triangular space, that could not be seen or commanded from them. To remove this defect, square towers were added to the wall at distances from one another, suited to the missile weapons then in use, with one face of each looking towards the field. This mode, however, of enclosing towns, was still found to be imperfect and defective, as the face of each of those towers that fronted the field, could not be seen from any other part, and of course could not be defended. Round towers were therefore introduced instead of them, as creating fewer dead parts,

and as being better calculated for resisting battering engines. This method was practised a long time, and would, in all human probability, have continued in use had it not been for the invention of gun-powder, which changed the mode of attacking places, and of course rendered alterations in that of defending them necessary. Even after the application of that powerful and inflammable substance to military purposes, bulwarks, or large bastions, of a round form, continued for a long time in use. Most of these have been either taken down, or charged into angular ones. But several still remain, and are to be seen in different parts of Europe.

The intestine wars which harassed Italy for a length of time, taught the Italians experience in war, and the necessity of attending to every thing that contributed to improve the art of defence. They were accordingly the first people in Europe who fixed the idea of modern fortification, and reduced it to a sort of system. Unaccustomed then, however, to the effects of shells, and a numerous artillery, they confined their improvements chiefly to the covering of two guns in each flank, for disputing the passage of the ditch.

The war, which afterwards broke out in the Low Countries, and continued during eighty years with an extraordinary degree of valour and obliquity, and a destruction of the human race, of which there are but few examples, contributed a good deal to the advancement of this science. The Dutch, who alone, and unsupported, had to oppose for a long time the whole preface of a power so formidable as that of Spain then was, made great progress in the attack and defence of places. And it is from that time that we ought to date the epoch of the superiority which the former of these has acquired over the latter.

The following is Errard's method of construction. He fortifies inwards; and his line of defence isasant in all figures. He makes his flank from the square, up to the octagon, inclusive, perpendicular to the face of the bastion. But, in all other polygons, he makes it perpendicular to the curtain.

The flanked angle, or salient angle of the bastion, is, in the square, equal to sixty degrees, in the pentagon, to eighty, and in all other polygons, to ninety degrees.

For instance, let *AB* (*Plate V. Fortification, fig. 1.*) be the side of a hexagon, of which *O* is the centre. Draw the radii *AO*, *BO*, at the extremities *A*, *B*, of the exterior side *AB*, make the angles *OAF*, *OBE*, each equal to forty-five degrees. From the points *A*, *B*, draw right lines *AE*, *BF*, bisecting these angles, and meeting *BE*, *AF*, in the points *E*, *F*. Then these last-mentioned points *E*, *F*, will be the terminations of the curtain *EF*, of the lines of defence *AF*, *BE*, and of the flanks *EC*, *FD*, which in all figures, up to the octagon inclusive, are by this construction perpendicular to *AF*, *BE*, the lines of defence, but in all other polygons to *EF*, the curtain. If the same construction be made on each of the other sides of the hexagon, it will be fortified. And if from *C*, *D*, the angles of the epaules or shoulders, right lines be drawn parallel to theasant lines, or lines of defence *AF*, *BE*, we get the counterescarp of the ditch. On the inside he makes a rampart equal in breadth to the length of one of the flanks.

Since the line *AB*, in the preceding figure, is supposed to represent the side of a regular hexagon inscribed in a circle, the angle *AOB* of the centre is equal to 60 degrees, the angle *ABK* of the polygon is equal to 120 degrees; the flanked angles, or angles of the bastions *LAC*, *DBM*,

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D B M, are each of them equal to a right one, or 90 degrees. The angles of the epaules or shoulders ACE, B D F, are also each of them equal to a right angle. The angle *diminué* A F G, or B E H, or the angle A B E, or B A F, formed by the exterior side, and either line of defence being equal to the difference between 60 and 45 degrees, is of course equal to 15 degrees. The angle C E F, or D F E of the flank, is equal to 75 degrees, and the flanking angle C N D, is equal to 150 degrees. But since the angle C A E, which is half the flanked angle, or angle of the bastion, is equal to 45 degrees, and is by construction bisected by the right line A E, each of the angles C A E, E A G is equal to 22° 30'. And the angle A E C, the complement of C A E to 90°, is consequently equal to 67° 30'. The angle A E G is therefore equal to 37° 30', the angle A E F to 142° 30'; the angle A G F to 120 degrees, and the angle E A B to 37° 30'. Also the angle A E B is equal to 127° 30'.

Thus then all the necessary angles are known for calculating the different parts of the construction. For the exterior side A B being given, the line of defence A F or B E is easily found by means of the triangle A F B, or the triangle A E B, by the following analogies.

As the sine of the angle A F B
Is to the sine of the angle A B F,
So is the side A B
To the side A F.
As the sine of the angle A E B
Is to the sine of the angle B A E,
So is the exterior side A B
To the line of defence B E.

And the right line A E, or its equal B F, is found by the following analogy.

As the sine of the angle A E B
Is to the sine of the angle A B E,
So is the exterior side A B
To the right line A E or B F.

And as the angle A C E is a right one, we get the face A C of the bastion, and the flank C E, by means of A E, and the following analogies.

As radius
Is to the sine of the angle A E C,
So is the right line A E, or its equal B F,
To A C, the face of the bastion, or its equal B D.

And,

As radius
Is to the sine of the angle C A E,
So is the right line A E, or its equal B F,
To the flank C E, or its equal D F.

The perpendicular to the exterior side A B, or the rectilinear distance from the middle of it, to the point N, the intersection of the rasant lines, or lines of defence, is determined by this analogy.

As radius
Is to the tangent of the angle B A N, or A B N,
So is half the exterior A B
To the perpendicular distance from the middle thereof, to the point N.

By means of the flank, the curtain is found by the following analogy.

As radius
Is to the secant of the angle C E F, or D F E,
So is the flank C E, or D F,
To the curtain E F.

And the capital A G of the bastion is found by this analogy.

As the sine of the angle A C E
Is to the sine of the angle A E G,
So is the right line A E
To the capital A G of the bastion.

In like manner, the demi-gorge E G, or F H, is found by the following analogy.

As the sine of the angle A G E
Is to the sine of the angle E A C,
So is the right line A E, or its equal B F.
To the demi-gorge G E, or its equal F H.

The calculation of these different parts will be similar when the flank is perpendicular to the curtain, instead of the lines of defence as in polygons above an octagon, which is effected by taking the right lines N C, N D, equal, respectively, to the lines N E, N F. The flanks then are longer and better.

This author assigns no reason drawn either from the nature of the polygons, or their capability of being embraced or defended for the length of his perpendicular or the magnitude of the angle formed by an exterior side, and a line of defence. And, as in all polygons, from the hexagon upwards, the flanked angle or salient angle of the bastion, is the same, or equal to 90 degrees; his construction in all polygons, above an octagon, gives this perpendicular or angle much greater than it ought to be. Thus, in a de-

agon, it gives this angle equal to $\frac{180^\circ - \frac{360^\circ}{10} - 90^\circ}{2} = 27^\circ$; whereas, it ought but very little to exceed $22\frac{1}{2}^\circ$.

In a dodecagon is given this angle = $\frac{180^\circ - \frac{360^\circ}{12} - 90^\circ}{2}$

= 30°. whereas it ought only to be about 24°. And this construction on part of a right line, which may be regarded as a polygon of an infinite or rather indefinite number of sides, gives this angle equal to 45 degrees, and the flanking angles formed by the intersections of the lines of defence, equal each to 90 degrees. The lines of defence in this case exactly correspond with Montalambert's construction in his "Fortification Perpendiculaire."

As in this construction the angle *diminué*, or the angle formed by an exterior side and a line of defence increases fast in magnitude, as the number of the sides of the polygon increase, being in the dodecagon twice as great as it is in the hexagon, the lengths of the curtains decrease and the faces of the bastions increase greatly beyond their just proportions, which is a material defect; since the faces, which are the weakest parts, being defended respectively, only on one side by a single flank, are thereby augmented, and the curtains, which are the strongest, being defended each on both sides, or by two flanks, are diminished.

His mode of placing the flanks in figures up to the octagon inclusive at right angles to the lines of defence, and in other polygons perpendicular to the curtains, though it certainly secures them well against the enemies' batteries, and renders them fit for defending the gates and curtains, (which, however, by their narrowness to the flanks, are naturally best figured), does not enable them to discover the enemies' batteries sufficiently to defend the counterscarp, and prevent them from advancing their works to it, a circumstance which affords great advantage to the besiegers. And if orillons be made in flanks, so placed, the covered flanks would be so hid, that they could scarcely see the ditch throughout its whole width, and the merlons from their angles towards the field being very acute, would easily be ruined by the enemies' batteries and rendered useless. Flanks ought to be placed per-

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pendicularly, or at least very nearly so to the lines of defence. For when an enemy once makes a lodgment on the counter-scarp, he will discover them whether they be so placed or not. And if flanks be discovered, they also discover, and being either reveted or demi-reveted and formed of earth that is well settled, they are by no means so easily ruined as the batteries of the besiegers, which are formed of gabions and newly raised earth.

Count Pagan's method of construction on a polygon, (fig. 2.) is widely different from that of Errard, and also much preferable. For instead of making the angle of the flank acute in the octagon and figures of a smaller number of sides, and only equal to a right one in any polygon of a greater number of sides, as Errard does, he makes it obtuse and places his flanks perpendicularly to the lines of defence, in order that they may discover more ground, and the better raise and defend the faces of the bastions, which are the most salient and weakest parts of the body of the place and are first attacked, breaches being commonly made in them. This ingenious author makes his lines of defence like Errard's, always rasant, but does not like him make 90 degrees the maximum of his flanked angle, or angle of his bastion.

He delivers constructions for three sorts of fortifications, namely, the great, the mean, and the little. He fortifies or constructs inwards, and in the great fortification makes the exterior side equal to 200 toises, in the mean equal to 180 toises, and in the little equal to 160 toises. He allows 60 toises to each face of a bastion in the great, 55 in the mean, and 50 in the little, in all figures above a square. He makes the perpendicular to the exterior side in the great fortification in all figures, except the square where it is 27 toises, equal to 30 toises; in the mean equal to 24 toises; and in the little equal to 21.

The dimensions of these principal lines in these three kinds of fortification, are contained in the following Table.

	Great Fortification.		Mean.		Little.	
	square.	In all other Polygons.	square.	In all other Polygons.	square.	In all other Polygons.
Exterior Sides.	200	200	180	180	160	160
Perpendiculars.	27	30	24	30	21	30
Faces of bastions	60	60	55	55	45	50

Supposing then the exterior side A B, (see the figure,) equal to 200 toises in the great, to 180 in the mean, and to 160 in the little, bisect it in the point C. In C O, which is perpendicular to A B, take C D equal to 30 toises, in all regular figures of a greater number of sides than four. Through the point D, draw the lines of defence A D H, B D G, on which take A E and B F, each equal to 60 toises in the great fortification, to 55 in the mean, and to 50 in the little. Then draw the flanks E G, F H, perpendicularly to the rasant lines or lines of defence B G, A H, and form the curtain by joining the points G, H. This is Count Pagan's construction, without orillons and retired flanks.

The figure is a regular hexagon, supposed to have each of its sides equal to 180 toises, as in his mean fortification. The angle A O B of the centre is therefore equal to 60 degrees, and the angle of the polygon to 120. A C, or B C, is equal to 90 toises, the perpendicular C D is equal to 30, and the face A E, or B F, to 55 by construction.

Now by means of these lines and angles, the others are ea-

sily found. And in the first place, the angle *diminué* C A D, or the angle formed by the exterior side A B, and the line of defence A H, is formed by the following analogy.

As A C, equal to 90 toises,
Is to C D, equal to 30 toises,
So is radius

To the tangent of the angle C A D = $18^{\circ} 26' 0''$ very nearly. If this angle be taken from 60 degrees, half the angle of the polygon, we get the angle O A H, or M A E, equal to $41^{\circ} 33' 54''$. But this is equal to half the salient angle of the bastion, wherefore the whole flanked angle or angle of the bastion is equal to $83^{\circ} 7' 48''$. And the flanking angle A D B, being equal to the excess of 180 degrees above twice the angle *diminué*, is evidently equal to $143^{\circ} 7' 48''$.

The tenaille A D, being equal to $\sqrt{AC^2 + CD^2}$, is = $\sqrt{90000} = 10\sqrt{90} = 94.868329825$ nearly. Or it is found by this analogy.

As radius
Is to the secant of the angle *diminué* C A D,
So is A C, half the exterior side A B,
To the tenaille A D.

If from this there be taken the face A E, which is equal by construction to 55 toises, we get the right line D E, and the following analogy for the flank E G.

As radius
Is to the sine of double the angle *diminué* C A D,
So is the right line D E
To the flank E G.

And as the angle A E G of the epaule or shoulder is always, in regular construction, equal to twice the angle *diminué* C A D, and the angle E G B formed by the flank and line of defence, the angle D E G is known, and D G is ascertained by the following analogy.

As radius
Is to the sine of the angle D E G,
So is the right line D E
To the right line D G.

The angle E G H of the flank, is in this construction equal to 90 degrees, together with the angle *diminué*, or the angle formed by the exterior side, and one of the lines of defence.

The complement, D G, or D H, being thus found, the curtain G H is ascertained by the following analogy.

As the sine of the angle *diminué* D G H
Is to the sine of double the said angle,
So is the complement D G
To the curtain G H.

The lengthened curtain M H, or G N, is determined by the following analogy.

As the sine of half the angle of the polygon
Is to the sine of half the flanked angle,
So is the rasant line, or line of defence A H,
To the lengthened curtain M H. From which, and the curtain G H, the inward or interior side M N is immediately obtained.

And the capital A M is ascertained by this analogy.

As the sine of half the angle of the polygon
Is to the sine of the angle *diminué*,
So is the rasant line, or line of defence A H,
To the capital A M of the bastion.

It is manifest from the foregoing table, that the perpendicular in this learned and judicious author's great fortification, subtends in the square an angle of about $15^{\circ} 6' 34''$ nearly, and in all other regular figures of about $16^{\circ} 41' 57''$ nearly; that in his mean fortification it subtends in the square an angle of

about

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about $14^{\circ} 55' 5''$, and in all other regular figures an angle of about $18^{\circ} 29' 6''$; and that in his little fortification, it subtends in the square an angle of about $14^{\circ} 42' 30''$, and in all other regular figures an angle of about $20^{\circ} 33' 22''$.

For his casemates or retired batteries and orillons, he bisects his flanks, leaving one-half of each adjoining the capote or shoulder for its orillon. The first flank or battery on the other half is retired five toises behind the orillon, and is two toises above the level of the ditch; the second is retired seven toises within the first, and is four toises above the level of the ditch; and the third is retired seven toises behind the second, and is six toises above the level of the ditch, being as high as the rampart, which is three toises above the level of the field, or terre-plain of the place, as the bottom of the ditch is three toises below it. These are formed by continuing the lines of defence into the bastions, and drawing lines parallel to these continuations from the points bisecting the flanks.

He makes within each of his bastions a sort of smaller bastion, or a cavalier in the form of one, having its faces parallel to those of the bastion and 12 toises distant from them, which serves as a retrenchment. The great ditch is 16 toises wide, and its counterscarp is parallel to the faces of the bastions or to the lines of defence. The capital of each of the ravelins, which he places on the re-entering angles of the counterscarp in such a manner as to be defended by the faces of the bastions and the counter-guards before them, is equal to 50 toises, and its faces are drawn to the shoulders. The demi-gorges of the redoubt within the ravelin are each equal to 15 toises, and the faces of it are parallel to those of the ravelin itself. The ditch of the ravelin is 12 toises wide, and that of the redoubt 6. The salient angle of each counter-guard is 40 toises distant from that of the bastion which it covers, and this work is from 9 to 10 toises broad at its extremities. The ditch before it is 12 toises wide. The covert-way is 4 toises wide, and the faces of the places of arms are each 8 toises long, and parallel to the opposite counterscarp.

The flanks, curtain, and other lines in this construction found above by means of lines, tangents, and secants, may be ascertained without any logarithmic table, in the following manner.

Since the tenaille AD is $= 10\sqrt{90}$ toises $= 30\sqrt{10}$ toises, and AC is $= 90$ toises by hypothesis, and CD is $= 30$ toises, by construction, or $= \frac{AC}{3}$, we have AD :

AC :: $\sqrt{10} : 3$, and AD : CD :: $\sqrt{10} : 1$. But AD : AC :: AE (55 toises by construction) : the excess of AC above one half of EF, which excess is therefore equal to $\frac{2 \times 55}{\sqrt{20}}$ toises, and its double, which is the excess of AB above EF, is of course equal to $\frac{330}{\sqrt{10}}$ toises, or to $33\sqrt{10}$ toises; consequently EF is equal to $180 - 33\sqrt{10}$ toises; but AD : CD :: EF : FH, and AD : AC :: EF : EH; wherefore the flank FH is equal to $\frac{180 - 33\sqrt{10}}{\sqrt{10}}$ toises $= 18\sqrt{10} - 33$ toises; and EH

is equal to $\frac{540 - 99\sqrt{10}}{\sqrt{10}}$ toises $= 54\sqrt{10} - 99$ toises. And since ED is $= AD - AE = 30\sqrt{10} - 55$ toises; we get DH equal to $24\sqrt{10} - 44$ toises. But AD : AB :: DH : GH, which is therefore equal to $\frac{24\sqrt{10} - 44}{\sqrt{10}}$

$\times 6$ toises $= \frac{144\sqrt{10} - 264}{\sqrt{10}}$ toises; and DI, which is

equal to a sixth part of GH is equal to $\frac{24\sqrt{10} - 44}{\sqrt{10}}$ toises.

Consequently CI is equal to $\frac{54\sqrt{10} - 44}{\sqrt{10}}$ toises. And OC : CI :: OA : the capital AM of the bastion. Count Pagan's flank, in his mean fortification, being to the perpendicular, as $18\sqrt{10} - 33$ to 30, is upwards of 5 toises less than it, which is certainly too great a difference.

This learned and judicious author, whom the principal fortifiers since his time, particularly Vauban, have very much followed, considering that the flanks, ramparts, and ditches, were the works that contributed most powerfully towards the defence of the body of a place, and the retarding of the approaches of an enemy to it, made the demi-gorges of his bastions large, in order to have three flanks or batteries on each of them, sufficiently long for placing four pieces of cannon in, respectively. Three of these, in each of the said three flanks, are, by his construction, so well covered from the counter-batteries of the besiegers, that they cannot easily be damaged by them. And the besiegers, on approaching the breaches, and attempting to make lodgments in the ruins of them, must suffer greatly from the guns so covered in these retired flanks, as they are then fired on by them, de revers, or in the rear.

Though his division of fortification, into great, mean, and little, seems not to be of much use, or moment, he must certainly be allowed to be the first writer on the subject that gave the true position to his flanks, making them perpendicular to the lines of defence. His mean fortification appears to be preferable to the great, as it does not make the lines of defence too long for musquet-shot. The position of the flanks, and great length, he gives to the faces of his bastions, render his demi-gorges long enough to afford a sufficiency of room for his retired flanks.

The two ditches, with the two ramparts, that he makes, are well calculated for obstructing and retarding the enemies' passage of the ditch, for depriving them of the use of fourneaux, and for preventing them from lodging themselves on the ruins of the breaches. For when the besiegers have even passed the main ditch, and taken the first rampart, they will find themselves exposed in the second ditch to the besieger's fire on all sides, and liable to be destroyed by shells, handgrenades, fourneaux, mines, &c.

By giving one-half of his flank to the orillon, he covers his retired batteries extremely well. The ditch is very well defended from the flanks, which being perpendicular to the lines of defence, look fully along the faces of the opposite bastions.

It must be observed, however, that though the position of his flanks be good, they are too small, particularly in polygons of a considerable number of sides, being a good deal shorter than the perpendiculars to the exterior sides; whereas they should be equal, or nearly equal to them, as perpendiculars to the exterior sides of polygons were first introduced into construction for the sole purpose of obtaining flanking defences. This is in a great measure occasioned by his making the faces of his bastions too long, which he was probably led to do from a desire of obtaining three retired batteries in each flank. The face of the bastion is equal to the $\frac{1}{3}$ th part of the exterior side, whereas it may with confidence be asserted, that it ought not to exceed a fourth. For the faces of the bastions are most salient, and consequently the tenderest part of the body of the place. They are always first attacked, and in them the breaches are constantly made. But when they are very long, the besiegers can

can make large breaches in them, which is a great advantage to them, and a no less disadvantage to the besieged.

The retrenched bastion, or redoubt in form of one within the bastion, must increase the expence at least one-third. The ditch before it is but ill defended, as there are no tenailles for that purpose. And as it is hollow or empty, it may be taken as easily as the main bastion, by means of a second mine, and thereby occasion the loss of the place, especially as no retrenchment can be raised within it to enable the besieged to capitulate with more advantage.

His retired flanks, or batteries, appear to be too near to one another, being only seven toises distant from outline to outline.

He makes no traverses. But this cannot be imputed to him as either an oversight or fault, as firing *en ricochet* was not known in his time. By giving the same perpendicular to the exterior sides of all figures of a greater number of sides than four, he makes the flanked angle, or angle of the bastion in a polygon of a considerable number of sides, very obtuse. This angle begins to become obtuse in the hexagon, and by his construction on part of a right line, it is no less an angle than one of 143° or 48° .

He assigns no reason whatsoever for the length of his perpendicular, derived from the properties of different polygons, or their relative degree of importance and capability of defence, nor for his giving the same perpendicular in all regular figures of a greater number of sides than four. His perpendiculars are mere arbitrary assumptions, like those of all other authors, who have written on fortification since his time. The truth however is, that every regular figure has a perpendicular of its own, which is different from that of any other, of a precise and determinate length, and bearing a given ratio to the exterior side.

Mr. Blondel's method of construction is as follows :

Like Count Pagan he fortifies inwards, but instead of the perpendicular he begins with the angle *diminué*, or the angle formed by an exterior side, and a line of defence. This angle he determines by taking a right angle, or 90 degrees from the angle of the polygon, and adding 15 degrees to a third part of the remainder. Thus, if n denote the number of the sides of a regular figure, the angle of the polygon, or the angle contained by two of its sides, will be equal to $180^{\circ} - \frac{360^{\circ}}{n}$, and his angle *diminué* will of course be

equal to $30^{\circ} - \frac{120^{\circ}}{n} + 15^{\circ}$ or $45^{\circ} - \frac{120^{\circ}}{n}$, which gives 15°

for it in the square, 21° in the pentagon, 25° in a hexagon, and in his construction on part of a right line 45° , which then makes the perpendicular equal to half the exterior side. This expression for his angle *diminué*, as is evident by inspection, is always equal to the excess of 45° above 120° divided by the number of the sides of the figure; wherefore it is always found without any reference whatsoever to the angle of the polygon, by dividing 120° by the number of the sides of the figure, and subtracting the quotient from 45° . And since the angle of the centre, or the angle subtended by one of the sides of the figure, is equal to $\frac{360^{\circ}}{n}$, this angle

diminué is had by taking from 45 degrees a third part of the angle of the centre.

His angle *diminué* gives the angle of the bastion, or flanked angle, in a square equal to 60 degrees, in a pentagon equal to 66 degrees, in a hexagon equal to 70 degrees, and in a construction on part of a right line equal to 90 degrees.

The flanking angle, or the angle formed by the lines of

defence, is in the square, equal to 150 degrees, in the pentagon, to 138, in the hexagon, to 130, and in a construction on part of a right line, to 90 degrees.

He supposes two sorts of fortification, *viz.* the great, in which he makes the exterior side equal to 200 toises in all polygons; his line of defence equal to seven tenths of the exterior side, or 140 toises; and the face of his bastion equal to half the tenaille, or line between a flanked angle and the intersection of the lines of defence; and the little, in which he makes the exterior side in every figure equal to 170 toises, the line of defence equal to seven tenths of this, or to 119 or 120 toises, and the face of the bastion equal to half the tenaille, his construction in both being the same.

Thus for instance, let AB (*fig. 3.*) be the side of a hexagon. At its extremities A, B, make the angles *diminué* ABG, BAG, each equal to 25 degrees, the excess of 45 degrees above a third part of AMB the angle of the centre. On A, G, B, G produced take A F, B E for the lines of defence, each equal to seven tenths of AB the exterior side. Biseñ the tenailles A G, B C, in the points C, D, to get the faces A C, B D, draw the flanks C E, D F, and form the curtain by drawing E F.

Mr. Blondel takes on each flank 10 toises for his square orillon, employing the rest of it as a covered flank, which he keeps retired five or six toises inwards, as high as the heptagon; on higher polygons from 10 to 12 toises, in order to lengthen the curtains; and to obtain curtains in constructions, which being made on a straight line, or very high polygons, have none, or very short ones, he retires his flank as much as 20 toises, that he may have a curtain upwards of 20 toises long. For by his construction on a right line, where the angle *diminué* is 45 degrees, the tenaille is upwards of seven tenths of the exterior side. The retraite of the flank is measured on a right line, drawn from the angle of the opposite bastion, to the point terminating the ten toises, set off from the epaule on the flank for the orillon. Like Count Pagan, he makes three retired batteries in each flank within the casemate, allowing three toises for the breadth of the parapet in each, and five for its platform, or eight toises from the outline of one battery to that of another. The lowest of these retired flanks is from nine to twelve feet above the bottom of the ditch, the second from 18 to 24, and the third, or highest, from 27 to 36 feet, being level with the rampart. These three flanks are terminated towards the demi-gorge upon the line of defence produced, and towards the orillon, on the line drawn from the angle of the opposite bastion, through the end of the same orillon. The parapet of the lowest flank is nine or ten feet high, that of the middle one six or seven, and that of the third, or highest one, $3\frac{1}{2}$. Those of the lowest, and middle one, must of course have embrasures in them.

As there is a great deal of space between the two high flanks in each bastion, he makes a cavalier in it, having its faces parallel to the flanks, and each of them capable of holding twelve pieces of cannon at least. These cavaliers and retired flanks must be made with the earth taken from the great ditch, of which the width is equal to the length of one of the flanks. The re-entering angle of the counter-scarp is therefore opposite to and nearly about the middle of the exterior side.

This author places a counter-guard in front of each bastion, with its faces parallel to those of the same composed entirely of masonry without any earth, and every where countermined. Its breadth or thickness is only from 3 to 4 toises, including its parapet, which is from 5 to 10 feet thick. It is erected in the great ditch 10 or 12 toises distant

tant from the counterfearp, which distance therefrom forms its ditch. The principal object in erecting this counter-guard is to conceal from the enemies' view the low flanks opposite to it, whilst its narrowness or small breadth puts it out of his power to place his guns in after he has taken it.

The salient angle of his ravelin is determined by the interfection of two arcs, described from the shoulders of the two adjoining bastions, with a radius equal to the distance between them. Its faces produced meet those of the bastions about 6 toises from the shoulders and are bounded on the lines or faces of the counter-guards produced, which also determine the gorge of the ravelin.

The ditch of the ravelin is from 10 to 12 toises broad, and that it may be the better defended, Mr. Blondel takes, in the face of the bastion, a space equal to this breadth, commencing six toises from the shoulder, in which he makes a low battery of 4 or 5 feet high, and another on the inside of the same height with the parapet of the place, and retired about 7 toises within the face.

The ditch before the counter-guards is 10 toises broad. The ravelin not only covers the shoulders and the oissons of each bastion, but likewise defends the ditch of the counter-guard, as he takes as much of its face as is sufficient for seeing or discovering all that to make two batteries in, *viz.* a low one and a high one in the same manner as he does in the faces of the bastions. He allows no more terre-plain in the ravelin, than what is just enough for the recoiling of his guns, leaving all the rest of its inside empty for the purpose of being able easily to countermine the rampart, and to prevent the enemy from making a lodgment in it, after he may have forced it.

The better to cover the batteries in the face of each bastion, which defend the ditch of the ravelin, he adds in the angles of the counterfearp of the ravelin *lunettes*, in the form of lozenges, allowing 20 toises for the semi-gorge in each. These have their faces parallel to the counterfearps of the ditches before the ravelin and counter-guard, and the ditch before them 8 toises broad.

The author likewise makes a *lunette* in his great ditch from 7 to 8 toises broad, which he carries quite round the work to prevent the low flanks, which would be otherwise easily accessible, from being got at. A smaller or narrower *lunette* might also be made in the ditches of the outworks, particularly when there are batteries in the demi-lunes or ravelins.

The calculations for the angles and lines of a construction

on the sides of a polygon, according to Mr. Blondel's method, are made in the following manner.

Since the figure referred to is a hexagon, the angle of the centre is equal to 60 degrees, the angle of the polygon to 120, and the angle *diminué*, B A F or A B E, to 25 degrees. The flanking-angle, A G B, is 130 degrees, and the flanked angle, N A G, or D B S, is equal to 70 degrees. Wherefore half the flanked angle, E B O, or F A P, is equal to 35 degrees.

The tenaille A G, and of course the face A C of the bastion, is found by the following analogy.

As the sine of the angle A G B

Is to the sine of the angle A B G,

So is the exterior side A B

To the tenaille A G, of which the face A C is one-half.

From the sine of defence A F, which is seven-tenths of the exterior side A B, we get the complement G F or G E, and the curtain E F of course by this analogy.

As the sine of the angle E F G

Is to the sin. of the angle E G F,

So is the complement E G

To the curtain E F.

And as the sum of the angles C E F, E C F, is equal to 180°—the angle *diminué* C F E (25°) = 155°, and C F, E F, are known, we have this analogy.

As the sum of the sides C F, E F

Is to their difference,

So is the tangent of $\frac{77}{77} 30'$, half the sum of the angles,

To the tangent of half their difference.

Half this difference added to half the sum, gives C E F the angle of the flank, and taken from half the sum gives E C F the supplement of A C E the angle of the *epaule* or shoulder.

And for the flank C E we have the following analogy.

As the sine of C E F, the angle of the flank,

Is to the sine of the angle *diminué* C F E,

So is C F

To the flank C E.

The demi-gorge E P is determined by first finding the lengthened curtain F P by this analogy.

As the sine of the angle A P F, which is known,

Is to the sine of the angle F A P which is also known,

So is the line of defence A F = $\frac{7}{5}$ of A B

To the lengthened curtain F P.

Then from F P so found take the curtain E F, and there will remain the demi-gorge E P.

TABLE of the Angles of the different Parts of the Construction, according to Mr. BLONDEL's Method.

Angles	A M B of the Cen- tre.	Q A B of the Poly- gon.	M A B of the Poly- gon.	N A C flanket, or half of the flanket.	M A C half of the flanket.	C A I diminué.	A C B flanket, or flanket of malle.	F C D supplement of flanket angle.	F D B of the point of shoulder.	F D C supplement of flanket.	D F E of the flank.	G F D	G I F
Square 4 sides.	90°	90°	45°	60°	30°	15°	150°	30°	120°	60°	123° 47'	107° 47'	120°
Pentagon 5	72°	108°	54°	66°	33°	21°	135°	42°	132°	48°	123° 11'	100° 41'	105°
Hexagon 6	60°	120°	60°	70°	35°	25°	130°	50°	140°	40°	123° 48'	97° 48'	55°
Heptagon 7	51° 25'	128° 35'	64° 17½'	72° 51'	36° 25½'	27° 52'	124° 16'	55° 44'	145° 44'	34° 16'	124° 15'	96° 23'	87° 51'
Octagon 8	45°	135°	67° 30'	75°	37° 30'	30°	120°	60°	150°	30°	125° 4'	95° 4'	82° 30'
Enneagon 9	40°	140°	70°	76° 40'	38° 20'	31° 40'	116° 40'	63° 20'	153° 20'	26° 40'	125° 20'	94° 40'	78° 20'
Decagon 10	36°	144°	72°	78°	39°	33°	114°	66°	156°	24°	126° 54'	93° 54'	75°
Endecagon 11	32° 44'	147° 16'	73° 38'	79° 6'	39° 33'	34° 5'	111° 50'	68° 10'	158° 10'	21° 50'	127° 42'	93° 37'	72° 17'
Dodecagon 12	30°	150°	75°	80°	40°	35°	110°	70°	160°	20°	128° 28'	93° 28'	70°
Right line.	0	180°	90°	90°	45°	45°	90°	90°	180°	0	135°	90°	45°

tant from the counter-scarp, which distance therefrom forms its ditch. The principal object in erecting this counter-guard is to conceal from the enemies' view the low flanks opposite to it, whilst its narrowness or small breadth puts it out of his power to place his guns in after he has taken it.

The salient angle of his ravelin is determined by the intersection of two arcs, described from the shoulders of the two adjoining bastions, with a radius equal to the distance between them. Its faces produced meet those of the bastions about 6 toises from the shoulders and are bounded on the lines or faces of the counter-guards produced, which also determine the gorge of the ravelin.

The ditch of the ravelin is from 10 to 12 toises broad, and that it may be the better defended, Mr. Blondel takes, in the face of the bastion, a space equal to this breadth, commencing six toises from the shoulder, in which he makes a low battery of 4 or 5 feet high, and another on the inside of the same height with the parapet of the place, and retired about 7 toises within the face.

The ditch before the counter-guards is 10 toises broad. The ravelin not only covers the shoulders and the orillons of each bastion, as he likewise defends the ditch of the counter-guard, as he takes as much of its face as is sufficient for seeing or discovering all that to make two batteries in, viz. a low one and a high one in the same manner as he does in the faces of the bastions. He allows no more terre-plain in the ravelin, than what is just enough for the recoiling of his guns, leaving all the rest of its inside empty for the purpose of being able easily to countermine the rampart, and to prevent the enemy from making a lodgment in it, after he may have forced it.

The better to cover the batteries in the face of each bastion, which defend the ditch of the ravelin, he adds in the angles of the counter-scarp of the ravelin *lanettes*, in the form of lozenges, allowing 20 toises for the semi-gorge in each. These have their faces parallel to the counter-scarps of the ditches before the ravelin and counter-guard, and the ditch before them 8 toises broad.

The author likewise makes a *lanette* in his great ditch from 7 to 8 toises broad, which he carries quite round the work to prevent the low flanks, which would be otherwise easily accessible, from being got at. A smaller or narrower *lanette* might also be made in the ditches of the outworks, particularly when there are batteries in the demi-lunes or ravelins.

The calculations for the angles and lines of a construction

on the sides of a polygon, according to Mr. Biondel's method, are made in the following manner.

Since the figure referred to is a hexagon, the angle of the centre is equal to 60 degrees, the angle of the polygon to 120, and the angle *diminué*, $\angle B A F$ or $\angle A B E$, to 25 degrees. The flanking-angle, $\angle A G B$, is 130 degrees, and the flanked angle, $\angle N A G$, or $\angle D B S$, is equal to 70 degrees. Wherefore half the flanked angle, $\angle E B O$, or $\angle F A P$, is equal to 35 degrees.

The tenaille $A G$, and of course the face $A C$ of the bastion, is found by the following analogy.

As the sine of the angle $A G B$
Is to the sine of the angle $A B G$,
So is the exterior side $A B$

To the tenaille $A G$, of which the face $A C$ is one-half.

From the line of defence $A F$, which is seven-tenths of the exterior side $A B$, we get the complement $G F$ or $G E$, and the curtain $E F$ of course by this analogy.

As the sine of the angle $E F G$
Is to the sine of the angle $E G F$,
So is the complement $E G$

To the curtain $E F$.

And as the sum of the angles $C E F$, $F C F$, is equal to 150° —the angle *diminué* $C F E$ (25°) = 155° , and $C F$, $E F$, are known, we have this analogy.

As the sum of the sides $C F$, $E F$

Is to their difference,

So is the tangent of $77^\circ 30'$, half the sum of the angles,

To the tangent of half their difference.

Half this difference added to half the sum, gives $C E F$ the angle of the flank, and taken from half the sum gives $E C F$ the supplement of $A C E$ the angle of the *epaule* or shoulder.

And for the flank $C E$ we have the following analogy.

As the sine of $C E F$, the angle of the flank,

Is to the sine of the angle *diminué* $C F E$,

So is $C F$

To the flank $C E$.

The demi-gorge $E P$ is determined by first finding the lengthened curtain $F P$ by this analogy.

As the sine of the angle $A P F$, which is known,

Is to the sine of the angle $F A P$ which is also known,

So is the line of defence $A F = \frac{1}{2} A B$

To the lengthened curtain $F P$.

Then from $F P$ so found take the curtain $E F$, and there will remain the demi-gorge $E P$.

TABLE of the Angles of the different Parts of the Construction, according to Mr. BLONDEL'S Method.

Angles	A M B	Q A B	M A B	N A C	M A C	C A I	A G B	F G D	F D B	F D C	D F E	G F D	G I I P
	of the Cen- tre.	of the Poly- gon.	half of that of the Poly- gon.	of the bat- tion.	half of the flanked.	diminut- ing.	of the te- nabile.	of flanking angle.	of the epau- le or Shoulder.	of the epau- le.	of the Flank.		
Square 4 sides.	90°	90°	45°	60°	30°	15°	150°	30°	120°	60°	122° 47'	107° 47'	120°
Pentagon 5	72°	108°	54°	66°	33°	21°	135°	42°	132°	48°	123° 11'	100° 41'	105°
Hexagon 6	60°	120°	60°	70°	35°	25°	130°	50°	140°	40°	123° 48'	97° 48'	95°
Heptagon 7	51° 25'	128° 35'	64° 17½'	72° 51'	36° 25½'	27° 52'	124° 16'	55° 44'	145° 44'	34° 16'	124° 15'	96° 23'	87° 51'
Octagon 8	45°	135°	67° 30'	75°	37° 30'	30°	120°	60°	150°	30°	125° 4'	95° 4'	82° 30'
Enneagon 9	40°	140°	70°	76° 40'	38° 20'	31° 40'	116° 40'	63° 20'	153° 20'	26° 40'	125° 20'	94° 40'	78° 20'
Decagon 10	36°	144°	72°	78°	39°	33°	114°	66°	156°	24°	126° 54'	93° 54'	75°
Endecagon 11	32° 44'	147° 16'	73° 38'	79° 6'	39° 33'	34° 5'	111° 50'	68° 10'	158° 10'	21° 50'	127° 42'	93° 37'	72° 17'
Dodecagon 12	30°	150°	75°	80°	40°	35°	110°	70°	160°	20°	128° 28'	93° 28'	70°
Right line.	0	180°	90°	90°	45°	45°	90°	90°	180°	0	135°	90°	45°

CONSTRUCTION.

TABLE of the Lines of the different Parts of the Construction according to Mr. BLONDEL's Method.

Lines.	A B Exterior side.	OP Interior side.	A F Line of Defence.	B G Tenaille.	B D Face.	F D Flank.	E F Curtain.	F O Demil- gonge.	B O Capital.	B M Semi-di- ameter major.	O M. Semi-di- ameter minor.	F K	B K	G K	G F	E O
Square 4 sides	200	177½	140	103½	51½	27	70½	28½	52	141½	89½	23	60	59½	36½	99
	170	109	120	88	44	23	60½	24½	44½	120	75½	19½	51	50½	31	87
Pentagon 5	200	129½	140	107	53½	36½	60½	33½	62	170	108	28	74	61	33	96
	170	111	120	90½	45	31	52	29	53	144½	91½	24	65½	52	28	83
Hexagon 6	200	132	140	110	55	42½	54	39	68½	200	131½	34	86	63½	29½	93
	170	113	120	94	47	35	46	32	58½	170	111½	29½	72	54½	25	80
Heptagon 7	200	137	140	113	56	47½	48	41½	72½	230½	138	38½	93½	65½	27	92½
	170	117½	120	96	48	41	41	38	62	196	134	33	79½	56	23	79½
Octagon 8	200	142½	140	115½	58	50½	41½	50½	75½	261½	186	47	101	71½	24½	92
	170	122	120	98	49	43	35½	43	64½	222	157½	40	87	60½	21	79
Enneagon 9	200	146	140	117½	59	52	38	54	78½	292½	214	52	107	74½	22½	92
	170	125	120	99	49½	45	32½	40½	67	248½	181	46	91	64	19	79
Decagon 10	200	150½	140	119½	60	54½	34½	58	80½	323½	243	57½	113	78	20½	92½
	170	129	120	101½	51	47	29½	49½	69	275	206	49	96	66½	17½	79½
Endecagon 11	200	154½	140	121	60½	56½	31½	61½	81½	355	273½	62	117	81	19	93
	170	132½	120	103	51½	48½	27	52½	69½	302	232½	53	100	69	16	80
Dodecagon 12	200	156	140	122	61	58	30	63	82½	386	303½	66	122½	84	17½	93
	170	134	120	104	52	49½	25½	54	71	328½	257½	56	104	72½	15	80
Straight line	200	200	140	141	70½	70½	0	100	100	Infinite.	Infinite.	141	200	141	0	100
	170	170	120	120	60	60	0	85	85	Infinite.	Infinite.	120	170	120	0	85

CONSTRUCTION.

This ingenious author also gives a table of the lengths of the different lines in his construction on the two following suppositions:

1st. That the exterior side of each figure is equal to 200 toises.

And 2^{dy}. That the exterior side of each figure is equal to 170 toises.

Mr. Blondel was undoubtedly a man of considerable talents and eminence, and had travelled over the greatest part of Europe, America, and the West Indies, making sensible and judicious observations on the various modes of fortifying, practised by different nations.

His acuteness however in discovering the mistakes committed by others, and his anxiety to avoid them, did not prevent him from falling into still greater ones himself. He did not attend sufficiently to the great expense that the execution of his method would unavoidably occasion, or to the numerous artillery that would be required for its defence.

Imagining, that places are generally lost for want of sufficient flanks, he makes three, one behind another. They are however so near to each other, that the rubbish of the higher ones must certainly render the lower ones useless: and were shells to fall into the lower ones they must unquestionably destroy the troops for want of room to avoid them. They are moreover too open and liable to be destroyed from the covert-way, as the counter-guards are not broad enough to cover and screen them from the enemies' fire. The low flanks are too narrow and too much confused. Before shells, however, were much used at sieges, they might have afforded a good defence.

He makes no use of traverses. But this is not to be imputed to him as a fault or omission, as rocket-firing was not used in his time.

His great ditch appears to be too wide, being not less than 25 toises before the faces of the bastions.

His angle *diminué* must be allowed to be preposterously great, as he makes it of as many degrees as it ought to be in a construction on a straight line, or on the sides of a polygon of an infinite or indefinite number of sides.

The following is the construction according to Mr. Bombelle's method.

Like Count Pagan he establishes three sorts of fortification. But instead of constructing inwards like him, he constructs outwards. His three sorts he denominates the little royal, the mean, and the great royal. The interior side of the little royal is equal to 60 rods of 12 Paris feet each, or 120 toises, that of the mean is equal to 70 such rods or 140 toises, and that of the great royal is equal to 80 such rods or 160 toises. His manner of fortifying in all the three is the same, and is the following.

Having determined on the side AB, (*fig. 4.*) (which we shall here suppose to be that of a hexagon), for the great, mean, or little royal, allow a fifth part of it for the demi-gorges AC, BD; and a fourth part of it for the flanks CE, DF, each of which must make, with the curtain CD, an angle of 100 degrees. Then the points, G, H, of the bastions are ascertained by the rasant lines CH, DG, and the whole operation or construction is finished.

As the construction in this figure is supposed to be made outwards on three of the sides of a regular hexagon, the angle AOB of the centre is equal to 60 degrees, and the angle GHK of the polygon is equal to 120 degrees. But the angle ECD of the flank is by construction equal to 100 degrees, the demi-gorge AC or BD is equal to a fifth part of the interior side AB, and the flank CE or DF is equal to a fourth part of AB. Consequently the sum of the

angles CDE, CED, is given equal to 80 degrees, and the sides CE, CD, are given; wherefore we have this analogy.

As the sum of the curtain CD and flank CE

Is to their difference,

So is the tangent of 40° half the sum of the angles CDE, CED

To the tangent of half their difference.

Hence the angle *diminué* CDE or CDG, the angle CED the supplement of the angle CEG of the *epaule* or shoulder, and AGD half the flanked angle, or half the angle of the bastion, are given.

And as the lengthened curtain AD or BC is given by the construction equal to four fifths of the interior side AB, we have the following analogies for DG, the line of defence, and AG the capital of the bastion.

As the sine of AGD, half the angle of the bastion,

Is to the sine of the angle GAD,

So is the lengthened curtain AD

To the line of defence DG.

And,

As the sine of AGD, half the angle of the bastion,

Is to the sine of the angle *diminué* ADG

So is the lengthened curtain AD

To AG the capital of the bastion.

In like manner we obtain DE from the triangle CED by means of the following analogy.

As the sine of CDE, the angle *diminué*,

Is to the sine of ECD, the angle of the flank,

So is the flank CE which is given

To the right line DE, which taken from DG, the line of defence, gives EG the face of the bastion.

And as in this figure, which is supposed to be a hexagon, the exterior side GH, or line joining the salient angles of two adjoining bastions, is equal to OG the perpendicular distance of the point I, the intersection of the lines of defence from GH is obtained by the following analogy.

As radius

Is to the tangent of I CZ, the angle *diminué*,

So is GZ, the half of GH or OG, in this figure,

To IZ, the perpendicular distance of I from GH.

And the perpendicular distance of the intersection of the rasant lines, or lines of defence, from the curtain, is found by this analogy.

As GH or OG in this figure

Is to the curtain CD,

So is IZ

To the perpendicular distance IY of I from CD.

And in any other regular figure than a hexagon, GH is found by this analogy.

As OA, the radius of the circumscribing circle,

Is to the interior side AB, which is given,

So is OG = OA + AG

To GH, the side of the exterior polygon.

And as radius

Is to the tangent of IGZ, the angle *diminué*,

So is GZ equal to half GH,

To IZ, the perpendicular distance of I from GH.

And as GH, the side of the exterior polygon,

Is to CD the curtain, which is known,

So is IZ, the perpendicular distance of I from GH,

To IY, the perpendicular distance of I from the curtain.

Mr. Bombelle, in the construction of each of his three sorts of fortification, makes the angle ECD or FDC of the flank, always equal to 100 degrees, and the angle *diminué* GDC or HCD invariably equal to about 20° 56'.

For

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For CD being always equal to three-fifths of AB, and CE equal to a fourth part of AB, the ratio of CD + CE to CD - CE is a given or constant ratio, being that of 17 to 7, whatever be the length of AB. And the construction of his mean fortification gives the demi-gorge AC or BD, equal to 28 toises, the curtain CD, equal to 87, the lengthened curtain AD or BC, equal to 112, the flank CE or DF, equal to 35, the line of defence DG or CH, equal to about 153½, the capital AG or BH of the bastion, equal to about 63½, the face GE or HF of the bastion, equal to about 61½. And in all the three the ratio of DY half the curtain, to IY the perpendicular distance from it to I, the intersection of the lines of defence, or of GZ, half the side of the exterior polygon, to ZI, the perpendicular distance from it to the said point of intersection, is given or constant, being always that of radius to the tangent of 20° 56'. The construction of his mean fortification on the sides of a hexagon gives ZI, equal to about 38,884 toises, and YI to about 16,066 toises.

This author makes his main ditch, or the ditch of the body of the place, 12 rods of 12 Paris feet each, or 24 toises broad, beyond which and opposite to the curtain he places a ravelin, the salient angle of which is in the intersection of two arcs described with the lengthened curtain AD, or BC, as radius from the extremities A, B, of the interior side AB, and the faces of which produced across the main ditch would terminate on the shoulders *i, i*, of the square orillons, that cover his rounded flanks or casemates, which are described in the following manner.

From the extremities C, D, of the curtain, and perpendicularly thereto, he draws two other flanks, Ci, Di, meeting the lines of defence in the points *i, i*, lengthening the faces GE, HF respectively by Ei, Fi in order to have room enough in each flank of every bastion for two covered ones, which are constructed in the following manner:

Take the two lines Gr, Hr, equal each to a third part of Gi or Hi, (Ci, Di being drawn from the extremities C, D, of the curtain CD perpendicular thereto), and the lines *ik, ik*, also equal each of them to a third part of Ci or Di. From the points *r, r*, draw right lines, *rkl, rkl*, through the points *k, k*, terminated at the points *l, l*, by the right lines Cl, Dl, drawn perpendicularly to the lines of defence G D, H C, which must be produced till they meet the radii of the polygon in some points as *p, p*, in order to take upon the same radii the distances *pg, pg*, for terminating the covered flanks, of which the common centre *x* is found by describing from the extremities D l, Cl, of the right lines Cl, Dl, arcs with a radius equal to three-fourths of Cl or Dl.

The distance between the two covered flanks on each flank of every bastion is equal to 12 rods of 12 Paris feet each, or twenty-four toises, and the parapets every where are 10 such rods or 4 toises thick.

The casemates which Mr. Bombelle adds at the points of the bastions, and which, in cases of necessity, may serve as retrenchments, are described by taking on the capitals of the bastions the right lines Gs, Hs, equal respectively to half the lines Gr, Hr, and describing from the points *s, s*, as centres, arcs, *rr, rr*, for the casemates, each of which has its parapet 4 toises broad. They are somewhat lower towards the points of the bastions than the other parts of the bastions, and the ways to them are through passages as *o, o*, in the bastions.

This author covers his ravelin with a sort of counter-guard or tenaille beyond its ditch, which he makes 8 rods of 12 Paris feet each, or 16 toises broad, or a third part of the breadth of his great ditch, thus rendering his ravelin a tenailleid, or horned half-moon.

Round covered flanks were first invented by the Italians; and Mr. Bombelle uses them in order to render them the more capacious, and the fitter for resisting the shock and effects of the enemies' cannon. They seem, however, to have too much convexity, advancing too far towards the centre of each bastion, and leaving too small a distance between the two high flanks.

As his flanks are great, he makes use of no second flanks on the curtains. But contrary to sound sense and reason, and inconsistently with the genuine principles of construction, he makes them of the same lengths or sizes in all polygons. His angle *diminué* also is invariably of a given magnitude, *viz.* of 20° 56', which by his construction on the sides of a square leaves the flanked angle, or angle of each bastion, equal only to 48° 8' in a pentagon, to 66° 8', in a hexagon, to 78° 8', and so on. His angle *diminué* in a square, is therefore more than double what it ought to be, by upwards of two degrees. And in a pentagon it does not fall quite 7½ degrees short of being twice as great as it should be in reality. He makes it even greater in a square than it ought to be in an octagon.

Mr. Vauban in his method fortifies inwards; and like Count Pagan, from whom he has borrowed his perpendicular for the hexagon and all higher polygons, begins with the perpendicular to the exterior side, and the salient lines or lines of defence. He does not, however, make the faces of his bastions so long, or his flanks quite so short. And he omits second flanks as not of very great moment, as they can be added at any time, without changing either the flanks or curtains.

Bisect, as in Count Pagan's construction, the exterior side AB in the point C. (*fig. 5.*) At the point C erect a perpendicular, CD, equal to an eighth part of AB in the square, to a seventh part of AB in the pentagon, and to a sixth part of AB in the hexagon and all higher polygons. From the extremities A, B, through the point D, draw the lines of defence ADH, BDG. On these take AE, BF for the faces of the bastions, equal each to two seventh parts of AB, and take EH, FG, each equal to EF, the distance between the shoulders E and F. Then join the points G, H, for the curtain GH. And if a similar construction be made on each of the other sides of the figure or polygon, we get the master-line of the curtains and bastions, or the principal or outline of the body of the place. To this must be added a rampart from 10 to 12 toises broad at the base, and elevated more or less above the level of the place, on the outer part of which, at top, there is raised a parapet three toises broad at the base, and elevated above the rampart from six feet to 7½. The ditch of the body of the place, or the great ditch, is 20 toises wide opposite to the flanked angles or salient angles of the bastions, and it is formed by describing from these angles with a radius of 20 toises, circular arcs, and drawing right lines from the *epaules*, or shoulders, to touch these arcs. For the parts of these lines lying between their intersections and the points of contact, together with these arcs, form the outline of the ditch.

The foregoing figure is a regular hexagon, and the exterior side is here supposed to be equal to 180 toises.

To determine the salient angle S (*fig. 6.*) of the half-moon or ravelin, let off 50 toises on the perpendicular DC, produced beyond the exterior side AB; from the point S draw right lines to the counter-scarp of the great ditch, so that if produced across the same, they would, according to some authors, terminate on the *epaules* or shoulders of the bastions, but according to others, about 3 toises from the shoulders on the faces of the bastions. These lines so drawn

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from the salient angle S, of the ravelin to the counterescarp, form the faces SL, SM, of the half-moon or ravelin. It is generally supposed that when the faces SL, SM of the ravelin terminate when produced across the great ditch on the faces of the bastions a few toises from the *épaules* or shoulders, they cover the flanks much better than they do when they terminate on the shoulders themselves.

The ditch before each ravelin is 12 toises broad; its counterescarp is parallel to the faces, and is made of a circular form, before the salient angle of each like the ditches before the salient angles of all works in general.

When the ravelin is made with flanks, as PN, QO, the faces SP, SQ, when produced across the great ditch, ought to terminate on the faces of the bastions 5 toises at least from the *épaules* or shoulders.

When a ravelin has flanks, they are commonly made by setting off 10 toises from L to P, and M to Q, from the extremities of the faces, and by drawing them from the points P, Q, parallel to the capital rS of the ravelin.

There is sometimes a redoubt made in a ravelin, which is done by setting off from the extremities, L, M, of the faces on the semi-gorges Lr, Mr, and then drawing right lines for its faces parallel to those of the ravelin. The ditch before such a redoubt should be 6 toises broad, and its counterescarp parallel to its faces.

Orillons and retired flanks are described in the following manner.

The front, AEG, HFB, being described as above taken, Ea equal to a third part of the flank EG. From the opposite flanked angle B, draw the right line Ba, on which produced take ab, equal to 5 toises. Take also on the line of defence, BG, produced, Ge equal to 5 toises, and join b, c. On be as a base describe the equilateral triangle bcf, and from the angular point f as a centre, describe the circular retired flank bc with the radius fb or fe.

Again, if Ea be bisected in the point a, and cd be drawn perpendicularly to Ea to meet a perpendicular to the face AE, from the point E in the point d, and if from the point d as a centre a circular arc be described with dE as radius, we shall get the circular orillon Ea.

ab is called the *revers*, or back part of the orillon, and Ge, the *enfacement* or depth of the casemate or concave flank bc.

In like manner are the retired or concave flank bi, and the circular orillon Fg described.

The orillons are useful in covering the retired or concave flanks, which by means of them cannot be seen but directly in front. And as Mr. Vauban makes his orillons round, they cannot be so easily destroyed as they might be were they of any other figure or form.

The calculation of the lines and angles of a construction on a polygon, according to this method of Mr. Vauban, is as follows:

If AB be supposed to be the side of a hexagon, the angle of the centre will be equal to 60°, and the angle of the polygon to 120°. And as the perpendicular CD is by the construction equal to a sixth part of AB, the angle *diminué* ABD or BGH is determined by the following analogy:

As AC or BC, the half of AB, } or, As 3
Is to CD the perpendicular, } Is to 1,
So is radius

To the tangent of the angle CAD or CBD, which is nearly equal to 18° 26' 6". Wherefore the flanked angle or angle of the bastion is equal to 83° 7' 48" nearly. And since the triangle EFG is isosceles by the construction, and the angle EFG, which is equal to the angle ABD, is of

enure equal to 18° 26' 6", we have the angles FEG, FGE, equal each to half the excess of 180° above 18° 26' 6", or to 80° 46' 57" nearly. Wherefore the angle EGH of the flank, which is equal to the angle FGE, together with the angle FGH, or angle *diminué*, is equal to 99° 13' 3". And the angle AEG of the *épaule*, or shoulder, being equal to the angle EGF or EGD, together with the angle EDG, which is equal to the angles ABD, BAD, taken together, or to twice the angle *diminué*, is equal to 117° 39' 6".

Now since AC, half of the exterior side AB, is given, and CD is found by the foregoing analogy, AD is known, its square being (47 E. 1.) equal to the squares of AC and CD; and as AE is equal to two sevenths of AB, the exterior side ED is known. But AD is to ED, as AB is to EF or FG, which are of course known. Or, either of these lines may be found by the following analogy.

As the sine of the angle EFD, which is equal to the angle *diminué*, or to 18° 26' 6",

Is to its opposite side DE,

So is the sine of the angle EDF, which is equal to 180°, twice the angle *diminué*, or to 143° 7' 48",

To the opposite side EF, the distance between the *épaules*.

And if from EF, or its equal EH, there be taken ED, the complement DH, or its equal DG, will be known. Wherefore the curtain GH is determined by either of the two following analogies.

As AD

Is to the exterior side AB,

So is the complement DG or DH

To the curtain GH.

Or, As the sine of the angle *diminué* DGH

Is to the sine of the angle GDH, which is = 143° 7' 48" nearly,

So is the complement DH

To the curtain GH.

The flank EG is easily found by means of either the triangle EFG, or the triangle EDG, as in the following analogies.

As the sine of the angle TGH, which is = 80° 46' 57" nearly,

Is to the sine of the angle EFG, which is = angle *diminué*, or 18° 26' 6" nearly,

So is EF the distance between the two opposite *épaules*

To the flank EG.

Or, As the sine of the angle EGD, which is = 80° 46' 57" nearly,

Is to the sine of the angle EDG, which is = twice the angle *diminué*, or 36° 52' 12" nearly,

So is ED the distance from the *épaule* to the intersection of the lines of defence

To the flank EG.

And as half the flanked angle is equal to 41° 33' 36", and the angle AHG, which is equal to the angle *diminué*, to 18° 26' 6" nearly; the angle formed by the capital of the bastion, and the lengthened curtain, or the curtain HG produced to meet the same, will be equal to 125° 0' 18" nearly. Wherefore the lengthened curtain is found by this analogy.

As the sine of 120° 0' 18"

Is to the sine of 41° 33' 36", half the flanked angle,

So is AH

To the lengthened curtain; from which, if the curtain HG be taken, we get the demi-gorge.

And the capital of the bastion is found by this analogy:

As the sine of 120° 0' 18"

Is to the sine of $13^{\circ} 26' 6''$, the angle *diminué*,

So is AH

To the capital of the bastion.

And the perpendicular distance, DI, of the curtain from the intersection of the lines of defence is found by the analogy, As AB is to CD, so is GH to DI.

Supposing the exterior side AB, as in his mean fortification, to be equal to 180 toises, the principal lines belonging to the construction may easily be found, as in the following manner.

The perpendicular CD being by construction $= \frac{AB}{6}$
is = 30 toises.

The *tenaille* AD or BD being equal to $\sqrt{BC^2 + CD^2}$ is equal to $\sqrt{9000}$ toises = $30\sqrt{10} = 94.8683298$ nearly.

The face BF of the bastion is commonly equal to 50 toises, or two-sevenths of AB nearly.

The distance DF of the *epaule* F from the intersection D of the lines of defence being equal to $BD - BF$, is equal to $10\sqrt{90} - 50 = 44.8683298$ toises nearly.

If from the *epaule* F there be drawn F I perpendicular to the exterior side AB, we shall have $BI = \frac{BC \times BF}{BD} =$

$5\sqrt{90}$ toises = $\frac{3D}{2} = 47.4341649$ toises nearly; and F I

the perpendicular distance of the *epaule* F from the exterior side = $\frac{CD \times BF}{BD} = 5\sqrt{10}$ toises = $\frac{BD}{6} = 15.8113883$ toises nearly.

The distance EF, between the two opposite *epaules*, E, F, or its equal EH or FG, is equal to $AB - 2BI = AB - BD = 180 - 30\sqrt{10}$ toises = 85.13167 toises nearly.

The complement DG or DH being equal to $FG - DF$ is equal to $230 - 10\sqrt{360}$ toises = 40.26334 toises nearly. The perpendicular distance DI of the intersection of the

lines of defence from the curtain GH being = $\frac{CD \times DG}{BD}$

is equal to $23\sqrt{10} - 60$ toises, or 12.7323861846 toises nearly. Consequently the perpendicular distance CI between the exterior side AB and the curtain GH being equal to $CD + DI$, is equal to 42.7323861846 toises nearly.

The curtain GH being equal to six times DI, is equal to $138\sqrt{10} - 360$ toises, or 76.3943171 toises nearly.

If Fm be drawn perpendicularly from the *epaule* F to AH, the line of defence, E_m, being equal to $\frac{EF \times BC}{BD}$

is equal to $54\sqrt{10} - 90$ toises, or 80.76299365 toises nearly.

The perpendicular Fm being to E_m as CD is to BC, is equal to a third part of E_m or $18\sqrt{10} - 30$ toises, or 26.921 toises nearly.

The distance mH of the point m from the extremity H of the line of defence being equal to $EH - E_m$, is equal to $270 - 84\sqrt{10}$ toises, or 4.3686765442 toises nearly.

The distance Dm of the point m from the intersection D of the lines of defence being equal to $E_m - DF$ or $E_m - DE$, is equal to $24\sqrt{10} - 40$ toises, or 35.8946538448 toises nearly. But since FEH is an isosceles triangle, the angle FEH or DBC is equal to twice the angle mFH, which is therefore equal to $9^{\circ} 13' 3''$ nearly.

The flank FH being equal to $\sqrt{Fm^2 + mH^2} = 3\sqrt{16300} - 5100\sqrt{10}$ toises, is equal to 27.27322895 or 27.275 toises nearly. And if from the extremity H of the line of defence AH there be drawn Hn to meet the face FB of the bastion in the point n, we shall have Hn

equal to $\frac{DH \times Fm}{Dm} = \frac{230 - 60\sqrt{10} \times 18\sqrt{10} - 30}{24\sqrt{10} - 40}$

toises, or 30.1976 toises, exceeding the perpendicular CD to the exterior side by 0.1976 of a toise only.

And as Fm is a fourth proportional to Dm, mH, and DF, or is equal to $\frac{mH \times D \times F}{Dm} = \frac{270 - 84\sqrt{10} \times 30\sqrt{10} - 50}{24\sqrt{10} - 40}$

toises, it is equal to 5.161 toises nearly. And Dn is equal to 50.392 toises nearly.

Now in Count Pagan's construction, from whom Mr. Vauban has borrowed the length of his perpendicular, on which the other parts chiefly depend, the flank FH is equal to $18\sqrt{10} - 33$ toises, or to 23.921 toises nearly, which falls short of the perpendicular Fm, drawn from the *epaule* F, in Vauban's construction, to the line of defence AH, by 3 toises, and of the flank FH by 3.35222895 toises. In any polygon, having its exterior side equal to 180 toises, their perpendiculars are equal, as well as the salient angles of their bastions. And we are persuaded, that even the greatest admirers of Vauban can assign no good reason for his not having followed Count Pagan also, with regard to the position of his flank, and placed it at right angles to the line of defence, instead of making them meet in an angle of $80^{\circ} 46' 57''$. There is great reason to suppose, that the Count would have made the face of his bastion considerably shorter than he did, had he not intended to have three flanks instead of one. He makes it 55 toises. But it is naturally to be presumed, that, had he intended to construct with a single flank, he would have bisected the perpendicular distance between his orillon and inner flank, (which is 19 toises,) and drawn his flank at right angles to the line of defence through this point of bisection, thereby forming a more complete construction for the body of the place than Vauban has done. And it is somewhat remarkable, that this line nearly coincides with the perpendicular Hn, to Vauban's line of defence, from its point H of intersection with the flank. Had he therefore, instead of taking 5 toises from the face of Count Pagan's bastion, taken 10, and then placed his flank at right angles to the line of defence, he would, without lengthening this line, have given the face of his bastion its proper length, and, at the same time, made the flank itself about equal to the perpendicular, as it ought to be, since perpendiculars to the exterior sides of polygons were first introduced into construction for the sole purpose of obtaining flanking defences. The lengths, however, with both these authors, as well as the other writers on fortification, are merely arbitrary, and by no means derived from reasoning either on the properties of the figures, or their relative degrees of importance and capability of defence. For there appears no reason for giving the same perpendicular to a hexagon and every other polygon of a greater number of sides, as Vauban has done, or to all regular figures above the square, as Count Pagan has done.

This author retains part of the *fausse-bray*, which used to go round the whole body of the place, at the distance of from 4 to 5 toises from the same, making use of it as *tenailles* opposite to his curtains, which are made differently.

A tenaille is commonly from two to three feet only higher than the level ground of the ravelin. The tenaille *abcd*, *efg*, (Plate VI. fig. 7.) is constructed by first setting off from the epaulés E, F, on the lines of defence Ea, Fg, equal each to three toises, for a passage between it and the flanks of the baillons; then taking *ab, gf*, for its faces, equal each of them to 16 toises, by describing from the shoulders *b* and *f*, as centres arcs with a radius equal to *bf*, and then by intersecting these arcs from the same shoulders as centres, with a radius equal to 10 toises, for its flanks *bc, fe*. Some, however, make the faces *ab, gf*, equal to half the lines *aD, gD* respectively, and place the flanks at right angles to the lines of defence, which is certainly the best position for them.

The tenailles *abcd, efgb*, (fig. 8.) are without flanks, and have their faces on the lines of defence. The passage between them, as well as the passages between them and the flanks, are three toises wide. These are called *simple tenailles*, and the foregoing is called a *reinforced tenaille*. There is also a third sort of tenailles, which have only faces *ab, gf*, and flanks *bc, fe*, without a curtain *ee*.

Simple tenailles, with their faces on the lines of defence, but without flanks, are not so well calculated for scouring and defending the ditch as either the *reinforced tenailles* are, or those with faces, and flanks without curtains. However, as they are not liable to be enfiladed, Mr. Vauban has generally preferred them to the other two, in most of the places which he fortified.

The *reinforced tenailles* defend the ditch much better, and add low flanks to those of the baillons, but are liable to have their own flanks enfiladed, an inconvenience that might be remedied by constructing them in such a manner as to be covered by the extremities of the parapets of the opposite ravelins, or by the adjoining *lunettes*. These are well calculated for scouring not only the ditch, but also the level ground of the ravelin, and the ditch before the *corps de guard, reduit*, or redoubt, commonly made within it, which cannot be so well seen or defended from any other parts.

Those with faces and flanks only, have the same advantages with these as to the defending or scouring of the ditch, but are also, like them, liable to have their flanks enfiladed, which should be guarded against in the same manner.

The better to scour and defend the ditch, and oppose its passage, this fortifier places in it, opposite to the middle of the *tenaille*, or of the curtain, a caponiere, or double way, covered with a parapet raised three feet above the bottom of the ditch. It is about 12 feet broad, is perpendicular to the curtain, and is palisaded on both sides. This work is good, and very useful, as it commands without being commanded, and serves as a passage for the musketeers from the body of the place to the outworks. He thus has four flanks for the defence of his ditch, namely, that of the body of the place, that of the orillon, that of the tenaille, and the caponiere.

Tenailles are reckoned to be necessary, that it is with good reason that there are few places fortified without them. For when the ditch is dry, the spaces behind them serve as places of arms, from which the troops may fall to oppose the enemies' descent of the ditch, to retard his operation, and destroy his works in it, and then retire to them as places of safety. They also render the communication between the body of the place and the ravelins more easy and secure, which is a great advantage, as the ravelins are thereby enabled to make a much better defence than they otherwise could do, being readily supplied at any time with troops and necessaries. And when the ditch is wet, the spaces behind them serve as harbours for boats, which armed men can make use of, both for opposing the passage of the ditch,

and for facilitating the communication between the tenailles and the ravelins.

This fortifier, in order to increase the strength of a place, places frequently works called *lunettes* (which literally signify spectacles) on both sides of his ravelin. He sometimes makes one face of his lunette perpendicular to the middle of the face of the ravelin, and sometimes perpendicular to the face of the ravelin, and so as produced to the same about one-third from the salient angle. In the former case he makes that face of the lunette equal to 30 toises, and determines its other faces by taking for the demi-gorge 25 toises, on the counterescarp of the great ditch from that of the ditch before the ravelin; and in the latter he makes the demi-gorge equal to 20 toises only. The ditch before the *lunettes* is 12 toises broad, the thickness of the parapet is equal to three toises, and that of the rampart to eight, as in the ravelin.

When he makes use of *lunettes*, he sometimes covers the salient angle of the ravelin with a work called *borne*, of which the faces are parallel to those of the ravelin, and when produced bisect those of the *lunettes*. The ditch before it is ten toises wide.

Tenailions. The term *tenailion* is sometimes applied to a reinforced tenaille; but it is generally confined to a work somewhat like a lunette, made on each side of a ravelin, but differing from a lunette in this circumstance, that one of the faces of a *tenailion*, though it is 30 toises long, like that of the lunette, is in the direction of the ravelin produced beyond its ditch, whereas that of the lunette is perpendicular to it. The other face of the *tenailion* is determined by taking 15 toises on the counterescarp of the great ditch from that of the ravelin. There is sometimes in a *tenailion* a battery 15 toises long, and 10 toises retired from the front and parallel thereto.

There are generally retranchments in *tenailions* which have their parapets either parallel to their fronts or perpendicular to their other faces, which, when produced, terminate on the faces of the baillons. The ditch before such a retranchment is about three toises wide; and as these works are commonly made of earth, without any revetement of masonry, there is a banquette, called *berm*, before the parapet, next to the ditch, about eight feet broad, to prevent it from falling into the fame.

As to the construction of counter-guards, horn-works, crown-works, covert-ways and glaces, detached redoubts, second ditches, and covert-ways, and profiles. See the same under these articles respectively.

Mr. Vauban, in his second method with tower-baillons, according to the plans of Landau and Besford, begins with his construction inwards, and fortifies outwards in the following manner.

Supposing A B (fig. 9.), to be the interior side of the hexagon of 120 or 130 toises, draw A C, B D from the centre thereof, through the extremities A, B; set off six toises from A to *b*, and from B to *c*; through the points *b* and *c*, draw right lines at right angles to A B, on which set off six toises from *b* to *f*, and *c* to *b*, and four toises from *b* to *d*, and *c* to *g*; and from the points *f, d*, draw perpendiculars *fr, dn*, to the capital A C, as also from the points *b, g*, perpendiculars to the capital B D. Then, if *rE* be taken equal to *rf*, and *pF* to *pb*, the points E, F, will be the salient angles of the tower-baillons, of which E *f d n* and F *bg g* are the halves.

If on the capitals A C, B D, there be taken E C, F D, equal each to 40 toises, the points C, D, will be the salient angles of the counter-guards before the towers. From the points C, D, draw the lines of defence C *e*, D *b*, to the points *e, b*, where the flanks of the towers intersect the curtain.

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tain. On these set off 56 toises, from C to G, and D to H, for the faces CG, DH, of the counter-guards. The flanks and tenailles are found or determined as in his first method.

The ditch before the salient angles of the towers is six toises broad, and its counterfearp is drawn to the extremities of the flanks of the counter-guards. The right line, which joins the ends of these flanks, determines the inside of the tenailles.

The ditch before the counter-guards is 12 toises broad at the salient angles, and its counterfearp is drawn towards the opposite shoulders, in the same manner as in his first method.

The capital of the ravelin is 45 toises, and its faces, when produced, terminate on those of the counter-guards, about 10 toises from the shoulders. Ten toises, however, are cut off from the faces of the ravelin, for the flanks which are parallel to its capital.

The ditch before the ravelin is 10 toises broad, the covert-way five, the demi-gorges of the places of arms 12 each, the faces 17 each, and the glacis is 20 toises broad.

The construction of Mr. Vauban's third method, according to the plan of New Briſach, is applied to an octagon, of which the exterior side is equal to 180 toises, and is made inwards. The perpendicular to the exterior side is, as in his first method, equal to 20 toises. The faces of the counter-guards are each of them equal to 60 toises. The flanks are found by setting off 22 toises, in arcs described from the opposite shoulders, as centres, and with the distance between as radius. A right line drawn through the extremities of the flanks, parallel to the exterior side, to meet the capitals of the counter-guards, determines both the inside of the tenailles, and the salient angles of the tower-baillon.

And if another right line be drawn parallel to this, at the distance of nine toises from it, the points, where it meets or intersects the capitals of the counter-guards, will be centres of the towers; from which points, if seven toises be

set off each way for their demi-gorges, the positions of their flanks, which are perpendicular to the said line, will be determined. For each of these flanks, five toises are let off outwards, and four from the said line. And the line joining the inside of the flanks at the end of four toises completes the towers.

The ditch is six toises broad before the salient angles of the towers, and its counterfearp meets the line joining these angles, within ten toises of the extremities of the flanks of the counter-guards.

The great ditch before the counter-guards is 15 toises broad, and its counterfearp is parallel to the faces. The capital of the ravelin is 55 toises in length, and that of the redoubt within it, is equal to 23 toises. The faces of the ravelin are drawn towards those of the counter-guards, within 15 toises from the shoulders, and those of the redoubt are parallel to these. Twelve toises are cut off from each face of the ravelin, and six from each of the redoubts by the flanks, which are parallel to its capital. The ditch before the ravelin is twelve toises wide, and that before the redoubt is six. The covert-way and glacis are the same as in his second method. The profiles also are nearly the same in both. This method, indeed, differs but little from his second, except in two small flanks, of about four toises each, which in this he makes in each curtain, that are not in the other. The parapets of his counter-guards, on both sides of the salient angles for the distance of about twenty feet, are raised four feet higher than the rest, to prevent these works from being annoyed by ricochet-batteries.

In Mr. Vauban's first method of military construction, it may not be amiss to give a table of the principal parts thereof, for drawing the matter-line by, as also an ichnographical one of the principal dimensions of the body of the place, tenailles, ravelin, covert-way, traverses, and places of arms, as published with his approbation (for he never published any thing himself respecting it.)

TABLE for the Construction.

Side of Figure, or Polygon.	Forts.						Little Fortification.				Mean.		Great.	
	90	100	110	120	130	140	150	160	170	180	190	200	260	
Perpendiculars.	15	11	12½	14	15	16	20	21	23	25	30	31	25	22
Faces of Bastions.	22	25	28	30	33	35	40	42	45	47	50	53	55	60
Capitals of Ravelins.	25	28	30	35	38	40	45	50	50	52	55	55	60	50

And the following is an ichnographical table of the thicknesses, &c. of the works composing the body of the place, &c.

	Toises.									
Of the Body of the Place.	}	Thickness of the rampart at its base	11	}	Of the Tenaille.	Its distance from the orillon of the bastion	3	}	Thickness of its rampart in the face and flank at the base	7
		Thickness of the parapet at its base	3			Thickness of its parapet at the base	5			
		The breadth of the ditch	20			Thickness of its parapet at the base	3			

Thickness

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		Toises.	
Of the Half-moon or Ravelin.	Thickness of its rampart at the base	10	striking against, scatter the stones, and make them fly in different directions.
	Thickness of its parapet at the base	3	
	The breadth of its ditch	12	
Of the Covert-way, Traverſes, and places of Arms.	The breadth of the covert-way	5	He observes, that the bridges of his curtains do not interfere with the fire from his flanks along the faces of the bastions in the ditch, and he prefers that ditch which, by means of sluices, can be filled or emptied at pleasure.
	Length of the demi-gorge of the places of arms at the re-entering angles	10	
	Length of the faces, each of the places of arms	12	
	Length of the traverſes at the re-entering angles	5	
	Length of the traverſes at the salient angles	4½	
	Thickness of each traverſe at the base	3	

The construction of the Chevalier de Ville's method of fortifying is the following.

He begins inwards, and constructs outwards. He makes his flanks equal to the demi-gorges, and each of them equal to a sixth part of the side of the figure or polygon on which he constructs. In the square and pentagon, he determines the flanked angle or salient angle of the bastion by a tangent line; but in all figures and polygons of a greater number of sides than five, he makes it equal to a right angle, by describing a semicircle, as EGN on a right line, (fig. 10.) EN joining the epaules E and N, thereby making a second flank, as DI, CH, which increases with the number of sides in the figure or polygon. The length AG, of the capital of the bastion is, in this case, equal to the gorge line CP, or the distance between the points where the flanks of the bastion meet the adjoining curtains, a circumstance which furnishes an easy method of finding the points of the bastions.

The traverſes on the sides where their banquettes are, or on their insides, are from 5 to 5½ feet high, and from 3 to 4 on the outside, towards the covert-way, which they form at the re-entering angles.

He gives his caponiere a banquette on each side, and the parapet of the place two or three, to suit men of different heights or stature, that they may all of them fire on the same level.

He makes a cut opposite to each traverse in the parapet of the covert-way, 4½ or 5 feet deep, for the soldiers to pass, which he flunts up with a small merlon, except at the salient angles, where such cuts could not be seen by those who defend the place.

When he gives flanks to his ravelin, he makes places of arms in its ditch, perpendicular to its faces, and near the angles of the epaules, to prevent the passage of the same. When the counterſcarp of the ditch is reveted, or faced with masonry, he makes steps at all its angles for the convenience of the troops, and the service of the covert-way. Each detached piece or work should, for a similar reason, have a pair of stairs to lead up to it.

He makes the countermines of a place under the terre-plain of the rampart, on a level with the ditch, and about ten feet distant from the revetement, to which they are parallel, and have a communication with it through small arched heads, or passages. From the countermines of the place men go down into the caponieres, and then up into the countermines of the covert-way, from which heads or passages are carried on under the field to fourneaux or small mines, made for blowing up the besieger's works, and retarding their approaches.

He was of opinion, that when an eminence falls gradually from its summit towards the glacis of a place, works ought to be made one before another, with their salient or flanked angles sufficiently raised; that the most distant ought to cover all the rest, and draw its defence from them; and that they ought all of them to be built in such a manner, as to prevent an enemy from making a retrenchment in the first, without being exposed to the fire of the second; or in the second, without being exposed to that of the third, and so on.

The glacis should as often as possible be composed of pebbles, or of stones covered with turf, since the besiegers can work but slowly in it when so made, and the parapets thrown up in it by the pioneers, are apt to occasion their being killed or wounded, as the cannon-shot of the place

In constructing his casemates, or retired flanks and orillons, he sets off from C and D, on the flanks CE, DF, lines equal each to a third part of CE or DF, or of the demi-gorge, as Da, for instance, on DF. He also takes Fb in the face HF produced, equal to Da, and then draws bc parallel to Fa, to meet a right line joining a, and G the point of the opposite bastion. Then bc is the front of the orillon, when it is made square. But when he makes it round, he describes two arcs from b and c, as centres, with a radius equal to bc, and from their intersection as a centre through the points b, c, he describes the arc of his orillon.

The calculation of the lines and angles, according to his construction, may be made in the following manner.

If we suppose AB to be the side of a hexagon, the angle AOB of the centre will be equal to 60 degrees, and the angle BAS, or ABT, of the figure, equal to 120°. And as the flank is by the construction perpendicular to the curtain, the angle ECD of the flank is, of course, equal to 90 degrees. But as the flanked angle EGN is also equal to 90 degrees, the half of it, AGI, is equal to 45 degrees, and consequently the angle diminué AIG, being equal to half the excess of the angle of the polygon above the flanked angle, is equal to 15°. And the angle of the epaule is of course equal to 105°.

Wherefore, if AB be assumed of a given length, whether equal to 120 toises, or otherwise, the capital AG of the bastion, and the gorge-line CP, which is equal to it, is easily found by the following analogy, and the isosceles triangle CAF.

As the sine of the angle ACP, or APC, half the excess of 180° above the angle of the polygon, or half the angle of the centre.

Is to the sine of the angle of the polygon or centre,
So is the flank of the bastion or $\frac{AB}{6}$

To the gorge-line CP, or capital of the bastion AG. And the salient line GI, in the oblique-angled triangle AGI, is found by this analogy.

As the sine of the angle diminué AIG

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Is to the sine of the angle GAI , or its supplement

OAI , half the angle of the polygon,

So is the capital AG of the bastion

To the radius line GI .

And the line AI is obtained from the same triangle, by this analogy.

As the sine of AIG the angle *diminué*

Is to the sine of AGI , half the flanked angle,

So is the capital AG of the bastion

To the line AI .

From which, if there be taken the flank or demi-gorge, there will remain the complement CI ; which, taken from the curtain CD , leaves the second flank DI . The complement CI is also easily found from the right-angled triangle, ECI , by the following.

As radius

Is to the tangent of the angle $CEI = 90^\circ -$ the angle *diminué*,

So is the flank EC , a sixth part of AB ,

To the complement CI .

The side GH of the exterior polygon is determined by taking a fourth proportional to OA , AB and $OA + AG$.

The foregoing methods of construction have been called the *French manner*, particularly those of Count Pagan and Mr. Vauban, who borrowed from him the length of his perpendicular, which is the principal part of construction, and that on which all the other parts chiefly depend. Vauban's method, however, has been chiefly followed on account of its plainness and simplicity, with a single flank. It is proper, nevertheless, to give the constructions of some of those methods of fortifying that have been made use of in other nations.

The Italians, who have not been anxious about making the flanked angle, or angle of the bastion, either right or obtuse, but prefer having it acute for the purpose of getting a second flank on the curtain, have several methods of fortifying delivered by their authors, amongst which that of Sardi has been esteemed one of the best.

He begins inwards and constructs outwards, supposing AB equal to 800 geometrical paces or feet (*fig. 11.*). Of these he allows 150 for the demi-gorge AC or BD , and the same for the flank CE or DF , which he places perpendicularly to the curtain CD , on which he takes an eighth part DI for the second flank, making I the point in the curtain, from which the radius line drawn through E the extremity of the flank or angle of the epaule, gives the salient point G of the bastion on the lengthened radius OA . And this operation, continued round the figure or polygon, completes the construction.

He makes a casemate in each flank, capable of holding three pieces of cannon, by setting off from the extremity of the curtain on the demi-gorge, a line equal to a third part of the flank, and the same on the flank itself. And he makes his orillons either square or round.

He places square cavaliers on the middle of his curtains, of which the faces are parallel to the parapet of the rampart, and 30 feet distant from the same. In each of these he puts 7 pieces of cannon, three of which look into the field, and the other four towards the two adjoining bastions to flank such breaches as the besiegers may make in the faces of them, and prevent them from giving the assault.

The calculation of the principal lines and angles in Sardi's construction, may be made in the following manner.

Since the interior side AB is by supposition equal to 800 geometrical paces or feet, and the demi-gorge AC , and flank CE , each equal to 150 of these, the curtain CD

is equal to 500, and the second flank DI , which is the eighth part thereof, is equal to $62\frac{1}{2}$. Consequently the complement CI is equal to $437\frac{1}{2}$ fath feet or paces.

But if we suppose AB to be the side of a hexagon, the angle AOB of the centre will be equal to 60° , and the angle SAB or ABT of the polygon will be equal to 120° . And the angle ECD of the flank is by the construction equal to 90 degrees.

The angle *diminué* CIE is therefore found from the right-angled triangle ECI by this analogy.

As the complement CI

Is to the flank CE ,

So is the radius

To the tangent of the angle *diminué* CIE , which is about $18^\circ 55'$. If this be added to the angle of the flank, which is equal to 90° , we get $108^\circ 55'$ for the angle CEG of the *epaule*. And if the said angle *diminué* of $18^\circ 55'$ be taken from the angle OAI , or half the angle of the polygon, which is here equal to 60° , we get $41^\circ 5'$ for the angle AGI half the flanked angle. Consequently the flanked angle is about $82^\circ 10'$.

If to the complement CI we add the demi-gorge AC , we get AI equal to $587\frac{1}{2}$ fath feet or paces, and the radius line GI is therefore found from the oblique-angled triangle AIG by the following analogy.

As the sine of half the flanked angle AGI

Is to the sine of the angle GAI , or of half the angle of the polygon,

So is the line AI

To the radius line GI .

The capital AG of the bastion is also obtained from the same triangle by this analogy.

As the sine of half the flanked angle AGI

Is to the sine of the angle *diminué* AIG ,

So is the line AI

To the capital AG of the bastion.

If to the curtain CD we add the demi-gorge AC , we get the lengthened curtain AD , equal to 650 fath feet or paces, and from thence by means of the oblique-angled triangle GAD the sicient line GD in the following manner.

As the sum of the lengthened curtain and capital AD , AG ,

Is to their difference,

So is the tangent of half the sum of the angles AGD , ADG , or of one quarter of the angle of the polygon,

To the tangent of half their difference, which is found to be about $12^\circ 31'$. This taken from 30° one quarter of the angle of the polygon, or 120° , leaves $17^\circ 29'$ for the angle ADG , and added to the same gives $42^\circ 31'$ for the angle AGD . Wherefore,

As the sine of the angle ADG

Is to the sine of the angle GAD , or of half the angle of the polygon,

So is the capital AG of the bastion,

To the sicient line GD .

The Italian writers on fortification seem fond of having the flanked angles, or angles of the bastions acute, in order that the faces of the bastions, on the same side of the place, may defend one another, and serve as flanks when the casemates and flanks are battered down or ruined. But the second flank on the curtain is by this construction too small to make the flanked angle always acute. To make it answer this purpose, it would be an improvement of it to make the second flank increase in length, as the number of the bastions or of the sides of the figure increases.

It is perhaps worthy of remark, that the angle ADG

by this confitition on a hexagon, exceeds that subtended by the true perpendicular of a hexagon by about 17' only.

The angles of the fquare and pentagon are too fmall for a fecond flank. And the Chevalier de Ville, whose conftruction much refembles Sardi's in feveral refpects, appears to have borrowed from him the idea of making his flanks equal to his demi-gorges. He takes care however to avoid fecond flanks in the fquare and pentagon, and in other figures to make them increafe with the number of the fides of the figure.

The following is the conftruction of the Dutch method of fortifying according to Marolois.

Before he begins his conftruction he afcertains the magnitud of the flanked angle, or angle of the baftion, by adding 15° to half the angle of the polygon, which makes it in the fquare equal to 60° , in the pentagon equal to 69° , in the hexagon equal to 75° , in the heptagon equal to about $79^\circ 17'$, in the decagon equal to 87° , in the dodecagon equal to 90° , which he alfo allows for it in all figures or polygons of a greater number of fides.

He makes the curtain I K (fig. 12) equal to 36 rods of 12 Paris feet each, or 72 toifes, the face of the baftion A F equal to 24 fuch rods or 48 toifes, making the ratio of the curtain to it a fequalteral one, or that of 3 to 2. He makes the flank-forming angle F M I equal to 40° , when he wifhes to have only a fingle flank, in order that the demi-gorge I M may be to the flank in the ratio, nearly of 6 to 5, and equal to 35° only, when he intends to have a covered flank, making then the ratio of the demi-gorge to the flank about that of 7 to 5.

Let A B be an exterior fide. Make the angle B A O equal to half the angle of the polygon. Bifect the fame by the right line A P. Take the angle P A E equal to $7^\circ 30'$. On the rafant line A E fet off from A 48 toifes for the face A F. From the epaule F draw the perpendicular F G, and produce G F indefinitely towards I, making at the point F an angle I F M of 50° . Draw through the point M, where the line F M meets the radius A O, an indefinite right line, M N, parallel to the exterior fide A B, which will be a fide of the inward polygon. Take the curtain I K, equal to 72 toifes, and the line G H equal to it. Join K H, and on it take K L equal to the flank I F. Make the demi-gorge K N equal to the demi-gorge I M, and H B equal to A G. Draw the face B L, and the capital B N, which, being produced, will meet the capital A M alfo produced in the centre O.

The calculation of the principal lines and angles of the conftruction on the fides of a polygon fortified, according to Marolois's method, may be made in the following manner.

If we fuppofe A B to be the fide of a hexagon, we have the angle of the centre equal to 60° , the angle of the polygon equal to 120° , and confequently O A B half the angle of the polygon equal to 60° . Wherefore O A E, half the flanked angle, is equal to $37^\circ 30'$, which taken from O A B, half the angle of the polygon or 60° , leaves $22^\circ 30'$ for the angle *diminué* E A B. But the angle of the flank is a right angle by the conftruction. If to this then there be added the angle *diminué*, we fhall have $112^\circ 30'$ for the angle A F I of the *epaule* or fhoulder, from which if the angle I F M, which is equal to 50° , be taken, there will remain $62^\circ 30'$ for the angle A F M. The angle A M F is $= 80^\circ$.

The capital A M of the baftion is found from the oblique-angled triangle A M F by this analogy.

As the fide of the angle A M F
Is to the fine of the angle A F M,

So is the face A F of the baftion
To the capital A M.

And the line M F is found by this analogy.
As the fine of the angle A M F
Is to the fine of the angle F A M,
So is the face A F of the baftion
To the line F M.

The flank I F is found from the right-angled triangle M I F by this analogy.

As radius
Is to the fine of the flank-forming angle I M F $= 40^\circ$,
So is the line F M

To the flank I F, which is equal to about 19 toifes.

And the demi-gorge M I is found from the fame triangle by this analogy.

As radius
Is to the fine of the angle I F M $= 50^\circ$,
So is the line F M

To the demi-gorge M I, which is equal to about $22\frac{3}{4}$ toifes, the double of which or $45\frac{1}{2}$ toifes added to the curtain I K, which is equal to 72 toifes, gives the interior M N, equal to about $117\frac{1}{2}$ toifes.

The exterior fide A B is determined by means of the line A G, which is found from the right-angled triangle A G F, by this analogy.

As radius
Is to the fine of the angle A F G $= 67^\circ 30'$,
So is the face A F of the baftion, which is equal to 48 toifes,

To the line A G, which is equal to about $44\frac{1}{2}$ toifes, the double of which added to G H, that is, equal to 72 toifes, gives $160\frac{1}{2}$ toifes for the exterior fide A B.

The fecond flank E K is determined by means of the complement E I, which is found from the triangle E I F, by either of the following analogies.

As the fine of the angle *diminué* I E F $= 22^\circ 30'$

Is to the fine of the angle E F I $= 67^\circ 30'$,

So is the flank I F

To the complement I E.

Or, As radius.

Is to the tangent of the angle E F I $= 67^\circ 30'$,

So is the flank I F

To the complement I E, which is equal to about $45\frac{5}{8}$ toifes, and which taken from the curtain, which is equal to 72 toifes, leaves $26\frac{3}{8}$ for the fecond flank E K or I C.

The perpendicular diftance of the interfection of the lines of defence, from the middle of the exterior fide A B, is found by this analogy.

As radius

Is to the tangent of the angle *diminué*, which is $= 22^\circ 30'$,

So is half the exterior fide A B

To the perpendicular from it to the interfection of the lines of defence, which is therefore equal to about $32\frac{1}{2}$ toifes.

This conftruction furnifhes an eafy method of working on the ground, when through interruptions from buildings, hedges, thickets, &c. and from the unevennefs and irregularity of the ground itfelf, a regular polygon cannot eafily be defcribed by finding the centre of the circumfcribing circle. For fuch a polygon may be traced on the ground by means of the mafter-lines of the curtains and baftions, fetting off firft fucceffively the angle of the polygon without any reference to the centre. This author, however, inftead of making his flank equal to his perpendicular, as it ought to be, makes it fall fhort of the fame by not lefs than $13\frac{1}{2}$ toifes.

There are other methods of conftruction delivered by Dutch writers, which, however, are hardly deferving of notice. And

as in all their methods, they make a second flank on the curtain, and for the molt part draw at the same time the counter-scarp of the great ditch parallel to the faces of the baillions, they render the defence very defective. For the branches of the counter-scarp being thus parallel to the sicient lines, will, when produced, frequently meet the curtains, and will of course cover the greatest part of the ditch itself, from the view of the flanks of the baillions. And as the principal part of the ditch is thus fenced by the second flanks only, which are easily ruined, the entrance into it is rendered easy to the besiegers.

The following is the construction of the Spanish method of fortifying.

Take the interior side AB (*fig. 13.*) equal to 120 toises. From A to C , and B to D , set off 20 toises or a sixth part of AB , for each of the demi-gorges A, C, B, D . On perpendiculars to AB at the points C, D , take CE, DF , equal respectively to AC, BD , or to 20 toises each, or a sixth part of AB . Let O be the centre of the circle, which circumscribes the polygon, of which AB is a side. From D through E , and C through F , draw right lines to meet the radii OA, OB , of the said circle, produced in the points G, H . Then EG, FH will be the opposite faces of the baillions $CEGPQ, DFHRS$, and AG, BH their capitals. And the same construction continued on the other sides AM, MT, TV, VN, NB , completes the operation.

The calculation of the principal lines and angles of this construction is made in the following manner.

Since AB is equal to 120 toises, and AC, BD , each equal to 20, the curtain CD is equal to 80 toises. And since CE, DF , are each equal to 20 toises, or the sixth part of AB , and also perpendicular to AB by the construction, CD is to CE as four to one, and as radius to the tangent of the angle CDE , which is therefore equal to about $14^{\circ} 2'$. Wherefore the angle CED is equal to about $75^{\circ} 58'$, and the angle CEG of the epaule or shoulder is equal of course to about $104^{\circ} 2'$. These angles, therefore, are the same in all polygons. But the flanked of consequence, with the angles of the polygons.

Now, if we suppose AB to be the side of a hexagon, we have the angle AOB of the centre equal to 60° , and the angle MAO or ABN of the polygon equal to 120° . Consequently half the flanked angle OGD or AGD , which is equal to the excess of OGH or OAB , half the angle of the polygon, above the angle *diminué* ADG or CDE , is equal to $45^{\circ} 58'$: and the whole flanked angle, or angle PGE of the baillon, is equal to $91^{\circ} 56'$.

The capital AG of the baillon, is found from the oblique-angled triangle AGD , by this analogy.

As the sine of half the flanked angle AGD , which is $=45^{\circ} 58'$

Is to the sine of the angle *diminué* $ADG = 14^{\circ} 2'$,

So is the lengthened curtain AD , which is $=100$ toises,

To the capital AG of the baillon, which is equal to about 33.73 toises.

And the rasant line or line of defence DG , is found from the same triangle by this analogy.

As the sine of half the flanked angle $AGD = 45^{\circ} 58'$

Is to the sine of the angle $DAG = 120^{\circ}$,

So is the lengthened curtain AD , which is $=100$ toises,

To the rasant line or line of defence DG , which is equal to about 120.46 toises, or $120\frac{1}{2}$ toises nearly.

But DE is equal to $\sqrt{CE^2 + CD^2} = \sqrt{20^2 + 80^2} = 4\sqrt{425}$ toises $= 82.86$ toises nearly. Wherefore the face GE of the baillon is equal to 37.6 toises nearly.

The gorge-line CQ is found from the isosceles triangle CAQ , by the following analogy.

As the sine of the angle $ACQ =$ half the angle of the centre

Is to the angle of the polygon CAQ ,

So is the demi-gorge AC , which is $= 20$ toises,

To the gorge-line CQ , which in a hexagon, as this figure is supposed to be, is equal to about 34.64 toises.

The line OG being equal to about 153.73 toises, the exterior side GH , when AB is the side of a hexagon, will also be equal to about 153.73 toises. But GH is always determined by taking a fourth proportional to OA, AB , and OG .

The perpendicular distance KL of the intersection of the lines of defence, from the exterior side GH , is found by this analogy.

As radius

Is to the tangent of the angle *diminué* $L GK = 14^{\circ} 2'$,

So is GL or the half of GH , the exterior side,

To the perpendicular KL , which in the hexagon, as this figure is supposed to be, is equal to about 19.2 toises, falling short of the flank CE by about 0.8 of a toise, or eight-tenths of a toise.

The Spaniards, who are rather partial than otherwise to obtuse flanked angles, have no second flank on the curtain, but always construct their fortifications with a rasant, and never with a sicient line of defence, not minding whether the flanked angle or angle of the baillon be acute, right, or obtuse. Their mode of construct on, except as to the second flanks, and the making of the flanked angle right, is the same with that of the Chevalier de Ville, above described, being compounded of the Italian and Spanish methods, has on that account been called the composed draught, or the composed method of construction.

Let AB (*Plate VII. fig. 14.*) be the side of a regular hexagon inscribed in a circle, and equal to 160 toises. Set off from its extremities A and C on it AC, BD as demi-gorges, and each equal to an eighth part of AB , or to 20 toises. From the points C and D on right lines perpendicular to AB take CE, DF , as flanks equal each to 20 toises, or an eighth part of AB also. Take the curtains CI, DK , from the points C, D , and A, B , each equal to 40 toises, or a fourth part of the interior side AB ; and from the points I, K , on right lines, drawn perpendicularly to AB inwards, take IL, KM , for the retired flanks, each equal to 20 toises, or the eighth part of the interior side. Join the points L, M , by drawing LM for the retired curtain. From the extremities L, M , thereof through the points K, I , draw the right lines LK, MI , which being produced, will pass through the outward extremities E, F , of the flanks CE, DF , and will meet the lengthened radii OA, OB , in the points G, H , which will determine the salient points of two of the baillions. And a similar operation continued quite round on the other sides of the polygon, will complete the construction.

As the foregoing figure is supposed to be a regular hexagon, the angle of the centre is equal to 60° , and that of the polygon to 120° . And as ML is to LI , as 40 to 20 or 2 to 1, the natural tangent of the angle *diminué* $LM I$, or MGH to unity, as radius is equal to $\frac{1}{2}$ or to 0.500000, which is nearly equal to the natural tangent of $26^{\circ} 34'$. If this angle be taken from 60° , half the angle of the polygon, there will remain $33^{\circ} 26'$ for half the flanked angle, or half the angle of the baillon. The flanked angle therefore, or the angle of the baillon, is in a hexagon equal to $66^{\circ} 52'$.

Now the line GI is found from the oblique-angled triangle AGI , by this analogy.

As the sine of $33^{\circ} 26'$, half the flanked angle, or AGI

Is to the sine of the angle $GAI = 120^{\circ}$,

So is the line AI , which is equal to 60 toises

To the line GI , which is equal to 94.31 toises nearly.

And the capital AG of the bastion is found from the same triangle by this analogy.

As the sine of AGI , half the flanked angle $= 33^{\circ} 26'$

Is to the sine of the angle *diminué* $AI G = 26^{\circ} 34'$,

So is the line AI , which is equal to 60 toises,

To the capital AG of the bastion, which is equal to about 48.704 toises.

But the line IM is equal to $\sqrt{IL^2 + LM^2} = \sqrt{25^2 + 40^2} = 4\sqrt{125} = 44.72$ toises nearly.

But EI is equal to IM . Wherefore GE , the face of the bastion, being equal to $GI - EI$, is equal to about 49.59 toises, or 49.6 toises nearly.

The short or little line of defence GM or HL , being equal to $GI + IM$, is equal to $94.31 + 44.72$ toises, or 139.03 toises, or 139 toises nearly.

The lengthened radius OG , and consequently the exterior side GH , when $A B$ is the side of a hexagon, is equal to $160 + 44.72$ toises, or to 204.72 toises.

The perpendicular distance of the intersection I , of the lines of defence, from the exterior $dc GH$, is found by either of the two following analogies.

As radius

Is to the tangent of the angle *diminué* $iGH = 26^{\circ} 34'$,

So is half the exterior side GH , or 102.36 toises,

To the perpendicular distance of i from the same.

Or, As radius

Is to the sine of the angle *diminué* $iGH = 26^{\circ} 34'$,

So is the little line of defence $GM = 139$ toises

To the perpendicular distance of the point i from GH , which is equal to about 62.166 toises.

This method was adopted for the purpose of constructing on a large front, and thereby lessening the number of bastions. And to keep the lines of defence GM, H, L , within musquet-shot, a curtain LM retired inwards, is made equal to a fourth part of the interior side $A B$, and opposite to the middle thereof. This manner of fortifying has been called the *ordre renforce* or re-inforced order, concerning which several Italian and Spanish authors have written large treatises. Like most other writers on fortification, who have delivered different methods of construction, they very absurdly make their angle *diminué* invariably the same in all polygons, without assigning any good reason for doing so, drawn from the natures or properties of the polygons themselves, the facility or difficulty of embracing them respectively, or from their relative degrees of capability of defence. In this method, the perpendicular distance of the intersection i of the lines of defence, from the exterior side GH , is more than three the length of the flank CE or DF .

Of Coehorn or Koehorn's methods.

The famous Minno, baron of Koehorn, who took many of the places, which the celebrated marshal Vauban had fortified, published three methods of construction, the first for a hexagon, the second for a heptagon, and the third for an octagon. The publication of his treatise on fortification however took place before he had acquired that great experience, which justly procured him the reputation of being one of the first engineers, that has ever appeared in Europe; and the methods delivered in it are not reducible to practice. That he afterwards thought so himself is evident from the towns which he fortified. For if, after acquiring experience in the attack of places he had really been of opinion that the methods he had published, were capable of making such a prodigious resistance or defence as he endeavoured in his book on fortification to show, that they were, it is a circumstance difficult to be

accounted for, that he never once thought of using them, when he had frequent opportunities of doing so. It ought also to be remembered, that his system of fortification was published before the method of firing *en ricochet* was either practised or invented.

In his first method the works occupy twice as much ground as they do in Mr. Vauban's, and being entirely of earth, low, and liable to be easily surpris'd, would require thrice as many men, at least, for their defence. His second and third methods are, in fact, impracticable, as the fortification in each of them takes up five times as much ground as the town or place it surrounds.

This being the case, we will just give a general description of them. In all the three he begins inwards and constructs outwards. The first he applies to a hexagon and supposes the surface of the water to be only about four feet lower than the level ground. In this he constructs from an interior side of 150 toises, from the extremities of which he sets off on the same 29 toises for each of the demi-gorges and 80 toises on the lengthened radii of the hexagon for the capital of each of the bastions. He thus leaves 72 toises for the length of his curtain. From the extremities of the interior side he takes, on the lengthened radii respectively, 40 toises for the points of intersection of the higher faces of the bastions, which are also equal each to 40 toises, and parallel to the lower faces that are in the lines of defence. The space between the lower and higher faces of the bastions is a dry ditch, the bottom of which is only about six inches above the level of the water in a wet ditch. Behind the lower parapet there is a banquette of three feet and a rampart of five, and under this rampart is a stone gallery, that runs from one end of it to the other, and is divided into several apartments, which are shut with doors. There is also a gallery, which goes from the salient angle formed by the lower faces to that formed by the higher with loop holes at small distances from one another, looking into the dry ditch. There are likewise rows of palisades placed parallel to the higher face at the distance of four toises from them.

The great ditch is 24 toises broad, and its counterscarp is parallel to the lower faces of the bastions. The demi-gorges of the ravelin are each equal to 29 toises, and the faces each to 45 toises. The dry ditch between the lower and upper faces of it is 16 toises broad. The rampart is 28 feet broad, the banquette three, and the parapet 20 . The lower faces are parallel to the higher ones.

The angle *diminué*, or the angle formed by the exterior side, and either line of defence, is in this method equal to $24^{\circ} 38' 48''$.

His second method he applies to a heptagon, and supposes the level of the ground to be only about three feet above that of the surface of the water. In it he constructs outwards from an interior side of 126 toises in length, from the extremities of which he takes on the same 30 toises for each of the demi-gorges. On the lengthened radii of the heptagon he sets off 72 toises for the capital of each of the bastions, at the extremities of which he draws right lines forming with the said capitals angles each of 40° , and on these lines he sets off 66 toises for the faces of the bastions respectively. From the salient angles of the bastions as centres with radii equal to the distance from the same to the extremities of the demi-gorges 30 toises distant from those of the interior sides he describes arcs, in which he sets off respectively chords equal each to 30 toises, and on these chords describes the mean flanks which are arcs of 60° .

The outline of his higher flank is 13 toises distant from that

that of the mean, and this flank is an arc described from the same centre, that the mean flank is described from, having its chord equal to 40 toises.

The dry ditch round the body of the place is 20 toises broad before the faces of the bastions, to which its counterescarp is parallel. There is a wet ditch before his tenailles 10 toises broad with two bridges at each end near the orillons, the one of which leads directly across it and the other along the face of the bastion.

The salient angle of the ravelin is 125 toises distant from the curtain of the body of the place and is of 70 degrees of magnitude. The faces are each 50 toises long, and the faces of the redoubt in it are 10 toises distant from those of the ravelin, and each 14 toises long. The wet ditch before the lower faces of the ravelin is 24 toises broad, and the work beyond that ditch, which he calls the second counterescarp, is 20, and parallel to the ditch.

The flanked angle or angle of the bastion in this method is equal to 80°, and the angle *diminué* or the angle formed by the exterior side and either line of defence is equal to twenty-four degrees and two sevenths. In his first method the angle of the bastion or flanked angle is equal to 70° 4' 24".

He applies his third method to an octagon, of which the side is equal to 110 toises, and from which he constructs outwards; and at its extremities he sets off 21 toises for each of the demi-gorges. On the lengthened radii, or radii of the octagon produced, he sets off from the said extremities of the interior side 64 toises for the capitals of each of the bastions, the faces of which he supposes to be each equal to 54 toises, and the salient or flanked angle equal to 85°. He thus makes his curtain equal to 68 toises.

In his first and second methods he has three flanks including that of the tenaille. But in this he has only two, the lower of which is determined or found by describing an arc through the extremity of the tenaille from the salient angle of the opposite bastion as centre and setting off from the said extremity in the said arc a chord equal to 20 toises, on which an arc of 60 degrees is described for the flank. The upper flank is described from the same centre, that the lower one is described from through one extremity of the curtain, and its chord is equal to 30 toises.

The wet ditch before the body of the place is 20 toises broad, and its counterescarp is parallel to the faces of the bastions.

The capital of the detached bastion is equal to 100 toises, its faces are directed towards the salient angles of the inner bastions. The dry ditch between the lower and higher faces of the detached bastions is 20 toises broad; and the higher faces are parallel to the lower, and each of them 34 toises long. The ditch before the detached bastions 24 toises broad. It is evident, that in this third method of Coehorn the angle *diminué* or the angle formed by the exterior side and either line of defence is equal to 25 degrees. For since the angle of the centre in an octagon is equal to 45°, that of the octagon is equal to 135°, from which, if the flanked angle, that by the construction is equal to 85°, be taken, we get 50° for the double of the angle *diminué*, which is of course equal to 25°.

Of Mr. Belidor's methods.

This author delivers three methods of construction, the first he applies to an octagon, of which the side is equal to 200 toises. In the three he begins outwards and constructs inwards. In the first he makes the perpendicular to the exterior side equal to 50 toises, the faces of his bastion equal each to 70 toises, and he finds his flanks in the same

way with Mr. Vauban in his first method. He makes his bastion with flanks equal each to about 26 toises. On the line joining the extremities of these flanks he constructs inwards, erecting a perpendicular to the middle thereof equal to 13 toises, through the inner extremity of defence and takes on them the faces equal each to 23 toises. The parts of the lines of defence from their intersection to the points where they terminate the flanks, are each equal to 14 toises. The dry ditch before this front is 10 toises broad at the inner extremities of the bastion, and its counterescarp produced terminates at the opposite shoulders. He connects the flanks of the bastions with the curtains or lines joining the faces of the interior front by means or works in the form of arcs called ram's-horns, which are described from the middle points of the said faces as centres with a radius of 23 toises. The salient angle of the redoubt in his bastion is in the intersection of the two adjoining curtains produced, and the faces of it terminate on those of the inner front within three toises of the *epaules* or shoulders. The ditch before it is 3 toises broad. It has a stone wall in the faces from three to four feet thick with loopholes. Mr. Belidor adds no outworks to this method of construction, which has certainly the advantage of all those with detached bastions. The retracements within are capable of a good defence, but occupy too much ground, particularly the ditches, that might be better disposed of. The flanks of such large bastions as his are too small. The great ditches are too large, being 20 toises broad at the salient angles of the bastions with its counterescarp directed towards their shoulders.

In this method his angle *diminué* or the angle formed by the exterior side and either line of defence is equal to 26° 33' 54", and of course the angle of his bastion or the flanked angle, as the construction is applied to an octagon, is equal to 81° 52' 12".

His second method of construction he also applies to an octagon, of which the exterior side is equal to 200 toises, the perpendicular to which, from the middle point thereof, he makes equal to 55 toises. The faces of his bastions, which are detached, are each equal to 70 toises, as in his first method. And the flanks as well as in the first are found in the same way as Mr. Vauban's.

The right line, that passes through the inner extremities of his bastion, serves as an exterior side for constructing the inward polygon on, the perpendicular to which, at the middle point thereof, is equal to 5 toises, through the inner extremity of which the lines of defence are drawn. On these the faces are set off, each equal to 24 toises; and the flanks are chords of arcs described from the opposite shoulders of the detached bastions as centres.

The inward polygon is in fact nothing else than a strong wall, behind the curtain of which, and at the distance of about 18 feet from it, there is an epaulement or a parapet of earth 3 toises thick. And within the bastions there are cavaliers, of which the fronts are circular arcs, described with a radius of from 23 to 24 toises. Their flanks are each equal to 7 toises, and their gorges to 33 toises each.

The counterescarp of the ditch before this inner polygon is distant from it at the salient angles, and is parallel to the curtain.

His tenailles, called ram's-horns, touch the outer lines of defence within three toises of the *epaules* or shoulders of the detached bastions, and are so described as to meet the said lines of defence inwards, beyond their intersection in the points, where the counterescarp of the inner ditch meets the same.

The outline of the curtain between the ram's-horns is 9 toises beyond or without the inner ditch.

The exterior line, from the retrenchment within his detached bastion is constructed, runs across the face, and meets the faces thereof about 20 toises from the *epaules*, or should-ers, the perpendicular to which line at the middle point thereof is equal to 17 toises. Through the inner extremity of this perpendicular the lines of defence for the retrenchment are drawn. On these lines, from the faces of the bastion, those of the retrenchment are set off equal each to 20 toises. The chord, on which the orillon is described, is equal to 5 toises, as is also that on which the retired flank is described. Both are made according to Mr. Vauban's method. The circular curtain of this retrenchment, and the rounded part of the ditch adjoining it, are described from the salient angle of the inner construction next to it, with a radius of 25 toises. The great ditch before the salient angles of the detached bastions is 20 toises broad, and as it is supposed to be dry, Mr. Belidor made a *caponiere* from the curtain between the ram's-horns to the ravelin of about 18 or 20 feet wide, the parapets of which he made terminate on both sides in a slope or glacis.

The capital of the ravelin he makes equal to 66 toises, and that of the redoubt within it equal to 30 toises. The faces of the ravelins are directed towards those of the retrenchments within the detached bastions, and those of the redoubt within it to the shoulders of the said bastions. The batteries in the ravelin are retired 8 toises back from the faces of it. The ditch in front of the ravelin is 12 toises, and the breadth of that before the redoubt is equal to 7 toises.

The demi-gorges of the *lunettes* are each equal to 25 toises, and their faces are perpendicularly directed towards those of the ravelin and detached bastions. The ditch before them is 8 toises wide, and the batteries in them are retired 8 toises back from their faces, and are each of them 15 toises long. The covert-way is 6 toises broad.

In this method the angle *diminué*, or the angle formed by the exterior side and either line of defence, is equal to $28^{\circ} 48' 39''$; and as the construction is applied to an octagon, the angle of the bastion, or the flanked angle, is of course equal to $77^{\circ} 23' 42''$.

It is manifest that in this construction the perpendicular to the exterior side, or of the great polygon, is much longer than it ought to be, since it exceeds the true perpendicular belonging to a polygon of 30 sides. For the angle *diminué*, which it gives, is greater than the true angle *diminué* belonging to a polygon of 30 sides, by upwards of one degree. And the angle of the bastion, or flanked angle, falls short of the real flanked angle in a polygon of 30 sides, by not less than 33° . The bastions are thereby made by far too large and extensive. The great ditch appears also to be too wide, as the excavation of it will furnish more earth than what is wanted for raising the ramparts. The works indeed, taken altogether, are too expensive to be erected. For it would require almost a whole army to defend them, besides such a prodigious quantity of stores and ammunition, as cannot be allotted for the service or defence of any one place.

Mr. Belidor applies his third method of construction, as he does his first and second, to an octagon, of which the exterior side is equal to 200 toises. But he makes the perpendicular to it at the middle point thereof equal only to 40 toises, which is very nearly indeed equal to the true perpendicular of an enneagon of the same exterior, and therefore comes nearer to the true perpendicular of an octagon

than that which has been described for it by any other writer on fortification. On this account we will give the construction of part of the body of the place on an octagon according to this method.

Let AB (Plate VIII. fig. 15.) be equal to 200 toises infide of an octagon. Bisect AB in the point C, and draw CD perpendicular thereto. From C to D set off to D, equal to 40 toises, and from the extremities A, and B, of the exterior side AB, through the point D, draw the lines of defence. On them take AE and BF for the faces of the bastions, equal each to 55 toises. The parts DA, DR, between the intersection, D, of the lines of defence, and the broken parts of the curtain, take each equal to 30 toises, and the length of each of the broken parts remains equal to 25 toises. The orillon is equal to 9 toises, and is part of a flank found according to Mr. Vauban's method. The flanks are retired 8 toises, and are arcs of 65° each. The outlines of the ram's-horns are 13 toises distant from one another. The passages at their extremities are each 3 toises wide. The outermost or lowest is described with a radius of 30 toises, and the other is described from the same centre. By making the same construction on two other sides of the octagon, the positions of the other faces, AG, BH, of the bastions is determined as well as the magnitude of the salient angle of each. He places cavaliers in the gorges of the bastions.

The capital of his ravelin is 44 toises, the demi-gorges of it are each equal to 31 toises, and its flanks, which are directed towards the shoulders of the bastions, are each of them equal to 9 toises. The ditch before the ravelin is 10 toises wide, and the covert-way is 6 toises broad.

The glacis before the salient angles of the bastions is 15 toises broad. The demi-gorges of the places of arms are each equal to 26 toises, and those of the redoubts or stone walls within them to 20. And the faces are parallel to the opposite demi-gorges. He makes arrows and detached redoubts after the manner of Mr. Vauban, but gives flanks to his arrows, which are parallel to the passages of 10 toises wide, that lead to them.

In this his third method of construction, the angle *diminué*, or the angle BAD, or ABD, formed by the exterior side and either line of defence, is equal to $21^{\circ} 48' 5''$, which differs from the true angle *diminué* of an enneagon by about 3 minutes only. And as it is applied to an octagon, the angle of the bastion, or the flanked angle, is of course equal to $91^{\circ} 23' 50''$.

It must be allowed that this construction for the body of the place is good. The ram's-horns are unquestionably well contrived, and are much preferable to tenailles, as they cannot be enfiladed from any one place, as they resist better by their bending or curvature outwards, the enemies' batteries, and render the flanks much superior to any batteries that the besiegers can erect against them. Like a mesc constructor on paper, however, he makes so many outworks, that they occupy a vast extent of ground, cannot be defended but by a very numerous garrison, and uncommonly large supply of ammunition, artillery, and provisions, and cannot be erected but at an immense expence.

The learned and ingenious Mr. Ozanam has given four methods of construction, in all of which he begins inwards, and fortifies outwards, from an interior side of 120 toises, and at the same time places or takes his flanks on right lines drawn from the centre of the polygon through the extremities of the demi-gorges set off on the interior sides.

In his first method he makes each demi-gorge equal to as many toises more than 20 as the polygon to be fortified

CONSTRUCTION.

has sides. In the square the demi-gorge is therefore equal to 24 toises, in the pentagon to 25, in the hexagon to 26, in the heptagon to 27, and so on to the decagon, in which the demi-gorge being equal by this rule to 30 toises, he makes it continue of this length in all higher polygons. He makes each flank equal to four times as many toises as the number of the sides of the polygon, allowing 16 toises for it in the square, 20 in the pentagon, 24 in the hexagon, 28 in the heptagon, and so on to the decagon, where the flank

being by this rule equal to 40 toises, continues of that length in all higher polygons.

The angle formed by right lines from the salient angle, and either shoulder or *epaule* of his bastion, he calls the *flank-forming angle*.

The following is a table of the lines and angles of a fortified polygon, from the square to the dodecagon, according to his first method of construction, the inward or interior side being equal to 120 toises.

Polygons	Sides.									
	4	5	6	7	8	9	10	11	12	
Angle of the centre	90° 0'	72° 0'	60° 0'	51° 26'	45° 0'	40° 0'	36° 0'	32° 44'	30° 0'	
Angle of the polygon	90° 0'	108° 0'	120° 0'	128° 34'	135° 0'	140° 0'	144° 0'	147° 16'	150° 0'	
Flank-forming angle	14° 2'	13° 1'	11° 53'	10° 36'	10° 2'	9° 21'	8° 44'	7° 50'	7° 22'	
Angle of the flank	120° 53'	112° 59'	108° 7'	105° 7'	102° 28'	100° 39'	99° 16'	98° 32'	97° 38'	
Angle diminuë	9° 42'	13° 19'	16° 49'	20° 14'	23° 46'	27° 16'	30° 43'	30° 49'	31° 16'	
Angle of the epaule	130° 40'	126° 18'	124° 56'	125° 21'	126° 14'	127° 55'	129° 59'	129° 21'	128° 54'	
Flanking angle.	160° 36'	153° 22'	146° 22'	139° 32'	132° 28'	125° 28'	118° 34'	118° 22'	117° 28'	
Flanked angle	70° 36'	81° 22'	86° 22'	88° 6'	87° 28'	85° 28'	82° 34'	85° 38'	87° 28'	
Demi-gorge	Toises. Feet. 24 0	25 0	26 0	27 0	28 0	29 0	30 0	30 0	30 0	
Curtain	72 0	70 0	68 0	66 0	64 0	62 0	60 0	60 0	60 0	
Flank	16 0	20 0	24 0	28 0	32 0	36 0	40 0	40 0	40 0	
Great line of defence	117 3	117 5	119 0	120 3	122 5	126 0	129 0	127 0	125 4	
Face of the bastion	36 1	37 5	40 1	42 2	45 2	48 5	52 3	50 0	49 1	
Capital of the bastion	28 0	33 3	39 4	46 1	53 4	61 2	69 4	67 5	67 3	
Little radius	84 5	102 1	120 0	138 2	156 5	175 2	194 1	217 5	231 5	

The following is this construction on a hexagon, of which the exterior side is equal to 120 toises.

Let ABCEPD (fig. 16.) be a regular hexagon, inscribed in a circle, of which the radius, A O, is equal to 120 toises. From the extremities A and B, set off A L, B M, for demi-gorges, equal each to 20 + 6 or 26 toises. In like manner set off A P, C Q; B a, D b; C T, E V; E c, F Y; F Z, D X; equal each to 26 toises. From the centre O, through the points, L, M, a, b, P, Q, T, V, c, Y, Z, X, draw the right lines O L, O H, O d, O e, O N, O S, O m, O h, O l, O b, O g, O f, and take I L, K M, a d, b c, Q S, T m, V h, c k, Y b, Z g, X f, equal each to 6 x 4, or 24 toises. From the points L, M, through the points K, I, draw right lines to meet the radii O B, O A, lengthened or produced in the points H, G. From the points a, b, through the points c, d, draw right lines in like manner, and so on round the figure. This operation will determine the salient angles of the bastions, and all the parts of the construction.

The calculation of the different lines and angles in this construction may be made in the following manner.

Since A B is equal to 120 toises, if from it there be taken the demi-gorge A L, or B M, which is equal to 26 toises, there will remain 94 toises for the lengthened curtain, A M, or B L, from which, if 26 toises be taken, we get the curtain L M, equal 68 toises. But as this figure is a hexagon, the angle of the centre is equal to 60°, and the angle of the polygon to 120°. The little radius is also of course equal to 120 toises.

The angle, I L M, of the flank, or its equal, A L O, is found by means of the following analogy.

As the sum of the sides O L + A L = 146 toises,

Is to their difference O L - A L = 94 toises,

So is the tangent of half the sum of the angles A L O, A O L = 60°,

To the tangent of half their difference, which is equal to about 48° 7'. This angle added to 60° gives 108° 7' for the

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the angle ILM of the flank, and taken from 60° leaves $11^\circ 53'$ for the flank-forming angle AOL, or AOL.

In like manner the angle *diminué*, LMI, or MGH, is found from the oblique-angled triangle ILM, by means of this analogy.

As the sum of the sides LM, LI, which is equal to 92 toises,

Is to their difference, which is equal to 44 toises,

So is the tangent of half the sum of the angles LIM, LMI = $35^\circ 56\frac{1}{2}'$.

To the tangent of half their difference, which is equal to about $19^\circ 77'$. This angle, taken from $35^\circ 56\frac{1}{2}'$, leaves about $1^\circ 49'$ for the angle *diminué* LMI, or MGH, and added to $35^\circ 56\frac{1}{2}'$ gives about $55^\circ 4'$ for the angle LIM; consequently the angle GIL of the epaule is equal to $124^\circ 56'$. And if $33^\circ 38'$, which is equal to twice the angle *diminué*, be taken from 180° we get $146^\circ 24'$, for the flanking angle GiH, or IiK. Double the angle *diminué*, or $33^\circ 38'$, taken from 120° , the angle of the polygon leaves $86^\circ 22'$ for the flanked angle, or angle of the bastion.

The angle *diminué*, $16^\circ 49'$, taken from $108^\circ 7'$ the angle of the flank leaves $91^\circ 18'$ for I L K, or I L H, the inner or inward flanking angle.

The line of defence, GM, is found from the oblique-angled triangle, A G M, by means of the following analogy.

As the sine of A G M, half the flanked angle, or $43^\circ 11'$,

Is to the sine of the angle of the gorge, G A M = 120° ,

So is the lengthened curtain A M = 94 toises,

To the line of defence G M, which is equal to about 119 toises.

And the capital, A G, of the bastion, is found from the same triangle, by means of this analogy.

As the sine of A G M, half the flanked angle, or $43^\circ 11'$,

Is to the sine of the angle *diminué* = $16^\circ 49'$,

So is the lengthened curtain A M = 94 toises,

To the capital A G of the bastion, which is equal to about $59\frac{1}{2}$ toises, to which, if we add the little radius OA, which is equal to 120 toises, we get $159\frac{1}{2}$ toises, for the great radius OG, to which the exterior side, G H, is equal, as the figure is a hexagon. And in every polygon, the exterior side, G H, is a fourth proportional to the little radius OA, the great radius OG, and the interior side A B.

The face, G I, of the bastion, is determined by finding the line I M from the oblique-angled triangle, I L M, by this analogy.

As the sine of the angle *diminué* I M L = $16^\circ 49'$,

Is to the sine of the angle I L M of the flank = $108^\circ 7'$,

So is the flank I L, which is equal to 24 toises.

To the line I M, which is equal to about $79\frac{1}{2}$ toises, and when taken from I M, the line of defence, leaves about $40\frac{1}{2}$ toises for G I, the face of the bastion.

The angle A O B is called the angle of the centre.

The angle B A C is called the angle of the polygon.

The angle N G I is called the flanked angle, or angle of the bastion.

The angle Ii K, or G i H, is called the outward flanking angle.

The angle G I L is called the angle of the epaule or shoulder.

The angle I L M is called the angle of the flank.

The angle I M L, or M G H, is called the angle *diminué*.

The angle AOL is called the flank-forming angle.

P N G I L is called a bastion.

A P, or A L, is called the demi-gorge of the bastion.

The line joining the points P, L, is called the gorge of the bastion.

The angle I L K, or I L H, formed by the flank I L and the line of defence L H' is called the inner flanking angle.

A B is called the inward or interior side.

G H is called the outward or exterior side.

O A is called the little radius.

O G is called the great radius.

I L, or K M, is called a flank.

I M is called the curtain.

A M, or L B, is called the lengthened curtain.

GM, or I H, is called a line of defence.

A G is called the capital line, or capital of the bastion.

A I, or H K, is called the face, or *pan* of the bastion.

The flank I L is called right flank, when it makes a right angle with the curtain; oblique flank when it makes an oblique angle with the same; and acute flank when it makes an acute angle with the curtain; as it does by Errard's method in figures up to the octagon. When the orillon is rounded or formed by the arc of a circle, it is called a round orillon, and when it is rectilinear, or formed by the face of the bastion, produced a few toises beyond the *epaule*, and a right line drawn from the extremity of the said prolongation, either parallel to the flank, or nearly so, it is called a square orillon. It is made for the purpose of covering part of the flank, which for that reason, or in order to be the more effectually covered, is taken a few toises inwards from the flank itself towards the centre of the bastion, and is generally made in an arc of a circle, though it would be better in a right line, or on the chord of an arc. It is on this account called the *retired*, or *covered flank*, and sometimes the *casemate*, and *place-basse*. And its depth, or enforcement, on the line of defence, produced beyond its intersection with the curtain, as well as its distance from the outside of the orillon, is called the *retirade* or *retrenchment of the flank*, or the *platform of the casemate*.

The line Q S is called flank, because it defends the face GN of the opposite bastion. For, in fortification, to flank has the same meaning or signification with the phrase *to defend*. When the line G Q is not composed of the face GN of the bastion, and a prolongation thereof to the angle Q of the flank, it is called *flank-siebert*, because a musketeer, at its extremity Q, can fire, or *sieher*, as the French term it, at or against any part of the face G N. Hence the line Q G, drawn from the said extremity Q of the flank, is called the *siebert-line of defence*, and sometimes only the *siebert-line*. It is also called the *great line of defence*. But when the face, G N, of the bastion produced, meets the curtain Q P, in any point R, between the points Q and P, or in any point R nearer to the said bastion, the line G R is called the *rasant-line of defence*, or simply the *rasant-line*, and also the *little line of defence*, being shorter than the line G Q, because a musketeer cannot from the point R fire at or against any part of G N, the face of the bastion, but can only rase or fire along it. The part Q R of the curtain intercepted between the lines G Q, G R, is called the *second flank*, as also the *fire or curtain*, because from every point in it, except the extremity R, one may shoot or fire against every part of the face G N. Second flanks are not always, nor indeed frequently, made. And when there are none, there are no *siebert lines*, but only *rasant-lines of defence*, in which case the flanks are called *rasant flanks*, because from their extremities, that join the curtains, one can only rase or fire along the faces of the opposite bastions, but from any intermediate points between those extremities and the *epaules*, he can fire at or against the said faces. The flanks form the principal defences, since an enemy cannot, whilst they remain entire, approach the body of the place. And they

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are, for that very reason, the parts which he first endeavours to destroy, in order to facilitate his passage of the great ditch.

The angle ILM, which the flank IL makes with the curtain LM, is called the *angle of the flank*, and the angle GIL, which the flank IL forms with the face GI of the bastion, is called the *angle of the epaule*, or simply the *epaule*, from which comes the word *epauler*, to cover on one side, or to cover the flank or the shoulder of the besieged in such a manner, that he cannot be seen or discovered on that side from without. The face GI, which thus covers the *epaules* or shoulders of those who assist in defending the place in the flank IL, is therefore called *epaulement*. The point or angle A, of the inward or interior polygon, is called the centre of the bastion.

When the flank, IL, is on a right line, drawn from the epaule I, to the centre O of the polygon, as it is in all his four methods of construction, it forms, when produced to the said centre O, an angle AOL, which is called the *flank-forming angle*. The angle IGN, which the two faces GI, GN, form at the point G of the bastion, is called the *flanked angle*, or *angle of the bastion*, because it is flanked or defended by the two opposite flanks QS, MK. The right line GH, drawn from one flanked angle to another, and which marks the distance between them, is called the *base-line*, and the side of the outward or exterior polygon, which in regular construction is always parallel to AB, the corresponding side of the inward or interior polygon. A re-entering angle is that which retires inwards; and in terms of fortification it is called a *tenaille-angle*, or simply a *tenaille*. And such of them as are formed by the meeting or intersection of two rasant lines, making an obtuse angle, are called *flanking angles*, as for instance the angle GiH; and the lines Gi, Hi, forming it, are also called *tenailles*. The angle GiH is also called the *outward flanking angle*, to distinguish it from the angle ILM, formed by the flank IL, and the rasant line GL, when the flank is rasant, which is called the *inward*, or *inner flanking angle*; or from the angle GRQ, when there is a second flank RQ, which is also called an *inward flanking angle*.

The rasant lines, GM, HL, always make acute angles with the curtain LM, either of which, as IML or GML, is called the *angle diminué*, or *angle diminué*, and is equal to the angle MGH, which GM forms with the base-line, or exterior side GH. The angle GAL, formed by the capital AG and the demi-gorge AL, is called the *gorge angle*, or *angle of the gorge*, and is always equal to the excess of 180° above half the angle of the polygon OAB; which half angle is called the *base-angle*.

In his second method of fortifying or constructing, he supposes the demi-gorges to be the same as in his first method: but instead of making each flank equal, as in it, to four times as many toises as the number of the sides of the figure or polygon, he, in this, makes each flank equal to 10 toises, together with twice as many more as the figure or polygon has sides. He thus allows 18 toises for each flank in the square: 20 for each in the pentagon; 22 in the hexagon; 24 in the heptagon; 26 in the octagon; 28 in the enneagon; and 30 in the decagon, in which the flank and demi-gorge being equal to each other, and to 30 toises respectively, he makes them continue so in all higher polygons.

But as it happens by this method of construction, that in the octagon, and all the higher polygons, the flanked angle or angle of the bastion becomes obtuse, in order to limit it to a right angle, he describes on a right line, joining the epaules or outer extremities of the flanks of each bastion, a

femircircle, which occasions a second flank upon the curtain, and two lines of defence, one rasant and the other schanct.

The calculation of the principal lines and angles in this construction is easily made.

In his third method of construction he makes his demi-gorges, as in the second, of the same length as in the first, and his flanks of the same length as in the second: but instead of limiting the flanked angle or angle of the bastion to a right one, by supposing a femircircle to be described on a right line, joining the two epaules, he supposes it to remain always acute, by making the capital AG equal to the gorge-line PL.

The calculation of the principal lines and angles is easily made on this supposition.

In his fourth method he has no second flanks, but makes all the defences rasant. He considers this method as more general than the three foregoing ones, which it certainly is, since it does not limit the lengths either of the demi-gorges or of the flanks, which, in this as well as in the others, are always on right lines, drawn from the centre of the polygon, through the extremities of the demi-gorges. And although the demi-gorges become greater with the number of the sides of the polygon, they increase so slowly, that in one of 60 sides the demi-gorge is only equal to about $3\frac{1}{2}$ toises. The following is his construction for this method.

From the centre O of the polygon or figure, draw a right line perpendicular to the inward or interior side AB. Divide this perpendicular into such a number of parts, as exceeds the number of the sides of the figure or polygon by unity. Set off two of those parts from each extremity of the inward or interior side, which is always supposed to be equal to 120 toises for each demi-gorge, and take three of them from the said extremities on the little radii produced for the capital of each bastion. Then, from the outer extremities G, H, of these capitals, which are the points of the bastions, draw right lines to the points M, L, where right lines, drawn from the centre through the extremities M, L, of the demi-gorges, intersect the interior side. And these rasant lines, so drawn, will determine both the faces GI, HK, and the flanks IL, KM.

By this construction, which is very simple and easy, the flanked angle or angle of the bastion begins to become obtuse in the enneagon, where it is equal to about $92^{\circ} 6'$, and grows more and more so in the higher polygons. This angle, however, increases but slowly, or at the rate of about one degree in each successive polygon, amounting in the dodecagon to about $96^{\circ} 26'$.

The calculation of the principal lines and angles, in this construction, is easily made in the following manner.

The perpendicular, from the centre O of the polygon to the inward or interior side AB, is found by this analogy.

As radius

Is to the tangent of the angle OAB = 60° ,

So is half the interior side AB, or 60 toises,

To the perpendicular from O to AB, which is equal to about 104 toises. Wherefore the gorge AL being, by this construction, equal to two-sevenths of this perpendicular, is equal to about $29\frac{2}{7}$ toises; and the capital AG, being equal to three-sevenths of it, is equal to about $44\frac{2}{7}$ toises. The lengthened curtain AM is consequently equal to about $90\frac{1}{2}$ toises. Wherefore the angle *diminué* AMG, or IML, is easily found from the oblique-angled triangle AMG, by this analogy.

As the sum of the sides AM, AG, which is equal to $134\frac{1}{2}$ toises,

Is to their difference, which is equal to $45\frac{1}{2}$ toises,

So

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So is the tangent of half the angle OAM, or 30° ,

To the tangent of half the difference of the angles AGM, AMG, which is equal to about $11^\circ 6'$. Consequently the angle AGM, or half the flanked angle, is equal to about $41^\circ 6'$, and the angle *diminué* LMI to about $18^\circ 54'$. Wherefore the flanked angle, or salient angle of the bastion, is equal to about $82^\circ 12'$, to which adding the angle of the centre, or 60° , we get the flanking angle G i H, equal to about $142^\circ 12'$.

The angle LIM, in this construction, is obtained by means of the following analogy.

As the sum of the perpendicular from O to AB and half LM, or $134\frac{1}{2}$ toises,

Is to their difference, which is equal to $74\frac{1}{2}$ toises, or as 403 to 224 ,

So is the tangent of 45° , which is equal to radius,

To the tangent of $28^\circ 42'$, which added to 45° , gives $73^\circ 42'$ for the angle OLM, and consequently $106^\circ 18'$ for the angle ALO, or its equal ILM, the angle of the flank; to which if the angle *diminué* LMI = $18^\circ 54'$ be added; we get the angle GIL of the epaule, equal to $125^\circ 12'$. And if from the angle OLM there be taken the angle OAB, or half the angle of the hexagon, we get $13^\circ 42'$ for the flank-forming angle AOL.

The flank IL is found from the triangle ILM by this analogy.

As the sine of the angle LIM, which is equal to about $54^\circ 48'$,

Is to the sine of the angle *diminué* LML, which is equal to about $18^\circ 54'$,

So is the curtain LM, which is equal to about $60\frac{1}{2}$ toises,

To the flank IL, which is equal to about 24 toises.

And the perpendicular distance of the intersection *i* of the lines of defence, from the exterior side GH, is found by this analogy.

As radius

Is to the tangent of the angle *diminué* iGH = $18^\circ 54'$,

So is the half of the exterior side GH, which is equal to about 82.25 toises,

To the perpendicular distance of *i* from GH, which is equal to about 28.1605 or 28.16 toises nearly, exceeding the flank by 4.16 toises.

Mr. Muller, in his "Elements of Fortification," has delivered what he is pleased to call a new construction. It differs, however, from Mr. Vauban's first method only in the following particulars.

1st. Instead of supposing, like Vauban, each flank to be the chord of an arc described from the shoulder or epaule of the opposite bastion as centre, he supposes it to be the chord of an arc described from the intersection of the line of defence and counterescarp produced.

2dly. He makes his retired flanks rectilinear, instead of making them in circular arcs.

3dly. Instead of using Vauban's tenailles before the flanks, he places ram's-horns before them.

4thly. He makes his orillon 5 toises long only, instead of 9, like Mr. Vauban.

Lastly. Instead of drawing the right line, which terminates the retired flank from the salient angle of the opposite bastion, like Mr. Vauban, he draws it from a point on the face 5, or rather 10, toises within the said angle.

For, in his construction of this method, he begins, like Vauban, in his first method outwards, and constructs inwards. Like him he also supposes the exterior side of the polygon to be equal to 180 toises; and after observing that the perpendicular may be of any length, as the 6th, 5th,

or 4th part of that side, he, like him, also fixes on 30 toises for its length. Like him also he makes the face of his bastion equal to 50 toises, or to $\frac{5}{7}$ ths of the exterior side.

He determines the salient angle of his ravelin in this manner: he sets off on the face of his bastion from 12 to 15 toises from the shoulder or epaule, and from the opposite angle of the flank as centre, with the distance therefrom on the line of defence to the extremity of the line, set off from the shoulder on the face of the bastion, he intersects the perpendicular to the exterior side, produced beyond it outwards.

He also gives the construction of a place with detached bastions from an inward or interior side of 130 toises, applied to an octagon, in which he substitutes small bastions instead of Vauban's tower-bastions. In this method, he makes the demi gorges of his small bastions each equal to 12 toises, the capitals of his detached bastions each equal to 55 toises, and their faces equal each to 60 toises. He determines the salient angle of his ravelin, by describing from the extremity of the flank, as centre, through a point in the face of the opposite bastion, about 20 toises from the shoulder, an arc to intersect the right line, in which is the capital of the ravelin.

He likewise gives the construction of a place with detached orillon-bastions, beginning outwards, and constructing inwards from an exterior side of 200 toises, and applying it also to an octagon.

He makes his perpendicular, in this construction, equal to 40, or a fifth part of the exterior; the faces of his bastions equal each to 55 toises; the radius of the arc, that serves to determine the position of his flank, equal to 22 toises; the width of the ditch of the salient angles equal to 16 toises; his orillon equal to 5 toises; and he keeps his flank retired 5 toises.

The marquis de Montalembert has published a large treatise on fortification, in which he makes much use of casemates and arches so much condemned by the Chevalier de Ville. His construction is in fact the same with Mr. Blondel's, applied to a right line or polygon, of an infinite or indefinite number of sides. For in this extreme case, which is of all others the most defective, Mr. Blondel's construction leaves no curtain, but gives the perpendicular equal to half the exterior side, and the angle *diminué* equal to 45° . In descending, however, from the right line or polygon of an indefinite number of sides, Mr. Blondel's construction affords a curtain, which gradually increases as the number of the sides of the polygon decreases, whilst the angle *diminué* at the same time gradually decreases, which in a hexagon, by his rule for determining it, *viz.* by taking from 45° , a third part of the angle of the centre of the polygon, is equal to 25° . But the marquis de Montalembert makes his angle *diminué* in every polygon, and on all occasions, invariably equal, to 45° . His construction is formed by the placing of triangles contiguous to one another, or by the juxtaposition of the angles at the bases of triangles in such a manner, as to make the other sides form re-entering angles equal each to a right angle, from which circumstance it is called *la fortification perpendiculaire*. It therefore affords no curtains or bastions, but when the section is of only an ordinary height, it necessarily creates dead parts from the re-entering angles quite to the salient ones, or throughout its whole extent.

It may indeed be alleged, that these dead parts can be removed by casemates in the revetements, counterescarp, caponiers, &c. &c. and no doubt they may. But what good reason can be assigned for adopting a mode of construction, which creates every where those very defects, which in constructing the body of any place, it has hitherto been the first object and principal business of every fortifier to avoid, and

then having recourse to a number of expensive, and otherwise unnecessary, contrivances, merely to get rid of the defects thus created.

As we understand that this system of fortification has been much disapproved of by some of the ablest engineers, on the Continent of Europe; and as the late duke of Richmond, when master-general of the ordnance, was so partial to it that it was with much difficulty and after a great deal of discussion, that the engineers in the Portsmouth division, could persuade him to adopt Vauban's first method in preference to it, for the new pentagonal fort, that has been erected on Portsea island, near Lauceston harbour; a candid and impartial comparison between these two methods of construction may not be useless to professional men, or unacceptable to the public. But we cannot make a comparison between them more ably, correctly, and scientifically, than it is drawn in an anonymous publication of 1794, re-published in 1805, in the following words.

"It is manifest then, that after a work is once adapted to the ground it is to occupy, &c. the first consideration is to construct it in such a manner, as to leave no dead parts; that is, to leave no such parts as cannot be seen, fired on, or flanked from some other parts. That this is a fundamental maxim, and ought to be a primary object of attention in the construction of every work, is manifest from this circumstance: that, were it not with a view to obtain flanking defences for the different parts, a rampart and parapet might as well be raised along the exterior sides of figures themselves, or the curves circumscribing them, as along the several parts of those figures, into which the sides are usually broken for this purpose. The strength of a work, indeed, depends chiefly on its flanks; since an enemy cannot approach the body of the place, whilst the flanking defences remain entire. But if there be dead parts, the moment an enemy gets to them, he finds himself in a state of security, and out of the reach of the besieger's fire. An idea therefore of the necessity of avoiding them has always made such a forcible impression on the minds of able fortifiers, as to induce them to limit the heights of bastions. For even when the side of a polygon is 180 toises long, and is broken into two demi-bastions, and a curtain with flanks, if the section of the work be very high, the guns in these flanks cannot see or scour the ditch but at too great a distance. When it is only of an ordinary height, it is well known that the guns in the flanks do not see the ditch effectually nearer than the intersection of the lines of defence, which in Vauban's construction is 44.8683 toises, or 45 toises nearly from the shoulders of the bastions, and 40.2632, or 40 toises and a quarter nearly from the re-entering angles formed by the curtain and flanks. When the exterior side, therefore, is less than 180 toises, the section ought to be kept proportionally lower, provided only it be not so low as to expose the body of the place to surprise. But if it once be admitted as a maxim, that a fortification ought to be constructed without the least regard to any flanking defence, and that the avoiding of dead or unseen parts is an object not worthy of attention, it is evident that the rectilinear and curvilinear are greatly preferable to the zig-zag or triangular construction formed by constituting triangles on the sides of any right-lined figure or polygon. The fire from a straight line is the best of the direct kind that can be obtained, being equally and uniformly distributed. And the enemy cannot advance against it directly, without a good deal of delay, inconvenience, and trouble, but must carry on his approaches somewhat in the way commonly practised, till he gets to the dead parts in front of it: when, unless contrivances be made use of that have no natural or inseparable connexion with the construction itself, it will cease to be formidable for want of

flanking defences. This observation likewise holds good in a great measure with regard to regular curves, from which the fire is also regularly distributed. The interior area too in each of these comprehended within the same eccentricity, length of enclosure, or extent of rampart, is much greater than in the triangular construction, which naturally, instead of producing any fire that is direct or at right angles to the exterior sides, produces no good flanking one for itself, but causes a continuity of dead parts, when the section is high and the lines of defence but short, to reign throughout its whole extent. An enemy can approach it without annoyance from the besieger in lines bisecting either the salient or re-entering angles, or in short in lines directed to any intermediate points whatever between these angles.

It must therefore be allowed, that the triangular construction, whether the re-entering angles be right ones (as in the "Fortification perpendiculaire" of the marquis de Montalembert), or acute or obtuse ones, is naturally the most defenceless and ill contrived of any, that can possibly be thought of or conceived: for it creates dead parts throughout the whole extent almost of the work, and is equally destitute of flanking fires for itself, and of a good or well distributed direct one against the enemy.

The marquis, fig. 4, planche 15, vol. i. of his performance, gives what he calls his regular construction in a dodecagon, of which the exterior side is 180 toises. The radius of the circumscribing circle is of course equal to 347.733297 or 347.7333 or 348 toises nearly, and the perpendicular distance from its centre to the exterior side 335.884572, or 335.8846, or 336 toises nearly. Consequently the annular area occupied by his construction is equal to that of the inscribed circle, in the circumference of which are his re-entering angles of 90°, or which comes to the same thing, to half the area of the circle circumscribing the dodecagon. But if Vauban's construction be made on the sides of the same figure, the annular area occupied by it will be to that of the inscribed circle, to which the curtains are tangents at the points, where the perpendiculars produced meet them, as 34986.228 to 85938.24, or as 17490 to 42969 nearly, or in small numbers as 20 to 49 nearly.

The exterior area between the construction and the sides of the dodecagon in Montalembert's method is to that in Vauban's as 8100 to 4270.2687, or in small numbers, as 19 to 10 nearly; and as both the salient and re-entering angles in the former are less than in the latter, this difference of lost area will be considerably increased in practice. For in the marquis's construction, each of the salient angles contains 60 degrees, and each of the re-entering ones 90; whereas in Vauban's the salient angle of each bastion is 113° 7' 48", and each of the re-entering ones formed by the flanks and curtains is 99° 13' 3".

Montalembert's construction gives the enceinte or boundary of the body of the place equal to 3054.70128 toises, exceeding Vauban's, which is equal to 2771.2836, by 283.41768 toises.

When he inserts or intercalates triangles having their salient angles right ones and in straight lines, as in figures 3, 5, 7 and 8, planche 15, after the method pointed out in fig. 1, he loses still more area in proportion to the interior space. And the very circumstance of his having recourse to different centres of construction, even on figures that are regular, is sufficient to create a suspicion, that he did not understand even his own method in its full extent.

Although he must certainly be considered as a very shallow and superficial geometer, the reason for his not fixing on any polygon under a dodecagon for illustrating his regular construction, is very obvious; for no regular figure of a smaller number

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number of sides, will by it give salient angles of sixty degrees, which is the smallest angular magnitude that engineers have generally reckoned admissible in fortification. I can see no good reason, however, (says our author) for his abandoning regular polygons, when he has occasion for more triangles than twelve, and by way of interpolation inserting the additional ones to this number between right lines parallel to the sides of triangles, squares, or rectangles; since a construction on the sides of a regular polygon furnishes much more interior area, with a comparatively but trifling increase of length in the enceinte or enclosure of the body of the place.

The comparison, which he draws, p. 197, (illustrated by fig. 9, planche 15.) between Vauban's method on the sides of a square, of which each is equal to one hundred and eighty toises, and his own on the sides of a dodecagon inscribed in the circle circumscribing this square, is a very improper and unfair one. In this figure, each of those lines, which he calls his lines of defence, is equal to 45.5874 toises, and mult, with a section of an ordinary height, have dead parts in front of it throughout its whole extent. Each of the sides is equal to 65.8846 toises very nearly, and not to 66 toises one foot, as from his scale he erroneously states it to be. The most candid and impartial mode of comparing these two methods of construction together is to suppose both to be made on the sides of one and the same figure. The marquis's construction, however, on the sides of a square, neither leaves interior area nor salient angles. For its re-entering angles meet in the centre of the circumscribing circle. But as in it the lines of defence when equal form angles of 45° with the exterior side, each of the salient angles, which it gives in any polygon, is equal to the excess of the angle of that polygon above 90°; or which comes to the same thing, to the excess of the re-entering angle formed by the lines of defence above the angle at the centre of the figure, since the excess of the angle of any regular polygon above 90° is equal to the excess of 90° above the angle at the centre of the circumscribing circle subtended by one of its sides. Consequently, when the polygon has an indefinite number of sides, or becomes a straight line, the salient angle is equal to ninety degrees. Thus a square with this construction gives no salient angle at all; a pentagon one of 18 degrees; a hexagon one of 30 degrees; a heptagon one of 38 degrees and four sevenths; an octagon one of 45 degrees; an enneagon one of 50 degrees; a decagon one of 54 degrees; an endecagon one of 57 degrees and three elevenths; a dodecagon one of 60 degrees; a polygon of 13 sides one of 70 degrees; a polygon of 36 sides one of 80 degrees; and so on indefinitely. By this construction on a pentagon, of which the side is equal to 180 toises, the re-entering angles come within 34 toises of the centre of the circumscribing circle; and within 19, if the exterior side be only equal to a hundred toises. How little interior area then would have been left, had this construction been made use of for the new pentagonal work on Portsea island, called Fort Cumberland, of which one of the exterior sides is equal to 120 fathoms, and each of the other four to a hundred! Even on a hexagon, of which the side is equal to 180 toises, it brings the re-entering angles within 66 toises of the centre of the circumscribing circle, and gives the annular area occupied by it to the area of the inscribed circle as $2\sqrt{3}$ to $4-2\sqrt{3}$, or as 6.4641 to 1, or in small numbers as thirteen to two nearly. If it be even made on parts of one and the same straight line as exterior sides, of which each is equal to 90 toises only, the perpendicular distance between that line and the right line passing parallel to it through the re-entering angles exceeds that between the parallel right lines, limiting Vauban's construction on parts of one and the same straight line as exterior sides

equal each to 180 toises, or two of the others, by 2.2576 toises, and only becomes equal to it, when the exterior side is reduced to 85.4548 toises.

The angle (105°) of a pentagon exceeds 90° by 15°, which are equal to the excess of 90° above (72°) the angle of the centre. But 15° are equal to $90^\circ \times \frac{1}{6}$ or $360^\circ \times \frac{1}{4 \times 6}$. In

like manner the excess of (120°) the angle of a hexagon above 90° is equal to 15° + 12° (= 30°) the excess of 90° above (60°) the angle of the centre, that is, to 360°

$\times (\frac{1}{4 \cdot 5} + \frac{1}{5 \cdot 6})$. Wherefore we get $360^\circ \times (\frac{1}{4 \cdot 5} \times \frac{1}{5 \cdot 6} + \frac{1}{6 \cdot 7} \times \frac{1}{5 \cdot 6})$, &c. indefinitely or *ad infinitum* = 90°, and of course

$\frac{1}{4 \cdot 5} + \frac{1}{5 \cdot 6} + \frac{1}{6 \cdot 7} + \dots$, &c. *ad infinitum* = $\frac{1}{4}$. Whence it is obvious, that methods of summing an endless variety of

such series, together with such series, as $\frac{n+m}{n \cdot n+1 \cdot n+m+1} + \frac{n+m+1}{n+1 \cdot n+2 \cdot n+m+2} + \dots$, &c. *ad infinitum*, and innumerable

other forms, may easily be derived from common geometry and the angular relations of rectilinear figures. But the summation of infinite series is a subject which it is not my intention to enter into the consideration of at present.

There is a circumstance attending this construction, which, I dare say, never occurred to the marquis. It is this: though on the sides of a square it brings the re-entering angles to the centre of the circumscribing circle, and leaves neither interior area nor salient angles; yet, if it be made on the sides of any given regular polygon, and the re-entering angles be joined by right angles forming a similar polygon, and on them a similar construction be made, and so on indefinitely or *ad infinitum*, it will never bring the re-entering angles to the centre of the circle circumscribing the given polygon, but nearer to it than by any given right line or distance. And if spirals be supposed to pass from the angles of the polygon through the angular points of equal angles in endless or indefinite succession (each equal to 45 degrees, together with the salient angle of the construction and the complement of its half) formed by the lines of defence taken singly from the first in the indefinitely successive constructions, will pass round the centre of the circle circumscribing the given polygon an indefinite number of times without ever reaching it; and the area between any two of these spirals commencing from one of the exterior sides of the polygon will become nearer in point of equality than by any given space or area to such a part of the polygon, as is expressed by the number of its sides, without ever equaling it. The sum or aggregate of these lines of defence, in decreasing geometrical progression and endless succession, can always be expressed by a given definite straight line.

From what has been observed, the following inferences may certainly be very fairly and impartially drawn respecting Montalembert's construction:—1st. When the exterior sides are short, it naturally creates, with a section of an ordinary height, dead parts throughout its whole extent. It may perhaps be alleged, that this capital defect can be removed by casemated defences with artillery near the re-entering angles on a level almost with the ditch. To a certain degree it certainly may: but that method of construction, which by itself naturally removes every such defect without any subsequent or adventitious contrivance, is surely entitled to preference in the opinion of every able or intelligent fortifier.

2dly. His saliant angles are too small, being less in a dodecagon than Vauban's are even in a square; for in a dodecagon his saliant angle is only equal to sixty degrees, whereas in a square Vauban's is equal to $60^{\circ} 55' 39''$, and in the dodecagon $113^{\circ} 7' 48''$. This is unquestionably an essential defect.

3dly. It furnishes no fire that is direct or perpendicular to the exterior sides. That this is a great defect cannot be denied.

4thly. Opposite to each re-entering angle, at the distance only of 90 toises from the exterior side, there is a quadrangular space (which no fire from the place scours, commands, or touches), commencing in an angle of 90 degrees, and terminating in one of 30 degrees, at the same distance from the exterior side with the centre of the dodecagon.

5thly. Opposite to every saliant angle, and at the distance from it only of about 254 toises and a half, there is a space that is not scoured or commanded by the fire of the place, which commences in an angle of 60 degrees, widens till its breadth becomes equal to the radius of the circle circumscribing the dodecagon, and then runs on indefinitely at that width between parallel lines.

6thly. The greatest width of each of the first-mentioned spaces not traversed by the fire of the place is to the corresponding width of each of the spaces traversed by it as 104 to 147, nearly: and the greatest width of each of the last-mentioned spaces not traversed by the fire is to the corresponding width of each of the spaces traversed by it as the radius of the circle circumscribing the dodecagon to 131.769 toises, or as 264 to 100, nearly.

7thly. As the respective breadths of these spaces not covered by the fire of the place bear so great proportions to the corresponding breadths of those covered by it, and, as the distance between every two of them is only equal to one of his lines of defence, or 127.2794 toises, the besiegers may advance almost to the very crest of the glacis without any interruption from the fire of the besieged. But it is an important object in defence to keep the besiegers at a distance from the body of the place as long as possible. For when they once get within the distance of serious musketry from it, they will infallibly silence artillery, whether the embrasures be open or covered at top, or whether the guns be in casemates or not.

8thly. The besiegers may easily destroy his principal covered musketry-defences before they are exposed to his principal casemated defences with artillery, which being low, to take off the dead parts unavoidably occasioned by the very nature and badness of his construction, are chiefly calculated for defending the passage of the ditch, and cannot annoy an enemy till he gets to the very crest of the glacis, after which every thing almost, except battering in breach, is determined without artillery.

Lastly. The great proportion which the annular area, occupied by his construction, bears to that of the inscribed circle, will for ever render it unfit for the purpose of fortifying any considerable town or city.

The marquis de Montalembert's construction has no claim even to originality, if we except the great impropriety (I had almost said folly) of making the lines of defence in it form the same angle in all figures, and on all occasions; for when applied to a straight line (as in fig. 1, planche 15, vol. i.) it is the same with Mr. Blondel's. In this case both give the perpendicular equal to half the exterior side, the angle *diminué* equal to 45° , the saliant angle of the bastion equal to 50° , the same line of defence, the same flanking or re-entering angle, and no curtain. The only difference between them consists in this, that Mr. Blondel, in descending from

the right line or polygon of an indefinite number of sides to interior polygons, makes his angle *diminué* gradually decrease according to the rule he has delivered for ascertaining its magnitude, whereas the marquis keeps his in all figures invariably the same. [Mr. Blondel's rule for ascertaining the angle *diminué* is the following: add fifteen degrees to one-third part of the excess of the angle of the polygon above 90 degrees.] Mr. Blondel's construction on an indefinite right line gives the perpendicular nearly double what it ought to be; and the marquis, by keeping this preposterously large perpendicular in all figures on the same exterior side and his angle *diminué* invariable, finds the saliant angle of his dodecagon equal only to 60° , the smallest that is generally considered by engineers as admissible in fortification. This circumstance, therefore, by the marquis's own acknowledgment, renders his construction inapplicable to any polygon of a smaller number of sides than twelve, and is certainly sufficient of itself to demonstrate not only its impropriety, but, I believe I may venture to say, even absolute absurdity. It in fact furnishes nothing but star-figures with re-entering angles of 90° ; and it is manifest that no regular figure of this sort under a dodecagon will give saliant angles of 60° .

Notwithstanding these observations, which I have certainly made with the strictest attention to truth, and, I flatter myself, also to candour, I am heartily disposed to allow every sort of merit to the marquis's voluminous performance, that either his grace or any other person can point out as really belonging to it. I never can be hostile to any person who even endeavours to enlarge the *potioria* either of abstract science or professional knowledge; for the very attempt is laudable. And I must confess I am inclined to believe, that some of his casemated contrivances might, in certain situations and circumstances, be advantageously united with Vauban's construction. I cannot help considering him however as rather a superficial geometer, and as a very loose and incorrect writer. But to prevent the possibility of charging me with misrepresentation in regard of his inaccuracies, I will briefly quote his own words.

In his "Discours Préliminaire," p. 38, he says, "Le premier système de M. de Cohorn est absolument le même que celui du Comte de Pagan, auquel il a seulement ajouté une tour casematée à chaque orillon, pour défendre les faces hautes des bastions."

That he should have hazarded such an assertion is to me astonishing. For these two methods differ widely and essentially. In Cohorn's first method, which is applied to a hexagon, for instance, the ratio between the perpendicular and exterior side is very different from what it is in Count Pagan's; since in the first the angle formed by the exterior side and line of defence is equal to $24^{\circ} 38' 48''$, whereas in the last it is only equal to $18^{\circ} 26' 6''$. The difference is $6^{\circ} 12' 42''$. The saliant angle of the bastion in a hexagon by Count Pagan's method is equal to $83^{\circ} 7' 48''$, whereas in Cohorn's first method it is only $70^{\circ} 42' 24''$, falling short of the other by $12^{\circ} 25' 24''$. These are capital and essential differences. And every person who chooses to examine them will find them very different in many other respects. Vauban indeed appears to have borrowed more from Pagan than Cohorn has done. For, in any polygon having its exterior side equal to 180 toises, their perpendiculars are equal as well as the saliant angles of their bastions; and I am persuaded that even the greatest admirers of Vauban can assign no good reason for his not having followed Count Pagan also with regard to the position of his flank, and placed it at right angles to the line of defence instead of making them meet in an angle of $80^{\circ} 46' 57''$. There is great reason to suppose that the Count would have made the face of his bastion considerably

siderably shorter than he did, had he not intended to have three flanks instead of one. He makes it 55 toises. But it is naturally to be presumed, that had he intended to construct with a single flank, he would have bisected the perpendicular distance between his orillon and inner flank (which is 10 toises), and drawn his flank at right angles to the line of defence through this point of bisection, thereby forming a more complete construction for the body of the place with single flanks than Vauban has done. And it is somewhat remarkable, that this line nearly coincides with a perpendicular to Vauban's line of defence from its point of intersection with the flank. Had he therefore, instead of taking five toises from the face of Count Pagan's bastion, taken ten, and then placed his flank at right angles to the line of defence, he would, without lengthening this line, have given the face of his bastion its proper length, and at the same time made the flank itself about equal to the perpendicular, as it ought to be, since perpendiculars to the exterior sides of polygons were first introduced into construction for the sole purpose of obtaining flanking defences. Were I at present treating formally of fortification, I would deliver a very simple method of construction for rendering the flanks always equal to the perpendiculars to the sides of the polygons. The lengths however assigned to these perpendiculars are merely arbitrary, and by no means derived from reasoning either on the properties of the figures or their relative degrees of importance and capability of defence. For there appears no reason for giving the same perpendicular to a hexagon and every other polygon of a greater number of sides, as Vauban has done, or to all regular figures above the square, as Count Pagan has done. In like manner Coehorn's perpendiculars are too long, and merely arbitrary: for in his first method, which is applied to a hexagon, the angle formed by the exterior side and line of defence is, as I have already observed, equal to $24^{\circ} 38' 48''$; in the second, which is applied to a heptagon, 24 degrees and two sevenths; and in the third, which is applied to an octagon, 25 degrees. This angle in Belidor's first and second methods applied to an octagon is also too great, being in the former equal to $26^{\circ} 33' 54''$, and in the latter to $28^{\circ} 48' 39''$. In his third method however, which is also applied to an octagon, it is equal to $21^{\circ} 48' 5''$, and is not so much distant from what it really ought to be, as it differs only about three minutes from the angle subtended by the true perpendicular of an enneagon.

The perpendiculars are also a great deal too long in Blondel's method, which, when it is applied to a straight line or polygon of an indefinite number of sides, gives one equal to half the exterior side.

The marquis, vol. i. p. 193, says, "Mais dès que lignes de défense peuvent avoir jusqu'à cent cinquante toises, et les hypothèses environ deux cent dix huit toises, il suit que le rayon de ce polygone régulier inscrit dans le cercle peut être de quatre cent vingt-neuf toises et demie, le rapport du côté du dodécagone à son rayon étant comme quinze est à vingt-neuf environ, et ce rayon est à-peu-près celui d'un polygone à bastions de quinze côtés, par conséquent de quinze bastions."

A right-angled triangle however, having each of the sides containing the right angle equal to 150 toises, does not give the hypothenuse equal to 218 toises, but to 212.132 toises, which, as the side of a dodecagon, gives the radius of the circumscribing circle equal to 409.876 toises very nearly, and not to 421 and a half, as he states it to be.

In page 203 he falls into the same mistake.—Take however his own words:

"Mais l'on a vu, comme il est aisé de le sentir, qu'il est un terme où le rayon d'un cercle ne pourrait plus déterminer le côté de notre manière de fortifier: et ce terme est

celui où la corde de l'angle au centre de trente degrés que le rayon donneroit, passeroit deux cent vingt toises, puisqu'alors cette corde prise pour diagonale auroit deux côtés de plus de cent cinquante toises chacun, qui est une distance plus grande que celle admise pour la portée des armes à feu de but en blanc."

Here he mentions 150 toises as the greatest admissible length for each of the lines of defence, and 220 for the corresponding hypothenuse, or exterior side, which he calls the diagonal. But the fact is, that a hypothenuse of 220 toises, gives either side of an isosceles right-angled triangle constituted on it greater than 155 toises and a half. There are many mistakes of a similar nature in this gentleman's performance, who appears to have used scales much more than calculation. The exposure of error, however, is an unpleasant task, even when the elucidation of truth is the object."

From the whole of what is above delivered, it appears evident, that the magnitude of the angle *diminué*, and of the perpendicular to the exterior side, on which the other parts of the construction chiefly depend, is with all the writers on fortification a mere arbitrary assumption, for which they do not even attempt to assign any reason, and much less any good one, drawn from the nature of the polygons themselves, the relative degrees of difficulty in embracing them, or their respective degrees of capability of defence. The truth is this, that every polygon has a perpendicular belonging to itself, of a precise and determinable length, or bearing a given ratio to the exterior side. And the ascertaining of the true perpendiculars belonging to all different polygons is the great desideratum now wanted for perfecting military construction. We understand, that Mr. Glenie, formerly of his majesty's corps of engineers, has had in his possession a complete investigation of this important problem for upwards of twenty-five years. But as he has not yet chosen to make it known to any person, we could not expect him to communicate it to us. He has, however, been pleased to furnish us with the following rules, which have been made known to several individuals, both for regular and irregular construction, on the latter of which nothing of extensive application or much deserving of notice has as yet been delivered by the writers on fortification.

A short paper on fortification, delivering a method of construction for always making the flanks either equal to the perpendiculars to the exterior sides, or in any given ratio to them, and also a rule alike applicable to regular and irregular construction; and, in its application to the latter of these, infinitely more extensive than all that has been hitherto published on the subject. By James Glenie, esq. A. M., and fellow of the Royal Societies of London and Edinburgh.

"After the invention of gun-powder, the ancient method of securing and fortifying places was gradually departed from. Various and important alterations were by degrees introduced into fortification, as the construction and management of artillery became more and more improved. Many treatises have been written on the subject in different nations and languages. And could we for a moment suppose improvements in the *ars muniendi* to have kept pace with these publications, we must naturally conclude, that military construction has by this time reached almost all the perfection it is capable of. But although war has been a profession in Europe, and the attack and defence of places has been studied as a science for almost these two centuries past, it is a certain and undeniable fact, that no writer on fortification has as yet either discovered or demonstrated the true lengths of those lines, on which the other parts of the construction of a work chiefly depend; viz. the perpendiculars

culars to the sides of a polygon, from which the body of the place is to be constructed. No writers on this subject have assigned any sufficient, good, or even plausible reasons for the lengths they give to these lines. With them all, without a single exception, the perpendiculars to the exterior sides of a work are mere arbitrary assumptions, and not the result either of any scientific or professional investigation. Even Mr. Muller, in the three new constructions which he gives in his "Elements of Fortification," in imitation of others, assumes those lines in a manner altogether arbitrary, without assigning any reason whatsoever for such assumptions. In page 76 of his said elements, in his problem "for determining the several parts of a front of a fortification," he makes use of the following words: "But as to the length of the perpendicular CD, it is no way determined; for some engineers make it twice as long as others; they seem indeed to differ from one another merely out of contradiction; since none of them, that I know of, has given any reason for this practice." This observation sufficiently shews, in what an imperfect state military construction remains even at present. For the true lengths of the perpendiculars form the great desideratum in it, since on them the flanking defences chiefly depend; for the sole purpose of obtaining which, and preventing dead parts, the sides of a polygon are broken, each of them into a curtain with two demi-battions to form the respective fronts of the work. And it must be allowed, that when a work is once adapted to the ground, it is intended to occupy, and its position is fixed on, the first consideration after determining the true lengths of the perpendiculars to the exterior sides, is to construct the whole of it in such a manner, as to have no dead parts; that is, to leave no such parts, as cannot be seen, fired on, or flanked from some other parts. That this is a leading or fundamental maxim, and ought to be a primary object of attention in the construction of every work, is manifest from this circumstance, that were it not with a view to obtain flanking defences for the different parts, a rampart and parapet might as well be erected on the exterior sides themselves of a fortification as on the figures, into which they are usually broken for that purpose. The strength of a work, indeed, it must be confessed, depends chiefly on its flanks, since an enemy cannot approach the body of the place, whilst the flanking defences remain entire. But if there be any dead parts through a deficiency of such defences, the moment an enemy gets to them, he finds himself in a state of security, and out of the reach of the besieged's fire. The absolute necessity of avoiding them, has always made such a forcible impression on the minds of able fortifiers, as to make them limit the height of sections. For even when the side of a polygon is not more than 180 toises, or 360 yards long, and is broken into a curtain with two demi-battions, if the section of the work be very high, the guns in the flanks cannot see or scour the ditch but at too great a distance; and it is well known, that when it is only of an ordinary height, they cannot see or command it effectually, nearer than the intersection of the lines of defence. But were it even to be alleged, which would however be an allegation altogether inadmissible, that a fortification ought to be constructed without the least regard to any flanking defences, and that the avoiding of dead or unseen parts is an object unworthy of attention, it is evident that the rectilinear is preferable to the zig-zag or angular construction formed by the placing of triangles contiguous to one another, or by the juxta-position of angles at the bases of triangles. For the fire from a straight line is the best of the direct kind that can be obtained, being equally and uniformly distributed. And the enemy cannot advance against

it directly, without a good deal of delay, inconvenience, and trouble, but must carry on his approaches somewhat in the way commonly practised, till he gets to the dead parts in front of it, when it will cease to be formidable for want of flanking defences. The angular or zig-zag line, on the other hand, has no good direct fire, and indeed no flanking fire whatever, where it is most wanted, or can be of any utility; but a continuity of dead parts, when the section is of a sufficient height, reigns throughout its whole extent. An enemy can approach it without being exposed to any direct fire from the besieged, that can annoy him, in the lines bisecting either the salient or re-entering angles, or, in short, in lines directed to any other intermediate points whatsoever, between these angles.

And it is no less evident, that the direct fire from the circumference of a circle, or from any other curve, that returns into itself, is much more equal and uniform, and better distributed than that from an angular or zig-zag line.

That able general and fortifier, the celebrated marshal Vauban, whose system has been most generally followed in Europe, in constructing from the sides of a square, made the perpendicular an eighth part of one of them, in a pentagon a seventh part, and in a hexagon, and all polygons of a greater number of sides, a sixth part. For this practice, however, he has not assigned any reasons. It is impossible indeed to assign any good reason for giving to a polygon of twenty or thirty sides, or to a construction on part of a right line, which may be regarded as a polygon of an indefinite or infinite number of sides, and to a hexagon, or a figure of only six sides, the same length of perpendicular. Any person, without even a knowledge of geometry, to enable him to draw deductions from the properties of figures themselves, who reflects but a little on the subject, must naturally conclude, that there can be no found or good reason for doing so. The truth, in fact, is this, that every polygon has a precise and determinate perpendicular of its own, proportional to and connected with its capability of being defended, and of being embraced by a besieging enemy, as, says Mr. Glénie, I shall clearly demonstrate in a subsequent paper, that may ere long be presented to the society, as well as shew, how an indefinite number of infinite series may not only be derived from, but also summed geometrically by means of polygons: and I make no doubt, that had Vauban possessed a sufficient knowledge of mathematics for the purpose of applying them to the improvement of the theoretical part of his profession, he would have discovered the precise or genuine lengths of perpendiculars, which different polygons ought to have, and would have regulated his practice accordingly, in the numerous works he constructed. Unwilling to give into prolixity, I will not, at present, enumerate the different lengths of perpendiculars to the sides of one and the same figure or polygon, which the various writers on fortification have assumed, although the enumeration would prove beyond controversy, that in assuming them they were guided by their own whims and fancies, and not by any just or determinate rule. It must however be regarded as a singular fact, that though perpendiculars to the sides of polygons were first introduced into construction, for the sole purpose of obtaining flanking defences, not one of these writers, in even treating formally of regular fortification, has either offered, or attempted to deliver, a method of construction for rendering the flanks always equal to the perpendiculars as they ought to be. To supply this defect I will now proceed to give such a construction, which, like many other things in science, most pregnant with utility, and most extensive in their consequences, has probably been hitherto overlooked chiefly on account of its simplicity.

Construction.

Let *AB* (fig. 17.) be a side of any given polygon, either regular or irregular. Let it be bisected in the point *C*, and let *CV* be an indefinite perpendicular to *AB* at the point *C*. Through the point *O* let indefinite right lines *AA*, *BT*, be drawn from the points *A*, *B*, and let *CD*, *CE*, be each equal to one-half of *AO* or *BO*. Draw the right lines *DF*, *EG*, parallel to *CV* till they meet *A*, *B*, *T*, in the points *F*, *G*; and from the said points *F*, *G*, draw *FK*, *GL*, perpendicular respectively to *BT*, *AS*. Then I say that *FK*, *GL*, are each equal to *CO*.

Demonstration.

Since by construction *AD* is equal to *BE*, and *AC* to *BC*, and *CO* is perpendicular to *AB*, the angle *CAO*, or *DAF*, is equal to the angle *CBO* or *EBG*, and *DF* is equal to *EG*, being parallel thereto. Wherefore *FG* is parallel to *AB*, and equal to *DE*, which is equal to *AO* or *BO*. Consequently, since *FK* is perpendicular to *BT*, and *GL* to *AS*, by construction, the triangles *ACO*, *GKF*, *FLG*, are equiangular and equal, and *CO*, *FK*, *GL* are equal. *Q. E. D.*

Thus then the flanks *GL*, *FK*, drawn at right angles to the lines of defence *AL*, *BK*, or *AS*, *BT*, are by this very simple construction always equal each of them to the perpendicular *CO*, whether *AB* be the side of a regular or an irregular polygon.

The perpendicular distances *FL*, *GK*, of the flanks *GL*, *FK*, from the shoulders *F*, *G*, of the demi-bastions *AFK*, *BGL*, are each of them equal to half the exterior side *AB*. And each of these perpendicular distances *FL*, *GK*, is to the curtain *KL*, as the sine of the angle formed by either flank, and said curtain, to the sine of the angle at the shoulder of either demi-bastion, that is, as the cosine of the angle formed by the exterior side, and either line of defence, to the cosine of twice this angle.

From the similarity of the triangles *ACO*, *ADF*, *BCO*, *BEG*, we have each of the faces *AF*, *BG*, of the demi-

bastions equal to $\frac{AO \times AD}{AC}$, or to $\frac{AO \times AC - 2}{AC}$, or

to $\frac{AO \times 2AC - AO}{2AC}$. Now if *AB*, or *2AC*, be denoted by *2P* and *AO* - *AC* by *2Q*, each of these faces

will be expressed by $\frac{P + 2Q \times P - 2Q}{2P}$, or by $\frac{P}{2} - \frac{2Q^2}{P}$,

which, when the perpendicular *CO* is but small, is nearly equal to the half of *AC*, or to a fourth part of the exterior side *AB*.

Each of the angles *AFK*, *BGL*, of the shoulders of the demi-bastions is equal to a right angle, together with the angles *BAO*, *ABO*, formed by the exterior side *AB*, and the lines of defence.

Scholium.

In like manner may a construction be delivered, which will make each of the flanks *FK*, *GL*, have any given ratio *m* : *n* whatsoever to the perpendicular *CO*. For if *CD* or *CE* be taken to $\frac{AO}{2}$ as *n* : *m*, we shall have *DE* equal to

$\frac{AO \times m}{n}$, or *n* : *m* :: *AO* : *DE* (*FG*) :: *CO* : *GL* or *FH*. And if *AC* be denoted as above by *P* and *AO* by *P* + *2Q*, each of the faces *AF*, *BG*, of the demi-bastions,

will, in this case, be equal to $\frac{2n - m}{2n} \times P + \frac{n - m}{n} \times 2Q$

$$- \frac{m}{n} \times \frac{2Q^2}{P}$$

Mr. Muller, in the preface to his "Elements of Fortification," expresses himself in the following words:

"Notwithstanding the art. . . . others."

"For the true art consists in weakest."

Mr. Muller certainly treats of irregular fortification in a more direct and particular manner than any other author that wrote on the subject before him. But his constructions on the sides of an irregular polygon are similar to that which he makes use of on the sides of a regular one. His perpendiculars in both are mere arbitrary assumptions, and the flanks, as well as the faces, of his demi-bastions in each front of both are equal. The rules therefore delivered by him, as well as by the other writers on fortification, may justly be regarded as only applicable to regular construction.

For although they treat of irregular fortification, they suppose the perpendiculars to bisect the exterior sides, the lines of defence, drawn from the extremities of any one of these sides, to make equal angles with it, and the correspondent parts, such as the faces and flanks set off from the face, to be equal, alike, and similar. They do not so much as even contemplate or once speak of any case, wherein the lines of defence make different angles with the exterior side, or wherein either the flanks or faces of the same front are of different lengths, or unequal to each other. It frequently happens, however, that an engineer cannot preserve this equality between either the faces or the flanks set off from the same exterior side, without losing the principal advantages arising from the nature and situation of the ground, and deviating from what ought to be the leading maxim in the construction of every work, namely, the proportioning of the fire of each part, as nearly as possible, to that which the enemy can bring against it; or, in other words, the defence in every place to the attack. To remove this difficulty and inconvenience, and to enable engineers to practise with facility and expedition the whole possible variety of irregular construction, I will proceed to deliver a rule, which I have had in my possession for nearly twenty-two years, but have not till now thought proper to communicate to the public. Its simplicity has, I suppose, been the principal cause of its being so long unnoticed or unattended to. It is easily and expeditiously carried into practice. It is alike applicable to regular and irregular construction, and in its application to the latter is infinitely more extensive than all, that has hitherto been published on the subject.

This rule is derived from the following very simple geometrical proposition.

If from the extremities of any given right line, two right lines be drawn in any angles, either equal or unequal, and from any two points in these lines, two other right lines be drawn reciprocally meeting them, produced beyond their intersection in any given angle, the angles formed thereby at these points, will be equal between themselves, and each of them equal to the two first mentioned angles, together with the given angle.

Demonstration.

Let *AB* (fig. 18.) be the given right line, from the extremities *A* and *B*, of which right lines *AF*, *BE* are drawn, making any angles *FAB*, *EBA*, therewith whatever, either equal or unequal; and from any two points, *C* and *D*, in these lines, let other right lines *CE*, *CD* reciprocally meeting them, produced beyond their intersection *I* in angles *CEI*, *DFI*, equal each to the given angle. I say that the angles

ACE, BDF, formed thereby, are equal, and that each of them is equal to the angle CEI or DFI, together with the angles FAB and EBA.

For (by 32 E. 1.) the angle ACE is equal to the angle CEI, together with the angle CIE: and by the same proposition, the angle CIE is equal to the angle IAE, together with the angle IBA. Therefore ACE is equal to CEI or DFI, together with FAB and EBA.

In like manner, BDF is equal to DFI or CEA, together with FAB and EBA, and consequently is equal to ACE, Q. E. D.

From the foregoing very simple proposition is derived the following rule.

Whether the angles, which the lines of defence drawn from the extremities of any exterior side make therewith, be equal or unequal, and the angle made by another flank with its line of defence be equal, or greater, or less than a right angle; in every case, the angle of either shoulder is equal to these three angles taken together; that is, to the angle formed by either flank with its line of defence, together with the two angles formed by the lines of defence with the exterior side.

By means of this rule, an engineer may trace out any work, however irregular, in a tenth part of the time requisite for tracing out even a regular work of the same size and dimensions, by the methods of construction hitherto prescribed and made use of. He is under no necessity of finding the centre, or of erecting perpendiculars to the exterior sides, which, in irregular construction, cannot be fixed and ascertained without calculation, trouble, and inconvenience; but after determining in his own mind on the angles, which the lines of defence are to make with the exterior sides, and laying them down, fixes the positions of the flanks, and sets them off from the shoulders, almost as expeditiously as he can walk over the ground. He may use it in woody places, with nearly as much ease and facility as in those that are clear and open; and in every situation, in short, where he can see to the distance of a few yards on each side of him. By it he can trace out in the field, and even in the face of an enemy, with almost mathematical exactness and accuracy, and much more expeditiously than by the tentative and inaccurate random-methods commonly made use of, and without the aid of a theodolite, plain table, or other bulky or cumbersome mathematical instrument: for a pocket Hadley's sextant, which will be useful on most occasions, is all that is necessary in any situation.

It may not perhaps be improper to mention the circumstance that first led me to think of this rule, and gave rise to the putting of it in practice. In summer, 1783, Colonel Moncrief, Lieutenant Fiddes of the Engineer-corps, and myself, went one forenoon to trace out a large pentagonal work, near Stoke's Bay House and Gomer Pond in the Gosport division, on one of the fronts of which it was thought advisable, from the nature of the ground, to have the flanks of different lengths, and thereby to vary the directions of their fire, and those of the faces of the demi-bastions, from those which the ordinary method of construction would have given. Colonel Moncrief, who, though he was commonly and justly reckoned a good judge of ground and positions, was, from the inapplicability of the customary rules to such a case, totally at a loss for the construction. He had Muller's "Elements of Fortification" in his hands, but could derive no aid or assistance from them. His embarrassment, and the novelty of our situation, which none of us had thought of beforehand, set me a

thinking seriously how we might surmount the difficulty. After a few minutes reflection, I discovered the foregoing rule, which I immediately applied on the spot, and very expeditiously. I might, however, as well as others, have overlooked it even to this moment, had it not been for the incident now mentioned. For the simplest and most useful things are generally least attended to. I gave copies of it in writing to these two gentlemen at their request, and another to his grace of Richmond.

There are various maxims delivered by the writers on fortification, which relate to the construction and defences of the works, independent of the general considerations for or against the erection of the fortifications themselves, in different circumstances and situations. Some of these maxims, however, are very questionable, and, on due examination, would be found to be inadmissible, having been laid down by men who did not understand the true principles of construction.

The following may, perhaps, be justly regarded as the most unexceptionable of the maxims that are commonly delivered.

1. There ought to be no part in the whole circuit, or *en-ciente*, of a fortress or fortification that cannot be seen, flanked, or defended from some other part. That this is not only an admissible but a fundamental maxim, and ought to be a primary object of attention in the construction of every work, is manifest from this circumstance: that, were it not with a view to obtain flanking defences for the different parts, a rampart and parapet might as well be erected on the right lines themselves, which form the exterior sides of polygons, as on the figures, into which they are usually broken for this purpose. The strength of a work indeed depends chiefly on its flanks, since an enemy cannot approach the body of the place whilst the flanking defences remain entire. But if there be *dead* or *unseen* parts, the moment an enemy gets to them he finds himself in a state of security, and out of the reach of the besieged's fire. An idea, therefore, of the absolute necessity of avoiding them, has always made such a forcible impression on the minds of able fortifiers, as to induce them to limit the height of sections. For even when the side of a polygon is equal to 180 toises, or to 360 yards, and is broken into two demi-bastions and a curtain with flanks, if the section of the work be very high, the guns in these flanks cannot see or scour the ditch, but at too great a distance. When it is only of an ordinary height, it is well known, that the guns in the flanks do not see the ditch effectually nearer than the intersection of the lines of defence, the distance of which, in Vauban's construction, from the epaules or shoulders, is equal to 45 toises nearly. Mr. Blondel's construction, therefore, in polygons of a great number of sides, and that of the marquis de Montalembert, which is nothing but Mr. Blondel's on a straight line or a polygon of an infinite or indefinite number of sides, are in this respect radically defective, creating dead or unseen parts throughout their whole extent, which cannot be removed but by casemates and contrivances, that have no natural connexion whatsoever with the constructions themselves.

2. The defence of every part ought to be always within the certain reach of musket-shot, in order to be defended both by great and small fire-arms: for if any parts be at too great a distance from those that flank them, to be within the reach of a serious and efficient fire of musketry, or can be defended by cannon only, the enemy may dismount these cannon by the superiority of his, and thereby destroy the defences of such parts at once. But if they be defended

by both cannon and musketry, should one of these two species of defence be destroyed, the other will still remain.

It has been frequently alleged, that a musket-shot will not kill at a greater distance than 150 toises, or 300 yards, or 900 feet. If this be true, the great line of defence, or the distance from the flanked angle or salient angle of the bastion to the opposite flank, ought not to exceed 150 toises, or even to be equal to so many toises. If, on the other hand, the line of defence were to be about two-thirds of that length only, or equal to about 100 toises, the bastions would be too near to one another, and too small, which would both increase their number in the same circuit or cunete, and lessen their strength or capability of defence. The length of the great line of defence, in order to render the fire more certain and efficient, is therefore commonly supposed to be equal to from 120 to 140 toises only.

3. All the defences should be as nearly direct as possible; for soldiers naturally fire directly before them. The lines of defence, therefore, should be either like Couat Pagan's, perpendicular to the flanks, or nearly so.

4. A fortification ought to be equally strong on all sides: for if it be not, an enemy may attack it on the weakest, and avail himself of its inequality of strength.

To these maxims we will take the liberty to add a few others, that are not to be found in the writers on fortification, but which we, nevertheless, conceive to be entitled to the most serious consideration. They are the following, and we are favoured with them by Mr. Genie.

1. In regular construction, the two flanks in each front ought to be equal each of them to the perpendicular to the exterior side of the polygon, or nearly so, since perpendiculars to the exterior sides of polygons were introduced into construction for the express purpose of obtaining flanking defences. And in regular construction, when it is necessary (as it generally is, in order to make field-works suit the ground they occupy) to make the two flanks in the same front unequal, their sum or lengths taken together should be equal to twice the perpendicular distance from the intersection of the lines of defence to the exterior side, or nearly so.

Mr. Genie, in the foregoing paper, has given a very easy method of making the flanks in regular construction, either equal to the perpendiculars, or in given ratios to them.

2. The face of the bastion, in regular construction, ought never to exceed one-fourth part, or two-eighths of the exterior side. The construction, which gives each of the flanks in the same front equal to the perpendicular, makes the face of the bastion equal to a fourth part of the exterior side very nearly.

3. The flanked angle, or salient angle of the bastion, ought never to be less than an angle of about $71\frac{1}{2}^\circ$, and should never exceed 120° . In Count Pagan's method, however, and that of Mr. Vauban, who has followed him, this angle in a polygon of only 18 sides is equal to about $123^\circ 7' 46''$; in one of 30 sides, to $131^\circ 7' 48''$; and in a construction on a right line, or part of a polygon of an infinite or indefinite number of sides, to $143^\circ 7' 48''$.

4. The angle of the epaule or shoulder should not be less than an angle of about $108\frac{1}{2}^\circ$, and ought never to exceed an angle of 150° .

5. The angle of the flank ought not to be less than an angle of about $99\frac{1}{2}^\circ$, nor greater than one of about 120° .

6. The outward flanking angle, or the angle formed by the lines of defence at their intersection, ought not to be less than 120° , nor ever greater than $161\frac{1}{2}^\circ$.

Lastly, Different polygons have different perpendiculars, which have respectively given ratios to the sides of the polygons. And the perpendicular that truly belongs to any polygon of a given number of sides, is different from that which belongs to any other polygon of a different number of sides; the exterior side in each of the polygons being supposed invariable or the same. A construction on the sides of any polygon of a given number of sides, ought to be made with the perpendicular that peculiarly belongs to it. An investigation, however, of the various perpendiculars that respectively belong to various polygons, from the square up to the right line, which may be regarded as part of a polygon of an indefinite or infinite number of sides, has never as yet been delivered by any writer on fortification; and it now forms the great desideratum in military construction.

CONSTRUCTIVE TREASON, in *Law*, was defined by 25 Edw. III. cap. 2. See TREASON.

CONSUALES LUDI, among the Romans, the same with CIRCENSES *ludi*. See also CIRCUS.

CONSUALIA, in *Antiquity*, feasts which were held among the ancients, in honour of the god Consus, *i. e.* Neptune; different from those other feasts of the same deity called Neptunalia.

They were introduced with a magnificent cavalcade, or procession on horseback; because Neptune was reputed to have first taught men the use of horses; whence his surname of *Ἰππιος*, *Equus*.

Evander is said to have first instituted this feast: it was re-established by Romulus, under the name of *Consus*; because it was some god under the denomination of Consus, that suggested to him the rape of the Sabines. It is said, that it was with a view to this rape, that he formed this institution. This, however, is certain, that it was to this feast all his neighbours were invited; when, taking advantage of the solemnities and sacrifices, he seized the women. To draw the greater concourse of people, he gave out that he had found an altar under ground, which he intended to consecrate, with sacrifices to the god to whom it had been originally erected.

Those who take upon them to explain the mysteries of the heathen theology, say, that the altar hid under ground, is a symbol of the secret design of Romulus to seize his neighbours' wives.

The consualia were of the number of feasts called *sacred*; as being consecrated to a divinity. Originally they were not distinguished from those of the Circus: whence it is, that Valerius Maximus says, that the rape of the Sabines was effected at the games of the Circus.

Plutarch observes, that during the days of this solemnity, horses and asses were left at rest, and were dressed up with crowns, &c. on account of its being the feast of Neptune's Equetris. Fessus says, the cavalcade was performed with mules; it being an opinion, that this was the first animal used to draw the car.

Servius gives us to understand, that the consualia fell on the thirteenth of August; Plutarch, in the life of Romulus, places them on the eighteenth, and the old Roman calendar on the twenty-first of that month.

CONSUBSTANTIAL, in *Theology*, a term of like import with *co-essential*; denoting something of the same substance in kind with another. That this is the meaning of the term *ὁμοουσιος* has been shown by Petavius, Curellæus, Cudworth, Le Clerc, Clarke, &c. &c.

The orthodox believe the Son of God to be consubstantial with the Father.

The term *ὁμοουσιος*, *consubstantial*, was first adopted by the fathers,

fathers of the council of Nice, convened A. D. 325, and consisting of 318 bishops, to express the orthodox doctrine the more precisely, and to serve as a barrier and precaution against the errors and subtleties of the Arians; who owned every thing excepting the *consubstantiality*.

At the Nicene council, Eusebius proposed a creed, in which he avoided the word *ὁμοουσιος*; and anathematized every impious heresy, without specifying any; but his advice was not followed; *ὁμοουσιος* was inserted, and the Arian doctrines were anathematized. Disputes ensued among the bishops concerning the meaning and the consequences of the word *ὁμοουσιος*. Eusebius assented to it, declaring at the same time in what sense he understood it. His sense of *consubstantial* was, that the Son of God was not like created beings, but received his existence and his perfections from the father in a different and in an ineffable manner. Others gave other senses to it; and the debate, says Socrates, the ecclesiastical historian, (i. 23. et Soz. ii. 18.) was like a battle fought in the dark. Sociates however was a consubstantialist, so far as even to believe that miracles were wrought by the Monks in favour of that doctrine; though he intimates, that the bishops of each party disputed about words of which they had no ideas, and charged one another with consequences and inferences, which neither side would own. By the word *ὁμοουσιος* the Nicene fathers meant, not the same numerical or individual substance, but the same general substance or subsistence. As amongst men, a son is *ὁμοουσιος* with his father, that is, of the same human nature; so, in their opinion, the Son of God is *ὁμοουσιος* with the Father, that is, of the same divine nature. By this word, therefore, they intended to express the same kind of nature, and so far a natural equality. But according to them, the natural equality did not exclude a relative inequality; a majority and minority, founded upon the everlasting difference between giving and receiving, causing and being caused. They had no notion of distinguishing between person and being; between an intelligent agent, and an intelligent active substance, subsistence, or entity. When they said, that the Father was God, they meant that he was God of himself, originally, and undivided, *ὁὐτος ἀγεννητος*, and *ὁ ὁὐτος*. When they said that the Son was God, they meant that he was God by generation or derivation, *ὁὐτος-γεννητος*. The unity of God they maintained; and they defended it, first, by considering the father as the first cause, the only undivided and self-existing; secondly, by supposing an intimate, inseparable, and incomprehensible union, connection, indwelling, and co-existence, by which the Father was in the Son and the Son in the Father; and thirdly, by saying, that in the Father and the Son there was an unity of will, design, and consent, and one divine power and dominion, originally in the Father, and derivatively in the Son. In process of time Christians adopted a notion, that the Son was *καὶ ὁμοουσιος*, and *μονοουσιος*, of the same individual substance with the Father and the Holy Spirit; and they seem to have done this with a view of securing the doctrine of the unity.

The Arians declared, that the word was God, as having been made God; but they denied that he was the same God, and of the same substance, with the Father; accordingly, they exerted themselves to the utmost to abolish the use of the word. The emperor Constantine used all his authority with the bishops to have it expunged out of the symbols; but it still maintained itself, and is at this day, as it was then, the distinguishing criterion between an Athanasian and an Arian.

Sandius will have it, that the word *consubstantial* was unknown till the time of the council of Nice; but it is cer-

tain it had been before proposed to the council of Antioch, held A. D. 270, in which Malchion directed and governed, and in which Paul of Samosata had been condemned; though it had there the fortune to be rejected. Curcellæus, on the other hand, maintains, that it was an innovation in doctrine in the council of Nice, to admit an expression, the use whereof had been abolished by the council of Antioch.

According to St. Athanasius, the word *consubstantial* was only condemned in the council of Antioch, inasmuch as it implied the idea of a pre-existent matter, prior to the things formed of it; now, in this sense, it is certain, the Father and the Son are not consubstantial, there having been no pre-existent matter.

In another council, held at Antioch, A. D. 341, consisting of about 100 bishops, the Arians made a creed and left out the term *ὁμοουσιος*; but wanting it to be approved by both parties, they called the Son the unchangeable image of the essence, counsel, and power of the Father, the first born of every creature. The disputes, however, between the consubstantialists and the Arians, and also the Semi-Arians or *ὁμοουσιος*, i. e. the homoiousians, continued to be carried on with great violence, particularly in the Eastern part, for several years. One remarkable difference has been observed between the creeds which were proposed by the contending parties. The consubstantialists drew up their creed with a view to exclude and distress the Arians; whereas the Arians had no design to distress the consubstantialists, but usually proposed creeds to which Athanasius himself might have assented; so that if the compilers were Arians, their creeds were not Arian. The Semi-Arians agreed with the Arians in rejecting the word *ὁμοουσιος*, but differed from them in exalting the perfections and dignity of the Son higher than the Arians did, and in affirming that he was *ὁμοουσιος*, of like substance and like to his father in all things. Dr. Clarke's doctrine, in his "Scripture Doctrine, &c." as stated by Le Clerc, (Bibl. Choix. xxvi. 419.) seems to be the same with that of the Nicene council, excepting that he uses not the word "consubstantial." Before the end of the fourth century the consubstantialists differed and disputed among themselves, whether in the Trinity there were three hypostases, or one hypostasis. See HYPOTASIS and TRINITY.

CONSUBSTANTIATION, a tenet of the Lutheran church, with regard to the doctrine of the real presence of Christ, or the manner of the change made in the bread and wine, in the eucharist; though the term *consubstantiation* was substituted in the room of *transubstantiation*, at the close of the thirteenth century, by John, surnamed Pungens Aflnus, a doctor of the university of Paris.

The divines of that profession maintain, that, after consecration, the body and blood of our Saviour are substantially present, together with the substance of the bread and wine; which is called *consubstantiation*, or *impanation*.

This notion, as the bishop of Meaux justly observes, has all the disadvantages, which the Romanists, and Sacramentarians, charge on one another, without having a single advantage that can be claimed by either. It has all the absurdity which the latter charge upon the former, inasmuch as it represents the same body existing in different places, at the same time; and inasmuch as it represents a substance existing without its accidents, or under the accidents of another substance; but has not the advantage of simplicity which the Romish doctrine has, in interpreting literally the words, "this is my body." On the Lutheran hypothesis the expression ought to have been, not "this is my body," but "in, with, and under this is my body." For the Lu-
therans

therans maintain that the bread remains unchanged, and is that which is seen, touched, and tasted; but that the body of Christ, the same which he had upon the earth and has now in heaven, accompanies the bread. Hence it appears, that the words are to be understood neither according to the letter, nor according to any figure of speech ever heard of before. It is neither literally Christ's body, nor figuratively the sign or symbol of his body; but it is something with which his body is accompanied. The Lutherans, by maintaining this doctrine of consubstantiation, were obliged to adopt another hypothesis not less absurd, *viz.* the ubiquity, or the omnipresence, and consequently the immensity of the body and human nature of Christ; hence they were called *Ubiquitarians*. See also *IMPANATION, TRANSUBSTANTIATION, and LUTHERANISM*.

CONSUEGRA, in *Geography*, a town of Spain in New Castile, containing two parishes and three convents. It belongs to the knights of Malta; 25 miles S.S.E. from Toledo.

CONSUETUDINIBUS ET SERVITIIS, in *Law*, a writ of right, which lies for the lord against the tenant that despotheth his lord of the rent, or service due to him, by custom, or tenure, for his land. This compels a specific payment or performance of the rent or service, and there are also others, whereby the lord shall recover the land itself in lieu of the duty withheld.

CONSUL, the appellation that was given to the first, or chief, magistrate in the Roman government, vulgarly and commonly called the Roman Commonwealth; though it was composed of royalty, aristocracy, and democracy, as much as the government of Great Britain is, and was, perhaps, in several respects, the most energetic and efficient mixture of these three simple forms that has ever existed in the world, particularly for the purposes of conquest and security against subjugation.

After the destruction of royalty at Rome, and the expulsion of Tarquinius Superbus, and his family from thence, in the 244th year of the city, a consular form of government was established in the 245th year in its stead; the people choosing to have some share in the management of public affairs themselves; they accordingly chose two officers, or magistrates, annually, who were invested with sovereign authority, and were originally called *prætores*, *a præcedendo*, according to some writers, but *a præcessu* according to others. These were afterwards called *consules*, *a consulendo*, because it was their duty to consult with the senate, with the people, and with each other. From their acting as judges, they were called *judices*; or from their possessing supreme command they were denominated by the Greeks *ΥΠΑΤΟΥ*. The first consuls were Brutus and Collatinus. The office of the consuls lasted a year; and if either of them died in the course of the year of their consulate, a new one was to be elected. In the beginning of the republic the consuls entered on their office at different times; at first, on the 23d or 24th of February, (vii. or vi. Kal. Mart.) the day on which Tarquin was said to have been expelled, which was held as a festival, and called "regifugium festus;" afterwards on the 1st of August, (Kal. Sext.) which was at that time the beginning of the year, *i. e.* of the consular, not of the civil year, which always began with January:—in the time of the Decemviri, on the 15th of May, (Id. Maii);—about 50 years after, on the 15th of December, (Id. Decemb.);—then on the 1st of July, (Kal. Quint.), which continued till near the beginning of the second Punic war, A. U. 530, when the day came to be the 15th of March, (Id. Mart.):—at last, A. U. 598, or 600,

it was transferred to the 1st of January (in Kal. Jan.), which continued to be the day ever after. After this, the consuls were usually elected about the end of July, or the beginning of August. From their election to the 1st of January, when they entered on their office, they were called "consules designati," and whatever they did in public affairs, they were said to do it by their "authority," not by their "power." This interval was made so long, that they might have time to acquaint themselves with the duties of their office, and that inquiry might be made whether they had gained their election by bribery. If, upon trial, they were convicted of that crime, they were deprived of the consulship, and their competitors, who accused them, were nominated in their place. They were also fined, and declared incapable of bearing any office, or of coming into the senate, by the Calpurnian and other laws. (Cic. pro Sylla, 17 and 32. Cic. pro Cornel. Muren. 23, &c. Sall. Cal. 18.) On the 1st of January, the senate and people waited on the new consuls at their houses; from whence, being conducted to the capitol, they offered up their vows, and sacrificed, each of them, a ox to Jupiter; and then began the exercise of their office, by holding the senate, consulting it about the appointment of the Latin holidays, and about other things relating to religion. Within five days they were obliged to swear to observe the laws, as they had done when elected.

The consuls were at first chosen only from among the Patricians, but afterwards also from the Plebeians. L. Sextius was the first plebeian consul, and the second year after him Licinius Stolo; from whom the law, ordaining one of the consuls to be a plebeian, was called "lex Licinia." Sometimes, but rarely, both consuls were plebeians; the patricians generally engrossed this honour. The first foreigner who obtained the consulship, was Cornelius Balbus, a native of Cadiz; who became so rich, that, at his death, he left to each of the citizens, residing at Rome, 25 drachmæ, or denarii, *i. e.* 16s. 13d.

The legal age for enjoying the consulship (as consularis) was 43; and whoever was made consul at that age, was said to be made in his own year; but we meet with some few exceptions from this rule. (see *AGE*.) Before any person was made consul, it was necessary for him to have gone through the inferior offices of quaestor, ædile, and prætor. No one could be created consul a second time till after an interval of ten years. But these regulations were not strictly observed.

The insignia of the consuls were the same with those of the kings, except the crown; namely, the toga prætexta, sella curulis, the sceptre, or ivory staff, and 12 lictors, with the fasces and securis. He who had the greater number of suffrages was called "Consul prior," and his name was marked first in the calendar; he also had the fasces first, and usually presided at the election of magistrates for the next year. All persons went out of the way, uncovered their heads, dismounted from their horses, and rose up to the consuls as they passed by them. When a prætor happened to meet a consul, his lictors always lowered their fasces. Valerius, called Poplicola, took away the securis from the fasces; *i. e.* he took from the consuls the power of life and death, and only left them the right of scourging, at least within the city; for without the city, when invested with military command, they still retained the securis, *i. e.* the right of punishing capitally. Poplicola likewise made a law, granting every one a liberty of appealing, from the consuls to the people; and that no magistrate should be permitted to punish a citizen, who thus appealed: a privilege which was also enjoyed under the kings. The consuls originally possessed kingly powers, both in civil and military

military matters. But afterwards, when the consuls came to be much employed from home, or abroad in war, and could not be present either to hear or determine civil causes, there was an officer constituted, under the designation of *prator urbanus*, and frequently called by Cicero *prator Romanus*, with power to judge matters of law between citizen and citizen. And for the convenience and accommodation, in this respect, of the great number of strangers that were always at Rome, another officer was appointed to judge causes between them, with the appellation of *prator peregrinus*. And as provinces came to be added to the Roman state, and the number of causes was of course greatly increased, there were eight *prators* appointed, which number continued till the time of Julius Cæsar, who raised it to ten.

The consuls, whilst they remained in Rome, and before they led out Roman armies into the field, were masters of all public affairs. For all the other magistrates, the tribunes of the people alone excepted, were subject to them, and bound to obey their commands. They introduced ambassadors into the senate and gave them audience; and they received all letters from the governors of provinces, and from foreign kings, and states. They also proposed to the senate the subjects of their debates, and directed all the forms that were observed in making their decrees. It was equally a duty likewise, belonging to their office, to attend to those affairs that were transacted by the people; to summon, or call together their general assemblies; to report to them, when assembled, the resolutions of the senate; and to ratify whatever was determined by the greater number. The laws which they proposed, and got passed, were commonly called by their name. The year was named after them, as it used to be at Athens, from one of the archons. The consuls had also command over the provinces, and could, when authorized by the senate, call persons from thence to Rome, and punish them. (See PROVINCE.) Their authority was so great, that kings, and foreign nations, in alliance with the republic, were considered to be under their protection. In dangerous conjunctures, the consuls were armed with absolute power by the senate. In all the preparations that were made for war, as well as in the whole administration, and management of things in the field, they possessed an authority almost absolute. For to them it belonged to impose on the allies whatever services they judged necessary or expedient; to appoint the military tribunes; to enrol the legions, and make the necessary levies; and to inflict punishments in the field on all that were subject to their command. In addition to all this, they had the power to expend whatever sums they might think convenient, or requisite, from the public treasure, and were attended for that express purpose by a *questor*, who was always ready to receive and execute their orders.

When a Roman army encamped, the consular tent was first pitched, and the ground on each side of it marked out for it, and on the breaking up of a camp, it was the first tent that was permitted to be struck; and one entire company of soldiers were always stationed round it.

When an action had taken place, in which any of the soldiers had shewn signal proofs of courage, the consul assembled the troops together, and commanded those to approach who had distinguished themselves by any eminent exploit. And after bestowing on each of them separately, or apart, the commendation that was due to that particular instance of their valour, and after recounting likewise all their former actions that had ever merited applause; he then distributed among them the following rewards:—To him who had wounded an enemy a javelin:—To him who had killed an enemy, and stripped him of his armour, a

goblet, if he were in the infantry; and if in the cavalry, a javelin in ancient times, but afterwards furniture for his horse. These rewards, however, were not bestowed on soldiers, who, in a general engagement, or in the attack of a city, had wounded or spoiled an enemy; but on those only, who in separate skirmishes, and when any occasion offered, in which, though they were not necessarily required to engage in single contest, threw themselves voluntarily into danger, and with design, provoked the combat. In taking a city by storm, those who first mounted the walls, were honoured by the consul with a golden crown. And those who saved the lives of any of the citizens, or of the allies, by covering them from the enemy in the time of battle, received presents from the consul, and were also crowned by the persons whom they had thus preserved.

Although the consuls were the dispensers of military rewards and punishments; although they were entrusted with the absolute direction of the preparations that were made for war, and exercised an uncontrolled authority in the field; although their powers and authorities, when they were present in Rome, made strangers sometimes suppose the government to be a kind of simple royalty; they were in truth, so dependent in different respects, both on the senate and the people, that without their assistance, they were unable to accomplish any design. Armies require a continual supply of necessaries. But neither corn, nor habits, nor even the military expenses, could at any time be transmitted to the legions, without an express order of the senate. It was also the senate that either compelled the consuls to leave their designs imperfect, or enabled them to complete the projects that they had formed, by sending a successor into each of their several provinces on the expiration of the annual term, or by continuing them in their respective commands. The senate also had the power of either aggrandizing and amplifying the victories that were gained, or of depreciating and debasing them. It was also necessary for the consuls, however far they were removed from Rome, to preserve the good affections of the people. For though the consuls might make treaties, the power of annulling, or ratifying, rested entirely with the people. And what was of still greater moment, the consuls, on quitting their office, were bound to submit the whole of their past administration to the judgment of the people. On this occasion they made a speech, and swore that they had done nothing against the laws.

Consuls were even continued under the emperors after the republic was destroyed; but consul was here little more than an honourable title; which, however, the people were fond of keeping up; as esteeming it some remains of their ancient liberty. As long as the emperors condescended to disguise the servitude which they imposed, the consuls were still elected by the real or apparent suffrage of the senate. From the reign of Diocletian, even these vestiges of liberty were abolished, and the successful candidates, who were invested with the annual honours of the consulship, affected to deplore the humiliating condition of their predecessors. In the epistles which the emperor addressed to the two consuls elect, it was declared, that they were created by his sole authority. The title of consul, however, though the real dignity and substantial power that accompanied it were lost, was still the most splendid object of ambition, the noblest reward of virtue and loyalty. The emperors themselves, even after Constantinople became the seat of empire, who disdained the faint shadow of the republic, were conscious that they acquired an additional splendour and majesty as often as they assumed the annual honours of the consular dignity. It dwindled for a long time, and at last the succession of consuls finally ceased, in the 13th year of Justinian, A. D. 541, whole

whose despotic temper might be gratified by the extinction of a title, which admonished the Romans of their ancient freedom: after him, no emperor either created any consul, or assumed the dignity himself. Basil is the last in the consular list, for the year 541. By this time, the dignity was depreciated to that degree, that it was conferred on the meanest persons: indeed, Justinian endeavoured to retrieve it 25 years after, and created himself consul, but without effect. Indeed, the annual consulship long lived in the minds of the people; they applauded the gracious condescension of successive princes, by whom it was assumed in the first year of their reign; accordingly Constantine created two consuls, whose office it was to exercise supreme jurisdictions, the one at Rome, the other at Constantinople; and three centuries elapsed, even after the death of Justinian, before that obsolete dignity, which had been suppressed by custom, could be abolished by a law of Leo the philosopher. Afterwards the title was vitiated, as we learn from the emperor himself.

From the establishment of the republic, and the consulate under L. Jun. Brutus, and L. Tarq. Collatinus, to the consulate of Basil, *i. e.* from the year of Rome 244, or 245, 509 years before Jesus Christ, to the year of Rome 1204, the space of 1049 years, the years were accounted by the consuls; but from the time of Basil, in the year of Christ 541, we find no mention made of consuls, or consulates; but the time was then computed by the years of the emperors' reigns, the indictions, and those of the Christian era.

Indeed, for some time after the consulate of Basil, the years are marked thus; *post consulatum Basilii*, 1, 2, 3, &c. (See the *Facti Consulares* of M. D'Alencouven.) That author reckons 1000 pairs of consuls, besides the substitute consuls, *supplæti*, elected to supply vacancies by death; and yet there were but 1049 years, and consequently only 50 many consulates.

The perpetual consulates of the Eastern emperors, which compose the *Facti Byzantini*, commenced in the year of Christ 507, and ended in 608, in the last year of Constantine.

Constantine Pogonatus would have the consulate inseparable from the empire; which it continued to be till the time of Constantine Porphyrogenetus.

In this form of government the empire and consulate were so closely united, that the empress Irene would needs assume the consulate when she was only regent of the empire.

But the French kings, those of Italy, and the Saracen princes who commanded in Spain, taking on them the title of consuls, as well as emperors of Constantinople; these last despised it, and laid it aside; so that the name was only continued to the magistrates of some cities, and certain other officers, as is shewn by F. Pagi.

Under the emperors there were *ordinary consuls*, *honorary consuls*, and *suffeiti*; which last also subsisted in the time of the republic.

In the middle age, we find the word consul used for *comes*, *count*, and *proconul*, for viscount; as is observed by Spelman, and De Marca.

And thus consul, in our law books, signifies an *earl*. Braët. lib. 1. cap. 8. tells us, that as *comes* is derived from *comitatus*, so *consul* is derived from *consulendo*: and in the laws of Edward the Confessor, mention is made of *vicescomites*, and *vicesconsules*.

CONSUL, at present, is used for an officer established by virtue of a commission from the king, and other princes, in the ports and factories of the Levant, on the coasts of Africa, Barbary, Spain, and other foreign countries of any considerable trade; to facilitate and dispatch business, and protect the merchants of the nation.

These commissions were never granted to persons, as consuls of the French nation, under the age of thirty years. When the consulate is vacant, the most ancient of the deputies of the nation were to discharge the function thereof, till the vacancy should be filled up by the king.

The consuls are to keep up a correspondence with the ministers of England residing in the courts whereon their consulates depend. Their business is, to support the commerce and interest of the nation; to dispose of the sums given, and the presents made, to the lords and principals of places: to obtain their protection, and prevent the insults of the natives on the merchants of the nation. There are also consuls of other nations established in the Levant, especially French and Dutch.

CONSULS also denote judges elected among the merchants and dealers, in ports and trading towns, chiefly in France; to terminate, *gratis*, and on the spot, without any process, such differences and demands as may arise relating to their merchandizes, bills of exchange, and other articles of commerce.

The first jurisdiction of consuls established in France, is that of Tholouse; the edict of whose establishment bears date 1549, under the reign of king Henry II.; that of Paris followed fourteen years afterwards. By degrees, they were established in most of the considerable trading towns in that kingdom.

CONSUL, *Chief*, or *Premier Consul*, the first or chief of the magistrates, who each of them bore the name of consul in the late constitution of France, which has been succeeded by its present military despotism. Napoleon Buonaparte, the present emperor of France, was appointed chief consul, in consequence of the revolution that took place in 1799.

CONSULAR, of or belonging to a consul: as for example, a consular camp, a consular army, the consular dignity, the consular authority, and so on.

CONSULAR comitia, and *medals*. See the substantives.

CONSULATE, or **CONSULSHIP**, the office of consul, which was instituted by the Romans, in the year of Rome 245, after they expelled Tarquin the Proud.

CONSULTATION, in *Law*, a writ whereby a cause, formerly removed by prohibition from the ecclesiastical court to the king's court, is returned thither again.

If the judges of the king's court, upon comparing the libel with the suggestion of the party, find the suggestion false, or not proved; and therefore the cause to be wrongfully called from the court-christian; then, upon such deliberation, or consultation, they decree it to be returned again, and the writ obtained hereon is called a consultation.

And, even in ordinary cases, the writ of prohibition is not absolutely final and conclusive. For, though the ground be a proper one, in point of *law*, for granting the prohibition, yet, if the *fact* that gave rise to it be afterwards falsified, the cause shall be remanded to the prior jurisdiction. If, *e. g.* a cause may be pleaded in the spiritual court, a prohibition ought to go, because that court has no authority to try it; but, if the fact of such a custom be brought to a competent trial, and be there found false, a writ of consultation will be granted. For this purpose the party prohibited may appear to the prohibition, and take a declaration, (which must always pursue the suggestion,) and so plead to issue upon it, denying the contempt, and traversing the custom upon which the prohibition was grounded; and if that issue be found for the defendant, he shall then have a writ of consultation. The writ of consultation may also be, and is frequently, granted by the court without any action brought, when, after a prohibition issued, upon more mature con-

sideration, the court are of opinion that the matter suggested is not a good and sufficient ground to stop the proceedings below. Thus careful has the law been, in compelling the inferior courts to do ample and speedy justice ; in preventing them from transgressing their due bounds ; and in allowing them the undisturbed cognizance of such causes as by right, founded on the usage of the kingdom or act of parliament, do properly belong to their jurisdiction. Blackst. Com. vol. iii.

CONSUMMATE ESTATE. See TENANT *by curtesy*.

CONSUMMATION, the end, period, or completion, of any work.—Thus, we say, the consummation of all things: meaning the end of the world. By the incarnation, all the prophecies are to be consummated.

Consummation of marriage denotes the last act of marriage, which makes its accomplishment.

CONSUMPTION, in *Medicine*, popularly named a *decline*, is a generic term, occasionally applied to different diseases, the most obvious symptoms of which are a gradual decline of the strength and functions of the body, and a diminution of its bulk, in consequence of the decrease or consumption, as it were, of the fat and muscular parts. From whatever cause, therefore, the nutrition of the body is impeded, consumption will be the consequence. The nutrition of the body may be impeded either by some great internal disease, which disturbs the functions, especially that of digestion ; or by deficiency of nutriment ; or by great evacuations or discharges of blood, or fluids secreted from the blood. These considerations have led nosologists to treat of consumption under three divisions or genera, with the titles of *Phthisis*, *Tubes*, and *Atrophia* : the two first being produced by internal organic diseases ; the last by the deficiency, or the abstraction, or corruption, of nutritious matter.

1. *Phthisis*, *Œlvis*, signifying *consumption* in general, is confined to that species which originates from disease of the lungs : this form of consumption being the most frequent and fatal. It is defined “ emaciation, with hectic fever, cough, and commonly with purulent expectoration.” The emaciation is occasioned by the disturbance in the function of digestion, which the daily fever produces ; by the impediment to the function of respiration, which the diseased lungs are unable to carry on ; and by the great discharges by expectoration, sweating, or diarrhoea, which latter frequently alternate with each other.

2. *Tubes*, which, in the Latin language, is synonymous with *phthisis* in the Greek, has been arbitrarily restricted by nosologists to that form of consumption, which is not accompanied by cough. It is defined, “ emaciation, with hectic fever.” Any local disease of long continuance, such as abscesses, ulcers, &c. which excites a hectic fever, may become the origin of a *tubes*. But the most frequent occurrence of *tubes* is observed in scrofulous habit, the scrofula being always slow in its progress : and one of the most common varieties of *tubes* arises, where scrofula attacks the glands of the mesentery. In this case emaciation is produced, not only by the disturbance of functions, and the sweats of the hectic fever, but by the physical impediment to the nutrition of the body, occasioned by the morbid condition of the mesenteric glands, through which the chyle cannot pass, in order to enter the thoracic duct, and thence to be poured into the blood-vessels.

3. *Atrophia*, derived from the primitive particle *a*, and *trophi*, *nutrio*, implying *defect of nourishment*, has been adopted to denote the simple emaciation and loss of strength, which is not accompanied with hectic fever, nor originates from any organic disease ; but depends altogether on the priva-

tion, corruption, or abstraction, of that which would otherwise support the strength of the body. It is defined, “ emaciation, without fever.” Hence atrophia occurs in those who have suffered great evacuations, as from salivation, hæmorrhage, sweat, leucorrhæa, &c. : in those from whom nutriment is abstracted in undue proportion to their strength and digestive powers, as in nurses suckling stout children, or continuing them at the breast too long ; and in those whose nutriment is corrupted, as the salt provisions, which excite fevers.

For a view of the nature and requisite treatment of the different kinds of consumption, see the following articles : *TABES Mesenterica* (or Mesenteric Consumption), and *ATROPHY*. *Savage's Nosol. Method.* Class x. ord. 1. *Cullen's Synopsis Nosol.* Class i. ord. 4. and Class iii. ord. 1.

CONSUMPTION, *Pulmonary*, the *phthisis pulmonalis* of medical writers, from *phthis*, *corruptio*, *consumo*, a distressing and very fatal disease, distinguished by the occurrence of a frequent cough, with expectoration of puriform matter, hectic fever, emaciation, and debility ; to which, in the latter stages, colligative sweats, often alternating with diarrhoea, supervene.

In this disease the number, degree, and progress, of the symptoms are extremely various, in different cases. It usually commences in an insidious manner, with a slight and short cough, which is often little remarked by those affected with it, but soon becomes habitual ; or with an occasional cough, which is more severe. At the same time, the breathing becomes easily hurried by any bodily motion, the patient grows leaner, and becomes languid and indolent. In this state he sometimes continues for a year, or even for two years, without making any complaint, excepting that he is affected by cold more readily than usual, which frequently increases his cough, and produces catarrh. This, however, is sometimes relieved, is supposed to have arisen from cold alone, and therefore gives no alarm either to the patient or to his friends, nor leads them to take any precaution. But upon some occasion of catching cold, as we commonly speak, the cough becomes more considerable ; is particularly troublesome, when the patient lies down at night, and in this state continues longer than is usual in the case of a simple catarrh. This may more particularly attract attention, if the increase and continuance of cough occur during the summer season.

The cough, in many instances, continues for a long time dry, or without any expectoration ; frequently, however, it is accompanied, from the first, with an expectoration of a blackish or bluish mucus, or of tough phlegm ; the expectoration being generally most considerable in the morning, in consequence of the accumulation of the matter during sleep. This matter becomes by degrees more copious, more viscid, and more opaque ; at length of a yellow or greenish colour, and of a purulent appearance, sometimes streaked with blood. As these changes take place, and the cough increases, the breathing at the same time becomes more difficult, and the emaciation and weakness go on also increasing. In the female, as the disease advances, and sometimes early in its progress, the menses cease to flow ; and this circumstance, although doubtless an effect, the sex themselves are generally disposed to believe to be the sole or principal cause of the disease. During this progress some pain is commonly felt in the thorax, at first under the sternum, especially, or almost solely, on the occasion of coughing ; but very often there is a pain in one side, sometimes dull and oppressive, sometimes sharp and shooting, and such as to prevent the person from lying easy upon that side. Even
when

when no pain is felt, it generally happens that phthical persons cannot lie easily on one of their sides, the difficulty of breathing being increased, and the cough excited by the attempt.

These symptoms have seldom continued long, before the pulse becomes frequent, sometimes to a considerable degree, without much of the other symptoms of fever. As it proceeds, the skin becomes dry and hot, especially the palms of the hands and soles of the feet; a circumscribed flush appears on the cheeks; transient chills are often felt by the patient, or he is exceedingly sensible to cold; and commonly a regular morning and evening febrile paroxysm takes place, the evening exacerbation being always the most considerable, and terminating in sweats during the night.

The mind is generally little or not at all impaired during the progress of pulmonary consumption; sometimes it is even more acute than in the previous state of health; and the patient is generally confident of recovery, and his spirits buoyed up by hope to the last extremity. But the gradual loss of flesh and strength, the sharpness of the features, the pearly whiteness of the eyes, the incrustation of the nails, and sometimes the loss of the hair, but too evidently mark the decay of the bodily functions. At length a colliquative diarrhoea, sometimes occurring together, but most commonly alternating, with the night sweats, contributes still farther to reduce the patient's strength; and death is frequently preceded by oedema of the feet and legs, and aphthæ in the mouth and throat, and occasionally by delirium.

Great numbers of people are repeatedly exposed with impunity to the circumstances which excite consumption of the lungs; it is only on a constitution of a peculiar nature, predisposed to the disease, that these exciting causes operate. This predisposition is frequently hereditary, descending from parents whom the disease had attacked, or who had, at some period of their lives, been affected with some form of scrofula. It is marked by a peculiar instability and weakness of the vascular system, more especially of the lungs; inasmuch as the person is subject to frequent catarrh, and spitting of blood. It is also distinguished by external peculiarities of form and appearance. Persons possessing what has been denominated the sanguine temperament, namely, having fine skin, with large veins, soft hair, light eyes, a florid complexion, tall and thin person, long slender neck, narrow chest, and projecting shoulders, may be considered as having the phthical predisposition: and those of the sanguine-melancholic temperament, combining with the fine skin and complexion, and slender form of the former, the dark hair and eyes, and dilated pupils of the melancholic temperament. This combination constitutes in general a temperament of peculiar beauty; but in the eyes of the medical physiognomist, a sense of its delicacy is not the least impression which it excites. Phthisis sometimes occurs also in persons who may be said to possess a sanguineo-phlegmatic temperament, *i. e.* who have the slender form and delicate constitution, with an habitually pale complexion, and without the disposition to acute inflammation, which belongs to the sanguine: it occurs occasionally too in temperaments almost entirely melancholic. See TEMPERAMENT.

In those who have a constitutional predisposition to the phthical state of the lungs, the disease is excited by various causes of irritation in those organs. Thus it is frequently induced by common inflammation of the lungs, or their membranes, by pleurisy, peripneumony, catarrh, whooping-cough, asthma, and the cough connected with measles; by frequent over-exertion of the lungs in speaking, singing, or blowing musical instruments; by inspiring certain kinds of dust or vapour; by hæmoptysis, or spitting of blood; by

sudden variations of the atmospheric temperature; by compressing the chest by tight bandages, &c. Of some of these causes we shall speak more particularly.

A great majority of the cases of pulmonary consumption is referred, by the sufferers, to a common cold or catarrh, as their origin; the expectoration of mucus, which belongs to catarrh, being gradually changed to an expectoration of pus, and a hectic fever supervening. But Dr. Cullen thinks that this supposition is not easily to be admitted; inasmuch as catarrh is properly an affection of the mucous glands of the trachea and bronchiae, analogous to coryza, and less violent kinds of sore-throat, which very seldom terminate in suppuration. He is of opinion, that the apparent catarrh, in such instances, was in fact the beginning of phthisis, for which it may have been mistaken, as the resemblance between the two is so great as commonly to preclude the means of discrimination. This difficulty, however, he admits, presses upon the necessity of paying minute attention to every catarrhal cough, especially in those who bear marks of the temperament which is predisposed to consumption. This observation has been inculcated, indeed, from ancient times. "Quod si mali plus est," says Celsus, "et vera phthisis est, inter initia protinus occurrere necessarium est; neque enim facile hic morbus, cum inveteraverit, vincitur." lib. iii. cap. 22. The attention of friends and parents cannot, indeed, be too strongly urged upon this point; to neglect the slightest catarrhal affection, which continues longer than the usual short period of a few days, is to neglect the only period of suppressing a disease, which almost invariably tends to fatality.

Hæmoptysis, or spitting of blood, is enumerated among the causes of consumption, and certainly very frequently precedes it. But this occurrence may, perhaps, be considered still more than catarrhal symptoms, as a sign of the commencement, and not a cause, of the disease; more especially when it occurs independently of external violence. Numerous instances of hæmoptysis have occurred, from blows and wounds, in which ulceration did not ensue, or at least was of short duration, and did not materially injure the constitution. But when it comes on without any obvious external cause, and especially in persons of one or other of the temperaments already described, ulceration, expectoration of pus, and all the distressing symptoms of phthisis are generally to be apprehended. In such cases, there is either a peculiar tenderness of the vascular system in the lungs; or, what is perhaps more generally the fact, an incipient obstruction, as tubercles, which render the small vessels liable to give way, when the circulation through them is increased by any exertion, or receives an irregular impetus from the action of coughing, occasioned by cold. In this way catarrh may lay the foundation of phthisis. Spitting of blood, however, if not among the first symptoms, very frequently occurs in the course of the disease, especially in the stage of purulent expectoration.

When inflammation of the lungs terminates in extensive suppuration, producing one or more collections of purulent matter, termed *vomice*, the great irritation often produces hectic fever, which, together with the expectoration of pus, continues after the vomice burst, and the patient is cut off with the ordinary train of symptoms belonging to phthisis.

Persons who are occupied in various employments, by which the air they breathe is contaminated with various substances, in the form of a fine powder, are peculiarly liable to be seized with phthisis. Thus hair-dressers, bakers, masons, bricklayers'-labourers, laboratory-men, coal-heavers, and chimney-sweepers, are frequently subject to the most obstinate pulmonary diseases; as are also, in an equal degree, the

dressers of flax and feathers, and the workmen in the warehouses of leather-fellers. Many persons, thus engaged, struggle a long time with a constant, hard, troublesome cough, which at length terminates in consumption. See Willan on Diseases in London, p. 301.

The exanthematous diseases, such as small-pox and measles, the latter of which, more particularly, often lays the foundation of consumption, seem to operate by occasioning some morbid change in the constitution, which may be considered rather as a predisposition than an actual state of disease. Dr. Cullen attributes this change to an acrimony left in the fluids by these exanthemata, which he believes to be the same with the acrimony which prevails in scrofula. But if we would avoid hypothetical language, all that can be said is, simply, that a predisposition to phthisis and to scrofula is occasioned by these diseases. The measles, indeed, may not only induce the predisposition, but, by the irritating cough which it leaves behind, may actually occasion a consumption of the lungs.

The venereal disease, or the irritation of the mercurial medicines necessary for its cure, or both combined, appear also to excite a predisposition, and lay the foundation of consumption.

Dr. Cullen has enumerated, among the exciting causes of phthisis pulmonalis, and as the most frequent of them all, tubercles in the lungs. In the majority of cases these undoubtedly exit; but we must consider them as constituting the essential part of the disease itself, and, if not originally induced by some of the causes above enumerated, excited into a state of activity by some one of them, perhaps most frequently by the common catarrh. Of the pulmonary tubercles, the best morbid anatomist of the times gives the following account.

There is no morbid appearance, he says, so common in the lungs as that of tubercles. These consist of rounded, firm, white bodies, interspersed through their substance. They are, I believe, formed in the cellular structure, which connects the air-cells of the lungs together, and are not a morbid affection of glands, as has been frequently imagined. There is no glandular structure in the cellular connecting membrane of the lungs; and on the inside of the branches of the trachea, where there are follicles, tubercles have never been seen. They are at first very small, being not larger than the heads of very small pins; and in this case are frequently accumulated in very small clusters. The smaller tubercles of a cluster probably grow together, and form one larger tubercle. The most ordinary size of tubercles is about that of a garden pea; but they are subject in this respect to much variety. They adhere pretty closely to the substance of the lungs, and have no peculiar covering or capsule, and have little or no vascularity. When cut into, they are found to consist of a white smooth substance, having great firmness, and often contain in part a thick curdy pus. But when the pus is in considerable quantity, it is thinner, and resembles very much the pus from a common sore. In cutting into the substance of the lungs, a number of abscesses is sometimes found, from pretty large tubercles having advanced to a state of suppuration. In the interstices between these tubercles, the lungs are frequently of a harder, firmer texture, with the cells in a great measure obliterated. The texture of the lungs on many occasions, however, round the boundaries of an abscess, is perfectly natural.

I have sometimes, Dr. Baillie continues, seen a number of small abscesses interspersed through the lungs, each of which was not larger than a pea. The pus in these is rather thicker than what arises from common inflammation, and resembles serofulous pus. It is probable that these abscesses have been

produced by a number of small scattered tubercles taking on the process of suppuration. The lungs immediately surrounding these abscesses are often of a perfectly healthy structure, none of the cells being closed up by adhesions. See Baillie's Morbid Anatomy, p. 66, *et seq.*

This accurate delineation of the condition of the lungs in the last stage of consumption, sufficiently evinces the impossibility of a cure by medicine, and may contribute farther to enforce an attention to its earliest symptoms.

It must not be omitted, however, that although the slightest symptoms of catarrh often prove the commencement of a fatal phthisis; on the other hand, catarrh does occasionally put on the appearance of phthisis, yet terminate well. Dr. Willan observes, in his "Reports on the Diseases in London," "many persons who had catarrhal coughs in March, were farther affected with spitting of blood, thick, viscid expectoration, pains within the chest, hectic fever, and diarrhoea, interchanging with night sweats, but recovered notwithstanding in the month of April." He concludes "that ulcerations in the lungs had not been produced, and that the expectorated fluid, so alarming in its appearance, was perhaps only composed of a puriform secretion, and an increased discharge of mucus, circumstances usual under other membranous inflammation." Reports, p. 4 and 147. But it must be added, that dissection has shewn, that even this condition of lungs has proved fatal, with the usual symptoms of phthisis.

To aid in distinguishing whether the matter expectorated be pus, or mucus only, several tests have been proposed; which, taken together, may afford us the means of an accurate conclusion. 1. The colour; mucus being naturally transparent, and pus always opaque. When mucus becomes opaque, as it sometimes does, it becomes white, yellow, or greenish; but the last mentioned colour is hardly ever so remarkable in mucus as in pus. 2. The consistence; mucus is more viscid and coherent, so as not readily to be diffused in water; pus is more readily friable, being broken into ragged fragments by a little agitation in water. 3. The smell; no odour is in general perceived in mucus, but frequently in pus. 4. The specific gravity; it being usual for the mucus of the lungs to swim on the surface of water, and for pus to sink in it; but in this we may be deceived, as pus which has entangled a great deal of air may swim, and mucus that is free from air may sink. 5. The mixture which is discernible in the matter brought up; for if a yellow or greenish matter appears surrounded with a quantity of transparent or less opaque and less coloured matter, the more strongly coloured may be generally considered as pus. 6. Chemical tests. Mr. Charles Darwin's experiments shewed that the vitriolic acid dissolves both mucus and pus, but most readily the former; that if water be added to such a solution of mucus, this is separated, and either swims on the surface, or, divided into flocculi, is suspended in the liquor; whereas, when water is added to a like solution of pus, this falls to the bottom, or by agitation is diffused so as to exhibit an uniformly turbid liquor. Again he shewed, that a solution of caustic potash, after some time, dissolves mucus, and generally pus; and if water be added to such solutions, the pus is precipitated, but the mucus not.

With respect to the *prognosis* in consumption, its tendency in general must be considered as extremely bad. In constitutions, where all the delicacy of the temperaments before described is observed, and more especially if an hereditary predisposition can be traced, the most trivial symptoms are alarming. The particular degree of danger must be estimated from these circumstances, from the mode in which the disease commenced, from its duration, and the slowness

CONSUMPTION.

or rapidity of its progress, the number and degree of the symptoms present, and the effects which medicine has already produced. The following aphorisms, the result of Dr. Cullen's observation, are worthy of attention.

"A phthisis pulmonalis, from hæmoptysis, is more frequently recovered from, than one from tubercles.

"A phthisis from a suppuration, in consequence of pneumonic inflammation, is that which most rarely occurs in this climate; and a phthisis does not always follow such suppuration, when the abscess formed soon breaks, and discharges a laudable pus: but, if the abscess continue long shut up, and, till after a considerable degree of hætic has been formed, a phthisis is then produced, equally dangerous as that from other causes.

"A phthisis from tubercles has, I think, been recovered: but it is, of all others, the most dangerous; and, when arising from a hereditary taint, is almost certainly fatal.

"The danger of a phthisis, from whatever cause it may have arisen, is most certainly to be judged of by the degree to which the hætic and its consequences have arrived. From a certain degree of emaciation, debility, profuse sweating, and diarrhœa, no person recovers.

"A mania coming on, has been found to remove all the symptoms, and sometimes has entirely cured the disease; but, in other cases, upon the going off of the mania, the phthisis has recurred, and proved fatal.

"The pregnancy of women has often retarded the progress of a phthisis, but commonly it is only till after delivery, when the symptoms of phthisis return with violence, and soon prove fatal." First Lines, parag. 898.

Treatment. It will readily appear, from what has been said above, that the cure of pulmonary consumption must be exceedingly difficult; in the latter stages, perhaps impossible. Many instances, however, have occurred, where the attention of the patient to the incipient symptoms, and his early adoption and steady pursuit of proper measures, have averted the fatality of the disease. When it is deeply rooted, alleviation of the sufferings is all that can be hoped for.

The treatment of a beginning consumption will depend much upon the peculiar constitution of the patient, as well as on the nature of its origin, and of the symptoms which it exhibits; but most particularly upon the prevalence of an inflammatory disposition, or of a general debility of the habit; these opposite states being both accompanied by great irritability; and the principal indications will be to diminish the inflammatory action and irritability; and in the latter state, just mentioned, to avoid debilitating measures, and to support the strength as much as is consistent with the inflammatory irritation that may exist.

Where there is considerable strength, and a complexion still florid, if there is much pain in the chest, or if the pulse be quick and sharp, perhaps small bleedings from the arm may be resorted to, and occasionally repeated; or blood may be drawn from the chest, near the seat of the pain, by means of leeches or cupping. But this discharge should be always effected after a cautious examination of the circumstances; for the debility which is apt but too speedily to ensue, may be thus accelerated, and, with it, the worst symptoms of the disease. It is now well understood, that the appearance of the buffy coat on the blood drawn, is by no means alone an evidence of the necessity of drawing more; for it will appear in phthisis, nearly as long as the arteries have power to propel it. The old doctrines respecting the buffy coat, have doubtless led to much practical error; but no one now considers pregnancy a disease which requires constant blood-letting; or uses the lancet, in the hot stage of an intermittent

fever, although under both these circumstances, the buffy coat is constantly found. In consumption occurring, as it most commonly does, in delicate habits, the practice of repeated venesection decidedly accelerates the fatal course of the disease. Blisters, on different parts of the chest, will better answer the purpose of relieving a local inflammatory disposition. Issues and setons have a similar effect, but the constant discharge tends to debilitate, and the irritation to counteract, in some measure, the good effects of the evacuation.

During the use of blisters, or other local discharge, the internal use of medicines, which have been denominated refrigerant, may be also resorted to with some advantage; such are acids, especially the vegetable, and certain neutral salts, as crystals of tartar, nitre, &c. The last named salt has been strongly recommended by Dr. Dickson, (see Med. Obs. and Inquiries, vol. iv. p. 208.) especially where there is hæmoptysis, administered in small doses frequently; "when given early in an hæmoptœe," he says, "I can almost equally depend upon it, as upon the cortex peruvianus in a genuine intermittent." But general experience does not warrant this encomium to its extent. We believe the digitalis to be the most efficacious medicine, in repressing that inflammatory action of the arterial system at large, and of the pulmonary arteries in particular, which commonly goes on at the commencement of phthisis, whether accompanied by spitting of blood or not. The latter it commonly suppresses, and we have frequently seen a febrile irritation, bordering on hætic, attended with a sharp and quick pulse, a dry ringing cough, and commencing emaciation, speedily subside under its administration. The digitalis may be given in combination with the acids, or with nitre, in a mucilaginous liquid. The cerussa acetata, or acetite of lead, was formerly employed in considerable doses, especially by the continental physicians, with the view of counteracting inflammatory action, and of suppressing hæmoptysis. The medicine, it would appear, is possessed of some efficacy; but the danger of inducing paralysis, and colica pictonum, and other effects, which result from the poison of lead, is sufficient to deter us from its use. Where the inflammatory action is high, we should be cautious in employing opiates, with a view to allay the cough; as, in such cases, opium in any form proves too stimulating; but where there is languor and debility, and less of the sanguine temperament, and the cough extremely harassing, opiates may be employed with benefit; they will save the strength of the patient, by appeasing the incessant irritation of coughing, which tends to wear him down, and deprive him of sleep.

Medicine, however, will not alone secure the patient from the deleterious progress of the disease. He will be required to pay strict attention to his diet, and to every external circumstance that can influence the functions of the body. His meat and drink, his cloathing, his exercise, his sleep, and even his amusements, must be regulated with a rigid correctness, so that the whole may combine, with medicine, to accomplish the same object, that of ridding the constitution of a disease of fatal tendency, and restoring it to its healthy condition. Diet, regimen, and medicine, must become, as it were, the business of the patient. He must regulate his life chiefly upon this principle; that every thing which can heat or irritate the body, or excite any increased or irregular action of the arterial system, must be shunned; and every measure which can support the constitution, without infringing on the last-mentioned precept, zealously adopted.

The diet of the consumptive, in the early stage, of which we now speak, should be light and nourishing, and such as is found to be adapted to his digestive powers. Animal food should

should be avoided; and vegetable matters, in the various forms of preparation, with the ripe saccharine and sub-acid fruits, and milk, be read the exclusive nourishment of the patient. Milk is particularly feasible, as being very nutritious, and easily digestible, without stimulating the system, and should be considered as the basis of the patient's diet. In some habits, however, where the digestive powers are feeble, or where there is a peculiar idiosyncrasy, cow's milk is not readily digested; a load at the stomach, or acidity, or head-ach, ensue after it is taken. In such cases, the whey which is produced by separating the cheesy part, or the butter-milk which is left after the separation of the oily part, or butter, may be substituted with advantage. Or the patient may have recourse to the lighter milk of the goat or the ass, which contains a smaller proportion of those heavy parts. The acidity which milk occasions in the stomach of some people, may be occasionally corrected by the admixture of lime-water. Some of the amygdaceous preparations from vegetables, may be used in conformity with this plan, such as the arrow-root, tapioca, &c.; and it is scarcely necessary to add, that with these, as with all other food, wine, spirits, and fermented liquors, must be most studiously avoided. A mucilaginous vegetable has lately been introduced, which, in feeble habits, seems calculated to assist this plan; namely, the lichen islandicus, which may be taken boiled in milk, and which, with its nutritive qualities, combines a very mild tonic power, which somewhat aids the digestion.

While every thing is done, by means of medicine and diet, to repress inflammatory action, while we moderately support the strength, another measure, still more efficacious, should be adopted, by those who have the power; they should remove to meet the winter in a warm and more equal climate. Cold, but especially sudden vicissitudes of cold and heat, appear to be the most inimical circumstances to a beginning consumption; and there are many living testimonies of the benefits which have been derived from an early visit to a more genial atmosphere. Portugal, the south of France, and Italy, have been resorted to, as well as the more regular and moderate climates of Madeira and St. Helena. Where these countries cannot be visited, some parts of our own island may be tried, as being milder than the rest; as Devonshire, and the neighbourhood of Bristol; which latter place possesses the additional advantage of a wholesome tepid water. Instances of the inefficacy of all these places, are, indeed, but too numerous; but much of this is to be attributed to the patients themselves. They persist in waiting the result of time, or of the less efficacious means of relief, until relief is altogether beyond their reach. "It seems too often to be the fate of consumptive patients," says Dr. Fothergill, "to do that last which they ought to have done first; and, by this profligate conduct, shorten their own lives, and afflict all who have any regard for them." (Med. Obs. and Inq. vol. v. p. 369.) The same intelligent physician affirms, that the Bristol water is, in his opinion, an efficacious medicine, and that he has "often found it of signal benefit to consumptive patients;" but "it is before the approaches to a confirmed phthisis that patients ought to repair to Bristol; otherwise, a journey thither will be, not only without benefit, but will be probably detrimental." Ibid. Those who have visited the pump-room at the hot-wells, must have seen, with pity, the hopeless condition of the poor creatures who are dragged thither, to their personal detriment, and the discredit of an useful medicine.

Exercise, by various modes of gestation, has been frequently employed as a remedy for consumption. Sydenham,

indeed, asserted, that riding on horseback is as effectual in the cure of phthisis pulmonalis, as the bark in agues, or mercury in the venereal disease, provided the journeys be long enough. An example is related in Dr. Darwin's "Zoonomia," vol. ii. (the case of the late ingenious Dr. Currie of Liverpool) in which an hereditary phthisis was removed, by persevering in a daily journey; at first in an easy carriage, and subsequently, as the strength increased, alternately in the carriage and on horseback. Some physicians, however, are of opinion, that exercise on horseback is rather pernicious, than otherwise, in phthisis. (See Dr. Dickson's paper, before quoted.) *Sailing* seems to be considered at present as the most efficacious mode of gestation, especially if a long voyage is taken, which is a double recommendation of the removal to a warmer climate. As a sort of substitute for this kind of gentle motion, *swimming* has been recommended as a remedy for phthisis, and Dr. Carmichael Smith has written a treatise in its favour. In the use of any, or all these modes of gentle exercise, however, the same precept must be pursued; they must be resorted to *early* in the disease.

If the plan, now detailed, has not been adopted in such time and mode, as to have checked the disease; if it has, therefore, advanced to the confirmed state, with purulent expectoration, hectic fever, and profuse night sweats; the principal object of medicine becomes merely palliative, and confined to the alleviation of urgent symptoms. If the cough is exceedingly urgent, opiates may be administered more liberally than in the early stage. At this period, some of the more stimulating expectorants are employed by some practitioners, with a view to facilitate the discharge of the matter which loads the lungs; such as the oxymel, or other preparation of squills, the various balsams, and some of the gum-resins. But the experience of the most observing physicians has decided against the utility of these heating drugs. (See Dr. Fothergill, loc. cit. Dr. Cullen, loc. cit.) There may be occasional circumstances in particular constitutions, where the objections may not exist, as in a cold phlegmatic habit, or where there is considerable debility of circulation, with little inflammatory tendency; but these are not common. The colligative sweats and diarrhoea frequently alternate with each other, and medicines which relieve the one, are liable to increase the other. The diluted sulphuric acid has a considerable influence over the night sweats, and opium is an efficacious medicine against the colligative diarrhoea. But the opium seems to favour the occurrence of the perspirations, and the acid tends to excite the action of the bowels. These medicines, therefore, must be combined, or used singly and alternately, according to the circumstances of the case. Opium may be also given by way of enema, when the diarrhoea is obstinate.

Some practitioners, presuming that the hectic fever, and the whole series of phthisical symptoms, were dependent on debility alone, have recommended the use of tonic medicines, and a generous diet, in the state of confirmed phthisis; and several cases are on record, in which this plan appears to have been attended with success. (See Dr. May's Papers, Lond. Med. Journ. vol. ix. and xi.) But we have already observed, supported by the authority of Dr. Willan, that catarrhal affections occasionally put on the symptoms of phthisis, and recover under the ordinary means. There are also cases of this sort, in which there is, we believe, no ulceration, but only a purulent secretion from the membranes, which nevertheless terminate fatally, with the worst symptoms of phthisis; and perhaps it is in such cases, that a tonic treatment is actually successful. But we have

no means of distinguishing these cases from the more general instances, in which abundant experience has taught us, that all stimulating or corroborant medicines and food tend to augment the cough and expectoration, to increase the hectic fever, and therefore to accelerate the destruction of the constitution, even in the last stages.

Emetics, repeated daily, have also been recommended, as a remedy for phthisis. They afford, we believe, a temporary relief to the respiration and cough, but nothing more. On the contrary, the continued repetition of such an irritation, and such a derangement of the natural action of the stomach, necessarily tends to debilitate and impair the functions of this viscus, and to weaken the constitution at large.

Before we conclude, we cannot omit mentioning an illusion, which was fostered in the minds of some enthusiastic physicians, after the discovery of the composition of atmospheric air by the chemists. It was found that oxygen was the great stimulus of life, and the source of the salutary change of the blood, which is marked by its florid colour. From the general florid colour of the blood of the phthisical, it was supposed that consumption was occasioned by a general hyper-oxygenation of the system; and hence, by an easy inference, the breathing of an air, in which the proportion of oxygen was diminished, by the addition of some azotic air, such as carbonic acid gas, or carbonated hydrogen, was suggested as a probable remedy for consumption. Cases were even published, illustrative of the extraordinary efficacy of this new medicine. But the light of experience has opened the eyes of the visionary, and the phantom has disappeared. It has even been shewn by the experiments of the French chemists, that the absorption of oxygen, or, at least, its disappearance in the lungs, is influenced principally by the state of the body, and not by the proportion existing in the air which is inspired.

CONSUMPTION, *mesenteric.* See **TABES mesenterica.**

CONSUMPTION, in *Barriery*, is also a disease incident to horses, consisting in waste of muscular flesh, attended with a slow fever. In this disorder bleeding in small quantities is recommended: mercurial purges, and a powder of native cinnabar, gum guaiacum and nitre, of each one pound, in the quantity of an ounce twice a day; spring grass, and salt marshes, are also of great service, when there is any prospect of a recovery. See **CONDITION.**

CONSUS. See **CONSUALIA.**

CONTA, in *Geography*, a river of Italy in Genoa, which runs into the sea near Albenga.

CONTACT, (from the Latin *contactus*;) means the meeting, or mutual touching of two things. The word is universally used in the common affairs of life, as well as in scientific subjects.

In geometry a line is said to touch another line, or a surface, or a solid; and a plane figure, or surface, is said to touch another surface or a solid, when the former meets the latter; but, being produced, does not cut it. Thus amongst the definitions of the third book of Euclid's "Elements of Geometry," a right line is said to touch a circle, when meeting with the same, and being produced, it does not cut it. Also two circles are said to be in mutual contact when they meet, but do not cut each other. Thus the mathematical meaning of the word contact is clear and definite, nor can any doubt arise in the speculative mind concerning the nature of it; the abstract ideas of a line, of a surface, or of a solid, being perfect and independent on any physical qualities of a doubtful or uncertain nature.

The contact of two spheric bodies is only in one point; and the same holds of a tangent and the circumference of a

circle. See **TANGENT.** Hence, because very few surfaces are capable of touching in all points, and the cohesion of bodies is in proportion to their contacts; those bodies will stick fastest together, which are capable of the greatest contact. The contact of curve lines or surfaces, with either straight or curved ones, is only in points; and yet these points have different proportions to one another, as Mr. Robartes has shewn in the *Philos. Trans.* vol. xxvii. p. 470, or *Abr.* vol. iv. p. 1.

In mechanics and in philosophy the contact between two bodies is said to take place, when one body, being brought near another body, cannot be approached nearer to it without, in some measure, affecting its state, be it of motion or of rest. Thus a stone, being gradually moved towards another stone, is said to come in contact with it, when its progress is either absolutely, or partially, obstructed by that other stone. Or, if they be both at rest, and contiguous to each other, they are said to be in contact, when one stone cannot be moved towards the other, without either urging the other forward, or being stopped by it, or lastly without making an impression upon its surface. The same thing must be understood of the contact between any two other bodies. But the great question in philosophy is, to determine whether the bodies which thus hinder, or affect, each other's state of rest or motion, do actually come in contact with each other's surface in the strict mathematical sense, or they exert that hindrance, opposition, resistance, &c. in virtue of a repulsive power, which acts at a certain indefinite small distance from their surfaces. This question seems, at first sight, to be easily determined; but, when duly considered, it will be found to involve certain properties of matter in general, and certain effects, which, in the present state of knowledge, are far from being thoroughly understood, or sufficiently examined.—The reasons which suggested the above-mentioned doubts, concerning the contact of bodies, and the answers which may be offered in elucidation of the subject, being fully deserving of notice, we shall now endeavour to state them in a regular and compendious manner.

Sir I. Newton, having placed a glass lens of a figure slightly convex, upon the flat surface of another glass, and having pressed the one against the other, observed certain coloured rings formed between the two glasses, and concentric with the point of contact in the middle of the glasses, which point was marked by a colourless dark spot. He farther observed, that those rings of prismatic colours, and the dark central spot, became larger when the glasses were pressed harder against each other, and became diminished in size when the pressure was diminished.—From the known figure of the glasses employed in this experiment, it is evident that a certain space or a film of air must remain between their contiguous surfaces; that this space, or film of air, became thinner when the glasses were pressed hard against each other, and *vice versa*; lastly, that at the centre, where the glasses may be presumed to have been in real contact, the want of space, or of air, rendered that spot colourless. In this experiment it is supposed, that the colours are owing to the space or film of air between the glasses; hence the central spot exhibits no such colours; and therefore, that when any prismatic colours appear between the contiguous surfaces of two glasses, their contact cannot be perfect. Nearly the same thing is observed when two flat pieces of glass are pressed against each other; prismatic colours being likewise seen between them, though not in rings, but in rows, which assume various directions, according as the pressure may happen to alter the surfaces of the glasses. And these colours cannot be made to disappear without the application

of an enormous degree of pressure; hence it is inferred, that, though of two bodies one may support the other, or push it forward, yet their contact may not be perfect. Professor Robison reckons the force with which two pieces of glass must be pressed against each other, in order to produce a perfect contact, as equivalent to the pressure of 1000 pounds for every square inch of surface; so that if two pieces of glass strike against each other, without exerting a pressure equal to 1000 pounds per square inch of surface, they may affect each other's motion, and yet not come actually in contact. In consequence of the above facts and observations it is supposed, that a repulsive power exists on the surfaces of bodies, and that this power is extended to a very small and inappreciable distance beyond the surface.

Another argument to prove the existence of the above-mentioned resisting power on the surfaces of bodies, is derived from the phenomena exhibited in an electrical experiment.—When an electric jar is discharged through a metallic chain in a darkened room, sparks of electric light are visible between the contiguous surfaces of the links. Dr. Priestley, considering this effect as arising from the want of perfect contact between the links, endeavoured to render it perfect by stretching the chain, until on making the discharge no such sparks should be seen. This he accomplished by making one end of the chain fast on a firm body, and appending weights to the other end. Thus proceeding, he found that a very considerable weight was necessary to be applied, before the sparks could be made to disappear between the links, when the jar was discharged through the chain. This induced Dr. Priestley to conclude, that the links of the chain could not be brought into actual contact without the application of a great force; since the electric sparks are visible only when the electric fluid in passing through a body or a series of contiguous bodies, meets with some obstruction, or interruption of continuity.

Besides the existence of the above-mentioned resisting or repulsive power on the surfaces of such gross bodies as come under the cognizance of our senses; it is farther supposed, that each component particle of such bodies is indued with the same repulsive power; in consequence of which they are not actually in contact with each other, though they form the same firm and impenetrable compound. And the existence of this power has been inferred from the phenomena of contraction and expansion. "Whatever opinion," says Dr. Young, "we may entertain, with respect to the ultimate impenetrability of matter in this sense, it is probable that the particles of matter are absolutely impenetrable to each other. This impenetrability is not however commonly called into effect, in cases of apparent contact. If the particles of matter constituting water, and steam, or any other gas, are of the same nature, those of the gas cannot be in perfect contact; and when water is contracted by the effect of cold, or when two fluids have their joint bulk diminished by mixture, as in the case of alcohol, or sulphuric acid, and water, the particles cannot have been in absolute contact before, although they would have resisted with great force any attempt to compress them. Metals too, of all kinds, which have been melted, become permanently more dense when they are hammered and laminated."

Whoever wishes to form a proper estimate of the merits of the above-mentioned arguments, and of the validity of the proposition which they are intended to establish, must necessarily take into the account all the other properties of matter, which have been discovered and confirmed by repeated and universal experience; for, should it appear impracticable to reconcile the former with the latter, then such other explanation of the phenomena ought to be substituted

as may be attended with less contradiction and greater simplicity.—That there is a mutual and universal attraction amongst all the particles of matter, is now no longer to be doubted; that this attraction is extended to all distances under certain determinate laws, has been sufficiently established by strict mathematical reasoning upon the grandest phenomena of the world; that the surfaces of several bodies, like those of polished glass or metallic bodies, when placed contiguous to each other, manifest a considerable degree of attraction, is well known; and, lastly, that the component parts of solids cannot be separated without a considerable force, is shown by daily and common experience. Yet, notwithstanding all these evidences of attraction between the bodies of the universe at all distances, we are told that a considerable repulsive power exists on the surfaces of bodies, and even that every individual particle of matter is endowed with a similar power; so that in the hardest bodies, such as a diamond, a flint, a piece of metal, &c. which cannot be divided without an immense force, the component particles are not actually in contact with each other. But let us endeavour to explain the phenomena, upon which the above theory is established, in a simpler and more satisfactory manner.

In the experiments with the glasses, it is said that their actual contact is prevented by a power of repulsion on their surfaces, which cannot be overcome without a very extraordinary pressure. Would it not be more natural to suppose, that the contact cannot be easily effected on account of the inequalities of the surfaces, and of the hardness of glass? The surfaces of the plates may be said to be slightly convex or perfectly flat, and such may appear to be for common purposes. But if a person examines how those surfaces are formed and polished; if he considers the alterations of figure which are unavoidably occasioned by the partial dilatations or contractions arising from heat and cold, also from the interposition of the least particle of dust, or even of the air itself; he will be easily persuaded, that those surfaces are by no means really flat or uniformly convex in the strict meaning of those words. It is true that the action of those causes, viz. the inequalities that are produced by them, are exceedingly small; but it is of small effects that we are speaking. Upon the whole, therefore, it seems, that when the flat and convex glasses in the Newtonian experiment, or the two flat glasses, are placed the one upon the other, they do actually touch each other, but in a few points only, viz. with their more prominent parts, and that the other more depressed parts of their surfaces cannot come into actual contact, unless the former are depressed to the level of the latter, by the application of an external force; so that the application of this force is not required by the existence of a repulsive power, but by the necessity of depressing the more elevated parts, in order that the lower or hollow parts may come sufficiently near to each other. This idea seems to derive additional confirmation from the degree of pressure which must be applied, &c. being, at least apparently, proportional to the hardness of the bodies employed. Thus, in glass, which has a great degree of hardness and rigidity, a considerable pressure must be applied for the purpose. Bring two pieces of cold wax close to each other, and the one will push the other forward without adhering to it, because in that state the contact can take place in a very few points only; but if those pieces of wax be softened by heat, it will be found, that one of them cannot be caused to push the other without adhering to it, because in that state their surfaces are easily adapted to each other, and instantly increase the number of points of contact.

The appearance of sparks between the links of a metallic chain, when an electric jar is discharged through it, may be explained

explained in a similar manner, without having recourse to a power of repulsion, &c. for, in consequence of their figure, and of the inequalities of surface, the links cannot touch each other in more than a very few points, through which the electric fluid must pass; and though in those points the contact be perfect, yet the electric fluid either melts them or renders them red-hot, and of course affords the appearance of luminous sparks, in the same manner, and for the same reason, which renders a very fine metallic wire red-hot, or fuses it, when an electric jar is discharged through it; namely, because it is not large enough to afford a free passage to the electric fluid. So that if in the slender wire, where there is no interruption of continuity, the passage of the electric power is rendered manifest to our eyes, it may be evidently presumed that the sparks may appear between the links of the chain, though those links may be in actual contact. That the light disappears when, by stretching the chain, the points of contact are multiplied, needs no farther explanation. But the circumstance which contributes to the production of the sparks, is the adhesion of dirt or dust, or the partial oxydation of the surface of the links; considering that chains for electrical purposes are generally made of brass or iron, which are very liable to a superficial oxydation.

With respect to the last argument, derived from the contraction and dilatation of bodies, we may observe, with professor Prevost, that the diminution of bulk does by no means prove that the component particles of bodies are not in immediate contact; for a person may easily conceive an infinite variety of arrangements or dispositions of the elementary particles, which will admit of contraction and dilatation, without the least interruption of contact. Those particles, for instance, may be disposed in the form of rings, which, by becoming more extended ovals, or more circular, will occasion an enlargement, or a contraction of the aggregate. The particles may be supposed to be arranged in rows, and these rows may be disposed at certain angles with each other; so that the bulk of the aggregate may become expanded or contracted according as those angles are enlarged or diminished; and so forth. That some such arrangement is not only probable, but does actually take place in most bodies (whence it may be inferred to take place in all bodies) is clearly indicated by the crystallization of several bodies; viz. a regular arrangement of their particles; as in zinc, bismuth, frozen water, salts, &c.

CONTACT, *angle of*, is the angle HLM (*Plate III. Geometry, fig. 51.*) formed by the arc of a circle ML, with the tangent HL, at the point of the contact.

Euclid demonstrates, that the right line HL, standing perpendicular on the radius CL, touches the circle only in one point: nor can there be any other right line drawn between the tangent and the circle.

Hence, the angle of contact is less than any rectilinear one; and the angle of the semicircle between the radius CL, and the arc ML, is greater than any rectilinear acute angle.

This seeming paradox of Euclid has exercised the wits of mathematicians: it was the subject of a long controversy between Peletarius and Clavius; the first of whom maintained the angle of contact heterogeneous to a rectilinear one; as a line is heterogeneous to a surface: the latter maintained the contrary.

Dr. Wallis has a formal treatise on the angle of contact, and of the semicircle; where with other great mathematicians, he approves of the opinion of Peletarius. See *ANGLE of Contact*.

CONTAGION, frequently used as synonymous with

infection, the matter or medium by which certain diseases are communicated from one individual to another.

Some writers confine the term *contagion*, in consequence of its derivation from *con* and *tango*, *I touch*, to the communication of those diseases, which can only be transferred by actual contact of the sick, or of the palpable matter from their bodies; and apply the word *infection* to the communication of those other diseases, which spread by means of invisible effluvia, conveyed through the air, or adhering to articles of clothes, &c., constituting what are called *foetites*. The distinction is not important, nor is it philosophically accurate; since there is an actual contact of a morbid matter, in all cases of infection, whether visible or not; and some diseases, as the small pox, are communicated both by palpable matter, and by imperceptible effluvia. Other writers have confined the two terms to more arbitrary significations. We are disposed with Dr. Wilson and others, to consider the word *contagion* as expressing the morbid poison, or the means of transferring a disease; and *infection*, as expressing the operation of the poison, or the act of communication of the disease. Treatise on Febrile Diseases, vol. i. p. 433.

No mention is made of contagion in the writings of Hippocrates, and it is hence maintained by some authors, that the ancients were altogether ignorant of its existence. It cannot be doubted, indeed, that many of the most formidable diseases, which are propagated by contagion, in modern times, were altogether unknown to the ancients: such are the small-pox, measles, and scarlet fever, among the acute; and the venereal disease, among the chronic contagions. Of the existence of contagion, therefore, the evidence which they possessed was comparatively small. From the number of the laws in the Mosaic code, however, forbidding all communication with persons labouring under diseases, which were deemed unclean, and from the caution with which intercourse with foreign nations was precluded, it would appear that a general notion of that species of contagion, which infects by actual contact of bodies, prevailed among the Jewish people, at a very early period. (See Numbers, chap. xxxi.) And whatever might be the knowledge of profane writers on this point, they were certainly well acquainted with epidemic diseases. But this does not imply a knowledge of the existence of contagion, since even with the most confirmed proofs of the existence of febrile contagions before them, physicians have generally disputed, in the worst modern epidemics, whether contagion actually existed or not. Livy, however, in describing the progress of an endemic fever, expressly mentions that contact of the sick excited the disease. "Et primo temporis ac loci vitio, et ægri erant, et moriebantur; postea curatio ipsa et contactus agrorum vulgabat morbos." Lib. xxv. cap. 26. But, although it be admitted that the existence of contagion was occasionally noticed by ancient writers, and was by more modern authors yet more generally known, its nature and mode of propagation were very imperfectly understood, until the latter half of the eighteenth century; when the method of induction was applied to the investigation by some medical philosophers, and more particularly by Dr. Haysarth.

Of that species of contagion by which certain chronic diseases are propagated by actual contact, little need be said. Its existence is obvious in a palpable secretion from the morbid part, and therefore the prevention of it, by avoiding contact with the diseased, is clear and easy. The diseases in which such contagious matter is produced, are the venereal disease, the itch, the tinea capitis, or scald head, the yaws, siveas, &c. The hydrophobia would be incorrectly classed

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with these diseases, although it agrees with them in being propagated by contact of a poisonous secretion.

In some acute diseases, which may be considered as an intermediate class, being propagated both by contact and effluvia, there is not less evidence of the existence of contagion, as in the small-pox, chicken-pox, and measles; because by the conveyance of a portion of the fluid contained in the pustules of the former, and in the milium vesicles of the last, (See Willan on Cutaneous Dis. p. 219.) the same train of symptoms has been excited in the persons receiving it, as occurred in the persons by whom the contagious matter was produced. But these diseases have been still more frequently observed to attack persons, who have approached within a short distance of the sick, where no contact took place; implying that the contagious matter, in an imperceptible form, was conveyed through the air, from the one body to the other.

The origin of the contagions, which produce these two classes of disease, is a subject of considerable difficulty; and inquiries in regard to it have generally proved fruitless, or led the inquirer into absurdities. By what concurrence of circumstances, or by what particular idiosyncrasy in any individual, a new animal poison can be generated, which shall excite a new and formidable disease, and propagate itself, and spread fatality for centuries through the world, we are altogether unable to discover. Yet in the history of medicine we find new and unknown contagious diseases springing up, and old ones, which had long prevailed, suddenly disappearing. The small-pox, and the measles, were first described by the Arabian physicians, and the scarlet fever first shewed itself in Italy in the fifth century. (See Willan on Cutaneous Dis. Order iii. p. 289.) The venereal disease was alike unknown to the ancients. The Plica Polonica seems to have made its appearance only in the last century. And on the other hand the leprosy of the Jews, and other species of leprosy, which raged in Europe in the 12th and 13th centuries, are scarcely now to be met with: and we have a remarkable instance both of the production and disappearance of a contagious disease in the Ephemera Britannica, Sudor Anglicus, or sweating sickness, as it was termed, described by Celsus and others. In such instances, if it should happen at any time that no person labours under the disease, the contagion might be lost, and the disease for ever disappear, unless the cause, which first gave rise to it, should again concur to reproduce it.

The cause is altogether different in respect to most of the fevers of that class, which are propagated by effluvia only, and in which no palpable poison is generated. Such is the typhus, or fever with debility, which prevails, under different denominations, in the temperate climates. According to the circumstances of its origin, it has been termed jail-fever, camp, hospital, and ship-fever: and from the variety of its appearances, putrid, malignant, petechial fever, &c. and it is occasionally combined with other diseases, along with which it is propagated, as with inflammation of the lungs, constituting the peripneumonia typhodes of authors, and with a dysenteric affection of the bowels, as in the camp-dysentery. In these instances the origin of the contagion has been obviously traced to circumstances of common occurrence; hence pestilential fevers of this class frequently arise spontaneously, that is, independently of the propagation of an existing poison, which has been perpetuated either by fomites or infected persons from its first origin. It is probable that the plague itself belongs to this class, and is the common fever, rendered peculiarly malignant by climate, season, or other circumstances.

The contagion, by which these fevers are propagated, is generated in three ways:—by the confinement of the healthy animal exhalations or effluvia in a crowded, and ill ventilated place;—still more readily by the confinement of morbid effluvia, although the disease be not originally contagious; and 3dly, by the exhalations from putrifying dead animal matter.

1. Many facts have been recorded, which shew that the natural effluvia of the living body, become the source of contagious fevers, when accumulated and concentrated in close apartments. Mr. Howel and others, who escaped, from the black hole of Calcutta, were seized with typhus fever. Dr. Lind informs us, that in a frigate, which sailed from North America, with a healthy crew, a malignant fever broke out before her arrival in England, during very bad weather, which affected a considerable number of the men, and of which the surgeon's mate, boatswain, and some others died. "Thus," he remarks, "a seasoned found crew became infected, as it would appear, from the closeness or damp below, occasioned by the hatchway being kept shut." (On Fevers and Infections, chap. i. § 2.) Sir John Pringle has observed that the hospitals of an army, not only when crowded with sick, but at any time when the air is confined, and especially in hot weather, produce a fever of a particular kind, and often mortal. "I have observed the same sort to arise," he adds, "in full and crowded barracks, and in transport-ships when filled beyond a due number, and detained long by contrary winds; or when the men have been long kept at sea under close hatches in stormy weather. Hospital-ships, for distant expeditions, have for this reason been generally destructive both to the sick and their attendants. (Obs. on the Dis. of the Army, part iii. chap. 7.) But contagious fevers are much more readily produced, under circumstances of confinement, where uncleanliness also conspired: hence such fevers originate most frequently among the poor, and even the most severe pestilence, when not imported, is generally to be traced to some quarter chiefly inhabited by the poor.

2. Where people, labouring under any diseases, are crowded together, more especially if the apartments are imperfectly ventilated, contagion is readily generated. Sir John Pringle remarks, that contagious fever "is incidental to every place, ill aired and kept dirty, that is filled with animal steams from foul and diseased bodies; and on this account, jails and military hospitals are most exposed to this kind of pestilential infection; as the first are in a constant state of impurity, and the latter are so much filled with the poisonous effluvia of sores, mortifications, dysenteric and other putrid excrements: nay, there is reason to apprehend that when a single person is taken ill of any putrid disease, such as the small-pox, dysentery, or the like, and lies in a small close apartment, he may fall into this malignant fever." Loc. Citat. It is very common, indeed, to observe mild febrile attacks among the poor, which, though originating from cold or other causes, become contagious in their course, in consequence of the confined and dirty situations in which the patients lie.

3. Contagion occasionally originates from the putrifying effluvia of animal and vegetable matters. Thus it often happens that typhus fever spreads itself over the adjacent country, when the dead are left unburied on the field of battle. Forellus mentions a contagious fever, which raged at Egmont, in North Holland, occasioned by the putrefaction of a whale, which had been left on the shore. And Senac gives an account of a malignant fever, excited by the offal of a city being accumulated without the walls. It was received

received into a ditch filled with water, and, while it was covered with the water, was not attended with any bad consequence; but when the quantity increased, so that it rose above the surface, a dreadful fever spread through the city, and its neighbourhood; so that, where four hundred used to die yearly, the deaths were increased to two thousand. Wilson on Febrile Diseases, loc. cit.

The most important part of our inquiry respecting contagion, relates to the mode and circumstances of its communication from individual to individual, and of its general spreading, with a view to discover the means of suppressing it, or preventing its extension. This inquiry is, of course, limited to the contagions which are soluble or diffusible in atmospheric air; since it is obvious that the indissoluble contagions may be avoided, by shunning the contact of the diseased. And it must be premised, that all the febrile contagions, whether of a specific origin, as that of small-pox, measles, scarlet fever, or malignant sore throat, or arising from the casual change of the animal effluvia, as that of typhus, jail and hospital fever, and perhaps the plague, have been found, by experiments, to be propagated according to the same laws, and to be suppressed by similar means.

Whenever a contagious epidemic disease prevails, a great general alarm is excited, in consequence of a notion, that the seeds of an evil so generally destructive must be diffused through the atmosphere at large; and that, if we stir abroad, we breathe contagion at every step. This opinion has been promulgated by physicians of high rank and authority; but recent observations have shewn that it is erroneous: thus at once removing all grounds for this unnecessary alarm, and directing our attention to those means of precaution and prevention, which can alone effectually contribute to our security. Dr. Lind long ago affirmed, after an extensive experience in the great naval hospital at Haslar, that the infection of malignant fever, in common with that of the plague, "extends to no great distance from its source."—"In the open free air, this infection does not appear to diffuse itself above fifty or sixty feet from its *nidus*." Chap. iv. sect. 2. With respect to the plague, it has been well ascertained by physicians, that its contagion does not contaminate the atmosphere in general, nor indeed to any great distance from the source of the poison. Dr. Patrick Russell, who was in extensive practice at Aleppo for many years, particularly during the plague of 1760, 1761, and 1762, used to administer medicines to great numbers ill of the plague, every day, out of a street window, about 15 feet above the ground, even in June and July; and, being short-sighted, he examined the sores within four feet: yet neither his family, nor any inhabitant of the square where he lived, were infected by the contagion of such a number of pestilential patients; and he affirms that it never spread in a large house, if communication were prevented. A numerous body of Franks live in Constantinople, and are uniformly preserved from the plague, by observing a few rules of cleanliness and separation, while the Turks die of it in multitudes around them. De Mærtens, author of a history of the plague at Moscow, anno 1771, has shewn that the contagion was disseminated to a very short distance through the air: a fact, which was demonstrated by the successful conduct of the committee of physicians, appointed by the empress to attend the sick on that occasion. The just inference from these observations is, that the plague is principally propagated by actual contact or close communication with the diseased, or their clothes, furniture, &c. "Solo ægrorum et rerum infectarum, contactu communicabatur," says Dr. De Mærtens, "atque atmosphæra contagium non spargebat; sed sanissima

semper fuit. Visitando tam prope adfabamus illis, ut sola pedis distantia inter nos et eos sæpe vix remaneret, et absque alia quacunque cautela, quam quod nec corpus neque vestes aut lectum tangeremus, a peste immunes permanerimus. Linguam propius observando solebam linteum aceto communi imbutum naribus et ori admovere." Hist. Pet. Moscens.

In addition to such facts, which are stated by physicians of high respectability, we have the support of direct experiments, made respecting a contagion not less virulent and fatal than the plague itself, viz. that of the small-pox; by which the short distance, to which the poison is communicated through the air, is demonstrably proved.

Dr. O'Ryan, professor of physic in the college at Lyons, instituted the following experiments, which we shall relate in the words of Dr. Haygarth's translation: "I placed a large doil of cotton, soaked in variolous matter, on the middle of an oval table, whose least diameter was three feet. I seated six children around it, three on each side of the table, in such a manner that all were situated within half a yard of the infectious cotton. This experiment was sometimes made in the open air, sometimes in the house. I took care to renew, every second day, both the variolous matter, and the substance which contained it. I alternately used the poison taken from the inoculated and from the casual small-pox; and I copiously impregnated with it balls of cotton, wool, and silk. This operation, repeated during a whole week, morning, noon, and night, for an hour at each sitting, produced no effect.

"I then sent away the children, desiring the parents to acquaint me, in case any indisposition appeared, and to bring them to me a fortnight afterwards, although no alteration should have taken place in their health. I declare that not only for that term, but for many succeeding months, during which I took care frequently to visit them, they all enjoyed perfect health. It was not till nine months after this time, that four of these children had a mild kind of small-pox.

"Having concluded from these experiments, that the children could not have escaped infection; but because the variolous matter might have lost that spring and that degree of energy, which perhaps it may possess on arising immediately from the human body, I placed a person, in the eruptive fever of the small-pox by inoculation, at the distance of about half a yard from four children properly prepared: each exposure continued one hour, and was repeated daily for a fortnight, reckoning from the commencement of the fever till the pustules were become perfectly dry. Not one of the four received the infection. Two months afterwards, I inoculated three of these children: they had the distemper in a very mild manner, and recovered without difficulty." Diss. sur les Fievres Infectieuses et Contagieuses. See Dr. Haygarth's Sketch of a Plan to exterminate Small Pox, vol. i. p. 79.

Again, proofs that the sphere of activity of febrile contagion is extremely limited in the air, have been greatly multiplied since the institution of fever-wards and houses of recovery, which were suggested by Dr. Haygarth, from the contemplation of such facts as we have just detailed. The fever-wards, in the Chester Infirmary, are situated within thirteen yards of some other wards of the building; yet, during a space of above twelve years, the contagion of fever was never known to extend itself from thence. And Dr. Currie relates, in a letter to Dr. Clark of Newcastle, that contagious fever had not, during ten years, extended itself, in any one instance, from the fever-wards, either in the Liverpool Infirmary or in the workhouse, although the latter of these buildings has sometimes contained 1,400 persons.

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In like manner, the house of recovery, in Gray's Inn Lane, London, which stands in a row, in contact with dwelling houses on both sides, and which has had a constant succession of contagious fevers in its wards, has now (Dec. 1807) been open nearly six years, and no fever has occurred in its neighbourhood during the whole period. Nay, it has been farther ascertained, in these wards and houses, as well as in the habitations of the rich, that, in a clean well-aired room of a moderate size, the contagious poison is so completely disarmed of its virulence, by dilution with fresh air, as rarely to excite the distemper, even in nurses, exposed to all the putrid miasms of the breath, perspiration, and other discharges. See Dr. Haygarth's Letter to Dr. Percival, on the Prevention of Infectious Fevers, 1801. Dr. Clark's Collection of Papers respecting Fever-wards, Newcastle, 1802. Reports of the Institutions for the Suppression of Contagious Fever, in Dublin, London, Manchester, &c.

A sufficient number of facts, we trust, has been cited, to shew that the popular opinion and apprehension are groundless, and that the most malignant contagions are never conveyed to any great distance through the atmosphere; but that they are, in fact, rendered inert and harmless, by diffusion in the open air, and even in the air of a well ventilated apartment. The necessary inference is, that all pestilence is propagated by *near approach*, to, or *actual contact* of, the diseased, or by the conveyance of the contagious poison in articles impregnated with it.

Dr. Lind remarks, in the essay before quoted, "by a fixed attention to this subject for some years past, I am convinced, that the *body* of the diseased, kept exactly neat and clean, is not so liable to impregnate the *taint*, as his late wearing apparel, dirty linen, and uncleanliness of any sort about him, long retained in that impure state:—I say, these last contain a more certain, a more concentrated, and contagious poison, than the newly emitted *effluvia* or excretions from the sick." There is no doubt that such *fomites* spread and perpetuate many contagious diseases among us. It is ascertained that cotton, hair, and wool, are the substances most readily imbued with contagion, which becomes more virulent, when the air is prevented from having free access to them. If infected clothing, made of these materials, remain for some weeks in a full close room, or locked up in chests, and be then sold out during an unhealthy season, not only the wearers of it, but all who have intercourse with them, are presently affected, and contribute to spread the disease. Thus the Europeans, says Dr. Lind, have carried the small-pox to almost all parts of the world, where their ships have opened a trade; though the seamen in those ships might not have been affected with it in their voyage. This poison has been conveyed, in an old blanket, to nations of Indians, some of whom it has almost extirpated. In the year 1746, while the French Squadron, under the command of the duc D'Anville, passed the summer at Chebueto, now Halifax, an infectious fever prevailed among them, and cut off a great number of their men. On the return of the Squadron to Europe, several blankets and old clothes, which had been used in their tents and hospitals, were unfortunately left behind. These fatal receptacles of disease were soon after eagerly picked up by a party of Mimack Indians, who accidentally came to visit the place, and who clothed themselves with some of them; others they carried home, and distributed among their tribe. The unhappy consequence of which was the almost total extinction of the Mimack nation; scarce any of them survived. The English, upon traversing the country next summer from Annapolis Royal, were surprised with finding the dead bodies and skeletons of whole families lying unburied in their huts, until the neutrals,

who also inhabited that country, and the neighbouring Indians informed them, that the Mimacks had been cut off by the French blankets. In several of their huts, these blankets were found, where not one of the family remained. (Lind. chap. iv. sect. 2.)

Dr. Willan remarks, on the subject of fomites, that the houses of the poor in London are often so little taken care of, that in the apartments where contagious fevers have existed, enough of the contagion remains, to infect all the inmates who successively occupy the same premises; and he mentions some particular houses, in which the fomites of fever were thus preserved for a series of years. (Reports on Dis. of London, p. 256.) The same accurate observer states, that the scarlet fever, which, when epidemic, has often commenced in the eastern extremity of London, and spread westward, though it may have been sometimes imported with infected goods brought from abroad, will be more frequently found to have originated from the large repositories of old clothes, near the Tower, East Smithfield, and Ratchiff Highway. "During the last year of my attendance at the Public Dispensary," Dr. Willan adds, "I had reason to think that a family in Wild-breet, Lincoln's-inn-fields, was infected with *scarlatina maligna* by clothes bought in Monmouth-street. More than fifty persons in the adjoining houses were soon affected with the disease, which afterwards traversed Drury-lane, and spread by Long Acre, and the streets connected with it, through several parishes in Westminster." (On Cutan. Diseases, p. 301.) Thus also, and not by the impregnation of the atmosphere, the small-pox, measles, typhus, whooping-cough, itch, tinea capitis, &c. are perpetuated among us; and the febrile contagions are from time to time widely diffused.

A great number of facts are on record, which serve to shew the extreme virulence of contagious poisons, which have been pent up and accumulated in close places, and have contaminated articles of clothing under such circumstances. In those periods of our history, when a less enlightened humanity was careless of the health of criminals, and prisoners in general, the occurrence of what were called *black affizes* was frequent in different parts of the country. The criminals, brought out of filthy and infected cells, with their clothes fully imbued with *fomites*, often spread a mortal contagion through the court, assembled for the purposes of justice. "The most pernicious infection next to the plague," says lord Bacon, "is the smell of the jail, where the prisoners have been long, and close, and nastily kept, whereof we had in our time experience, twice or thrice, when both the judges, who sat upon the jail, and numbers of those who attended the business, sickened upon it and died." One of the instances, to which lord Bacon alludes, was doubtless at the fatal affizes, held at Oxford, in the year 1577; of which Stow gives the following account in his Chronicle. "On the 4th, 5th, and 6th days of July, were the affizes held at Oxon, where was arraigned and condemned Rowland Jenkins for a seditious tongue; at which time, there arose amidst the people such a damp," (an expression in the language of those days, signifying bad air) "that almost all were smothered, very few escaped that were not taken, here died in Oxen 300 persons, and sickened there, but died in other places, 200 and odd." Similar infections took place at the black affizes at Taunton; and also at those of Exeter, in 1586; at which last some Portuguese sailors spread the contagion, having been confined, without change of clothes, "in a deep pit and stinking dungeon." The last black affizes at the Old Bailey were held so late as the year 1750. On the 11th of May the prisoners, who were brought into court, some of them labouring under jail-fever, had been kept

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nearly a whole day in small, close, and crowded apartments. All the individuals, who were seated in the course of a draught of air, passing from the prisoners to an open window, were seized with the distemper: the rest escaped. The lord mayor and those of the bench who sat on his left hand were infected; while the lord chief justice, and the recorder, who sat on his right, escaped. Many of the Middlesex jury, on the left side of the court, died of it, while the London jury, who sat opposite to them, received no injury. On the 13th of May died alderman Lambert; on the 14th R. Cox, under-sheriff; on the 17th baron Clark; on the 19th Sir T. Abney, justice of Common Pleas; T. Otway, barrister; W. Baird, ditto; W. Sharplop, and four others; on the 20th, the mayor and eight of the Middlesex jury. See Gentleman's Magazine.

These facts, while they evince the active virulence of contagion, accumulated in fomites in unventilated and crowded rooms, afford, at the same time, evidence, that, except where it is carried at once by a direct draught of air, its tendency to diffuse itself, and its power when diffused, through the atmosphere in general, is very limited. It is only under such circumstances of concentration, that the virulence of contagion is ever so great, as to be infectious at more than a few feet distance. It has already been shewn, that when arising from the body of the sick, either in the open air, or in well ventilated rooms, its influence is confined to a very small distance.

Before we point out the means of prevention from contagious diseases, which these facts and observations suggest, it will be necessary to attend more particularly to the circumstances of individual infection.

All individuals are not equally liable to be infected by contagion; and some, though the number is extremely small, escape altogether. Thus, there are persons who have gone through a long life without taking the small-pox. The constitution, however, appears occasionally to undergo such a change, in the course of life, that those who, in earlier years, had resisted the action of this contagion, have received it on some future exposure to its influence. There is a considerable difference, too, in the infectious degree of different contagions: thus, that of the whooping-cough affects a much smaller proportion of mankind, than that of the measles, or small-pox; and that of the scarlet fever excites the disease in children much more frequently than in adult persons. Again, the contagion, in some instances of pestilence, and, we believe, in the plague in general, is more fatal to the vigorous and middle-aged, than to the old on the one hand, or to children on the other. We were informed by a gentleman, who resided at Malaga, during the late pestilence at that place, that the appearance of the town, after the cessation of the fever, was remarkable, in consequence of the small number of strong, active, and well-looking people, who were to be seen; old people and children constituting almost the whole of the remaining population. In the typhus, or contagious malignant fever of this country, Dr. Haygarth infers, from accurate deduction, that about eight in 188 escape infection, though fully exposed to the contagion; which is less than one in twenty-three. (See Letter to Dr. Percival, p. 31.) It has been calculated that nearly the same number, or one in 20, is naturally exempted from the contagion of the small-pox. Upon this datum it was also calculated, that if two persons together have escaped the disease, the probability, that they were never both exposed to an infectious quantity of the poison, is above 400 to one; if three in a family have escaped, above 8000 to one. (Haygarth's Inquiry how to prevent the

Small-pox, p. 24.) This mode of reasoning is equally applicable to typhous infection.

Now, as great numbers of people, visitors, nurses, &c. breathe the air of the chambers of patients, ill of contagious fever, and yet escape infection, it is obvious that in almost all these cases, (at least in 22 out of 23) a sufficient dose of the poison had not been received. This leads us to an important inquiry, into the dose of typhous contagion requisite to produce infection. The quantity will vary, no doubt, according to different circumstances, but the observations of Dr. Haygarth, and of the physicians of fever-wards, and houses of recovery, have enabled us to judge with some accuracy of the limits of this variation. There appears to be a strict analogy between contagious miasms and other poisons. The larger the dose of a poison or drug, the greater in general is the effect which it produces. Many of the most powerful and salutary medicines, when taken in too large a quantity, are poisons, as opium, antimony, mercury, fox-glove, hemlock, &c. And, on the other hand, even arsenic itself, the most virulent and unmanageable of all poisons, has, by the skill and attention of physicians, been reclaimed from the class of mischievous substances, and by a diminution of the dose is justly held to be a safe and useful remedy. Farther, in different constitutions, and in different maladies, there is a certain degree of variety in the operation of any drug. Thus four or six times the dose, e. g. of antimony or mercury, may be required for one patient more than for another, or for the same person in different diseases. In the same way the mischievous quantity of infectious miasms admits of some variation.

It is clear, from the collected observations of Dr. Haygarth, and of those active and experienced physicians whose correspondence he has published, not to mention the experience which fever-wards have lately afforded, that in a large, airy, and clean apartment, few or none even of the most intimate attendants catch the disease, where the patient labours under infectious fever. The nurses themselves, exposed to the effluvia of the excrements, and perpetually near, and often in contact with the sick, nevertheless hardly ever receive infection. The atmosphere of a room where contagion is generated, if cleanliness and ventilation are employed, may therefore be breathed for a long time with impunity. And it is not less clear, that an atmosphere strongly impregnated with contagion, may be breathed, for a short time, with the same impunity. If we compare the numbers who escape infection after being exposed to breathe a contagious atmosphere, with the small number who are naturally not subject to receive contagion, this proposition must be obvious. But to state facts. "During four years attendance in the hospitals of Edinburgh and London, and afterwards during thirty-one years in private practice in Cheltenham, and fourteen years and a half in the Cheltenham Infirmary, and three years at Bath, I have been," says Dr. Haygarth, "in the habit of breathing air strongly impregnated with the infectious miasms of fever. In many, very many, instances, I have visited patients ill of infectious fevers, in small, close, and dirty rooms: yet never but once, above thirty years ago, had a fever. The physicians of the Manchester Infirmary for many years, and particularly during the late widely-spreading epidemics in that large and populous town, have, with great fortitude and humanity, constantly visited the home patients; that is, they have, in innumerable instances, breathed the most pestilential air, in the most concentrated state. Their and my safety manifestly proceeded from this circumstance; we remained but a short time in the patients' room. We did not receive an infectious dose of the poison." (Lect. to Dr. Percival, p. 40.) We could multiply evidence

CONTAGION.

upon this point: to an indefinite extent, but the general safety of medical men under such circumstances is sufficient to prove, that air strongly impregnated with infectious miasms may be breathed for a short time, and air weakly impregnated for a long time, without any injury. We might hence be almost led to believe, that the poisonous miasms do not generate a fever, till they have been respired without interruption, for several days together: and it is not improbable that, in some persons, such an accumulated quantity of the poison may be required.

There are, however, other facts which prove that this is by no means always the case. Infection is occasioned suddenly, in some instances, and from a very short exposure to a pestilential air. Whether this is owing to peculiar susceptibility of the individual, or to the particular mode of receiving the contagious effluvia, is doubtful. The writer of this article, about six years ago, visited a poor family, of four persons, lying in the same bed, in an exceedingly close and dirty apartment, ill of contagious fever. He always had the precaution to throw open the window on entering the room, to station himself between the window and the bed, whilst he examined the sick, and to remain but a short time with them. He had repeated his daily visits during a week, and with impunity, when he was at length accompanied by another physician, who designed to admit the patients into the House of Recovery, just then opened in Gray's-inn-lane. The latter took no precaution, but examined the skin of the sick minutely and closely, standing on that side of the bed towards which the air from the window impelled the contagious effluvia, and so near as to receive these effluvia and the breath in the most concentrated state. He took the infection, and his fever proved fatal. Here the infection of this excellent physician was attributable only to the full dose of the poison, which his incautious zeal induced him to inhale. In most cases, as in this, where a sudden infection takes place, a disagreeable sensation is excited at the moment of exposure, which different persons have described differently. Some have felt a sharp taste in the mouth, as if blue vitriol were dissolving in it, but which no washing or gargling could remove. Others have compared the first impression to that of an earthy exhalation from a newly-opened grave, the sensation extending down to the stomach, sometimes exciting instantaneous sickness and shivering. Dr. Haygarth mentions that two of his patients, who were physicians, were infected suddenly by a short exposure. One of them thought that he caught the fever by creeping behind, in order to assist his patient; the other by inspecting morbid fæces. In both these cases, the exposure was such as might probably afford a full dose of the contagion. Dr. Lind is of opinion, that, in these diseases, the stools, especially if very fetid, are most communicative of contagion; next to these the breath; and lastly the effluvia from the body.

The activity of contagion is not always proportionate to the appearances of malignancy in the diseased. Sometimes only one man in a ship may be seized with the *peste bubonica* or with the *yellow fever*, says Dr. Lind, while all the rest continue unaffected. And the most malignant case of fever, that we ever witnessed, did not infect any of the family, though in a close and small house. And on the contrary, we have seen fevers, of the mildest description, which spread extensively: so that we fully coincide with Dr. Lind in his observation, that "fevers have often no peculiar characteristic symptom, by which they are known to be infectious:" and again, when he says, "in some this fever will be more severe, in others more mild, and often most of the sick will be able to sit up through great part of the day, which can-

not be urged as an argument against the infection, but only as a proof of its mildness." (Loc. cit. § v.) It is obvious, therefore, that great caution should be used in pronouncing fevers not infectious.

The period at which different fevers begin and cease to generate contagious effluvia is not absolutely ascertained. It seems most probable that in eruptive fevers there is no contagion till the eruption appears; and that contagion remains so long as any scab remains on the skin. This is clearly the case in small-pox.

The latent period of contagion, as Dr. Haygarth terms it, or the period which elapses between the exposure to contagion and the first appearance of the disease which ensues, is ascertained with tolerable accuracy in respect to the small-pox; but in typhous cases it appears to be extremely irregular. The small-pox from inoculation usually commences on the eighth or ninth day after the operation. Thus, of 830 inoculated cases, in 519 fever commenced before the ninth, and 201 on or after the ninth day. But from the testimony of Drs. Woodville, Clark, and Currie, the eruptive fever sometimes commences so early as the fifth day after inoculation; and three cases are related by Dr. Clark where it commenced so late as the 16th, 17th, and 23d day. The latent period in the casual small-pox is somewhat longer than in the inoculated; most commonly from 10 to 16 days. (See Haygarth, Sketch, &c. before quoted.) The latent period of the contagion of measles is from 10 to 14 days. (Willan on Cutan. Dif.) But the latent period of typhous infection is much more irregular, and often much longer. Of a large number of cases related by Dr. Haygarth, more than half commenced between the 17th and 33d day after exposure, a great proportion after the 27th, and almost all between the 20th and 60th. (See Letter to Dr. Percival, p. 20. *et seq.*) The fever occurred in only five instances before the 10th day. So that on the whole, it appears, that the latent period of typhous infection varies from a few days to two months. (Ibid. p. 68.)

This latent infection is probably often allowed to lie long dormant, or is excited into action at an earlier period, according to the occurrence or non-occurrence of circumstances which may render the constitution less capable of resisting its action. Thus persons who had some time previously been exposed to the influence of contagion, have been immediately taken ill upon being wet with rain, or on exposure to a cold and damp air, or after a debauch, or other such debilitating causes. During the prevalence of a pestilence, it has been observed that exposure to the damps of evening, especially in warm countries, is extremely dangerous. And Dr. Chisholm remarks, that those who were addicted to the abuse of intoxicating liquors, were most subject to the fever of Grenada. From the great length of time, indeed, which the contagion of fever often lies dormant, we may infer, with Dr. Lind, that it is probable, that, without the influence of these casual exciting causes, the contagion might never, in such instances, have affected the constitution.

Prevention of infection. The circumstances under which contagion is generated, and the modes in which it is conveyed and propagated, being understood, the means of preventing its production, and of avoiding its pernicious influence, when it exists, will readily suggest themselves. Instead of omitting all attempts at avoiding the contagion of a pestilence, as altogether fruitless, where the very pabulum of life, the common air, is charged with poison; or of adopting the dangerous expedient of closing up every avenue of ventilation in our houses (Willan on Fevers, p. 458. vol. i.), or of employing useless and absurd measures of precaution, we shall

shall proceed upon rational grounds to the use of effectual preventives. All those who contend that the spreading of contagion depends upon some peculiar state of the atmosphere, admit that it is some *occult* quality in the air; that it is neither the heat nor the cold, the moisture nor the dryness, nor any other sensible condition of it, with which pestilence is connected. The great Sydenham, after having noted attentively the state of the atmosphere and the weather, in different years, during which epidemics of different kinds prevailed, was obliged to confess that he could perceive no difference in seasons in which different contagious diseases occurred. He, therefore, had recourse to a supposition equally gratuitous, that some unwholesome exhalations from the earth were the source of pestilential diseases.

But when it is considered, that contagion *originates* in accumulated and confined animal effluvia, and is *communicated* either to those who approach, or come in contact with the sick, or by means of substances impregnated with contagious matter, and in these ways only, the means of prevention are obvious.

With respect to the casual origin of contagion, it is scarcely necessary to say, that cleanliness and ventilation, as they preclude the confinement and accumulation of the animal effluvia and secretions, will infallibly prevent the generation of the poison.

Where contagion exists, its farther communication may be prevented by avoiding contact or approach to the sick, and by confining the patient to a separate room, in which, if it be kept clean, and well ventilated, it has already been shewn, that the contagion will be inert, at a short distance from the sick; and therefore that the necessary attendants, and medical visitors, will receive no injury from respiring the air within it. In this way contagion has been prevented from spreading in large schools, and other places, where a number of people live together, as in work houses and hospitals, of which some examples have been already given. Dr. Haygarth's rules for the prevention of infection, seem to comprise all the requisite means to be adopted in houses where contagious fever exists; they are the following.

Rules to prevent infection.

"1. As safety from danger entirely depends on cleanliness and free air, the chamber-door of a patient, ill of an infectious fever, especially in the habitations of the poor, should never be shut; a window in it ought to be generally open during the day, and frequently in the night. Such regulations would be highly useful both to the patient and nurses; but are particularly important previous to the arrival of any visitor.

"2. The bed curtains should never be drawn close round the patient; but only on the side next the light, so as to shade the face.

"3. Dirty clothes, utensils, &c. should be frequently changed, immediately immersed in cold water, and washed clean when taken out of it.

"4. All discharges from the patient should be instantly removed. The floor near the patient's bed should be rubbed clean every day with a wet mop or cloth.

"5. The air in a sick room has, at the same time, a more infectious quality in some parts of it, than in others. Visitors and attendants should avoid the current of the patient's breath,—the air which ascends from his body, especially if the curtains be close,—and the vapour arising from all evacuations. When medical or other duties require a visitor or nurse to be placed in these situations of danger, infection may be frequently prevented by a temporary suspension of respiration.

"6. Visitors should not go into an infected chamber with

an empty stomach; and, in doubtful circumstances, on coming out, they should blow from the nose, and spit from the mouth, any infectious poison which may have been drawn in by the breath, and may adhere to those passages." (See Letter to Dr. Percival, p. 73. *et seq.*)

By observing these rules, not only numerous visitors, but the medical attendants, and the nurses themselves, who frequently move and otherwise assist the sick, in fever-wards, and the wards of houses of recovery, entirely escape infection. This is proved, with scarcely any exception, in all the institutions of this sort throughout England and Ireland. During the last four years (the writer speaks from personal observation) only one instance of infection seizing a nurse in the London House of Recovery, occurred, and, in that case, she imprudently slept in a bed, just quitted by a convalescent, who had left the house, without changing the linen. By the same rules, Dr. Haygarth arrested the progress of a scarlet fever and fore throat in a school, containing 37 boarders, at a time when Winchester and other great schools were dispersing their scholars on account of this most contagious distemper, which had spread alarmingly among them. Not one was infected after the plan of separation in an unvisited room was adopted, although all the boys remained in the same house. (Let. to Dr. Percival, p. 81.)

Contagion may, however, be extensively circulated by *fomites*, i. e. attached to clothing, furniture, and other articles, which mode of communication is, perhaps, the most to be apprehended, during the prevalence of an epidemic malady. Hence the severe laws of quarantine have been enacted, in order to preserve this country from the contagion of foreign pestilence, which might be imported with the articles of commerce. And it is not less necessary, during times of internal pestilence, to be watchful in regard to this point. It is not, however, by a slight and brief exposure to contagious miasms, that substances are sufficiently imbued with them, to communicate infection. Thus it is, on the whole, well ascertained that the clothes of visitors do not acquire a pestilential quality, so as to infect others. Upon this point, the experience of several observing practitioners coincides. Dr. Clark of Newcastle affirms, that in eighteen years practice, he never communicated the contagion of small-pox, nor of the scarlet fever, with ulcerated fore throat, to any one, even to children in his own family, although he had frequently, on the same day, visited many patients in those diseases, and in the most malignant stages of the latter, and afterwards had intercourse with other children liable to receive them. Mr. Henry adduces his own experience, during nearly forty years, in Manchester, in testimony of the same fact, in regard to the contagion of small-pox. And the testimony of several other practitioners is equally strong, as to the non-conveyance of this contagion by their clothes. Now, whatever is true of the contagion of small-pox, and of scarlet fever, is still more decisive as to typhous infection, which is less powerful than either. (See Haygarth, Sketch of a Plan, &c. pp. 369, 386, 404, &c.) Substances do not become sufficiently impregnated with the poison, in clean and ventilated places, except by being a considerable time in contact with, or very near the sick, as the bed in which the patient lies, or the linen he wears; these *fomites* are chiefly produced in close and dirty places, where the contagion is concentrated by accumulation and confinement, as in the cells of jails, or in the apartments of the poor; in which cases, the utmost virulence of the poison is brought forth.

Where contagion of this degree of activity is produced, and is combined with articles of clothing and furniture, &c. the mere act of ventilation, which effectually prevents

its deleterious action, when arising from the body of the sick, is altogether inadequate to destroy its power in these *fomites*. Hence various means have been devised, in all ages, for annihilating contagion. Among these, fire has been most generally employed, more especially with a view of fumigating, or applying the smoke or vapours from different substances, to the source of the poisonous miasms. Hippocrates and Acron of Agrigentum, believing the air to be the medium of infection, are said to have ordered large piles of wood to be burnt in the streets and infected parts of Athens, by which means they stayed the plague in that city. (Aetii *Tetrab.* Plutarch, de *Isid.* de *Osir.*) But however useful the fumigation of *fomites* may be, it does not appear to be of any utility when employed in the atmosphere in general. In the year 1721, the plague raged at Toulon with such violence, that in the space of ten months it destroyed about two-thirds of its inhabitants. Many having insisted upon fires being made in different parts of the city, the public records were consulted, and it was there found that, on a similar occasion, the same means had been tried without success. The experiment, however, was repeated. Wood was laid before every house, and at the sound of a bell, all the fires were lighted, by which the city was involved in a thick smoke for nearly a whole day. The plague, however, suffered no abatement. The same measure was resorted to both at Marseilles and London, when the plague raged in these cities, with no better success. Nay, after the fires had been kept burning for three days in London, on the night which succeeded, no less than 4000 died, although not more than 12,000 had been destroyed during the preceding three or four weeks. (Wilson on Feb. Dif. vol. i. p. 464.)

There is no doubt, however, that contagion, adhering to clothes and furniture, may be effectually destroyed by the vapours from various combustible and volatile substances. Dr. Lind recommends the fumes of tobacco to be dispersed through the cells and infected apartments, in prisons and ships, as well as for the purification of infected articles; he also advises the exposure of *fomites*, to the fumes of sulphur, from a charcoal fire, as an efficacious mode of purification. But he is perfectly convinced, he says, from long experience, that even the simple heat of a *close confined* fire, or the heat of an oven, is a destroying power which "no infection whatever can resist." The efficacy of gun-powder was ascertained by an accident, and Dr. Lind afterwards used it in wards where fevers were received, every morning. In a ship of war, a contagious fever prevailed, which had destroyed sixty men; when, in an engagement with the French, twenty-five barrels of gun-powder were fired on board of her during the action; and, to the surprise of her officers, none of her men were afterwards attacked with fevers.

Some strong smelling substances, as camphor, the vapours of juniper, and of Cascailla bark, &c. have been occasionally resorted to as preventatives from contagion; but the power of these substances is very questionable, and they may be, perhaps, negatively prejudicial, as their aromatic odour may conceal the smell of bad air in the room of the sick, and thus prevent effectual measures of safety from being employed.

The most efficacious of the means which we possess of destroying contagion in *fomites*, seem to be the fumes of the mineral acids. The vapours of vinegar, and those of the sulphureous acid, have been long used with some degree of success; but those of the muriatic, and still more, perhaps, those of the nitrous acid, appear to be complete antidotes to accumulated contagion. The evidence of the efficacy of the nitrous acid fume, in purifying infected places

and substances, which was a few years ago laid before the House of Commons by Dr. Carmichael Smyth, was such as to induce that house to vote a national donation of five thousand pounds to him for the discovery. This vapour is easily obtained, by mixing with powdered nitre a little of the strong acid of vitriol or sulphuric acid; the latter combines with the potash, the base of the nitre, expelling at the same time the nitrous acid in fumes. (See Dr. C. Smyth's treatise on the subject.) The vapour of the muriatic acid may be obtained in a similar manner, by using common sea or rock-salt, instead of nitre.

Where contagion has been long pent up in close cells or rooms, it is apt even to adhere to the walls. In such cases, white-washing with hot or newly slaked lime, is an efficacious aid of the acid fumigations.

It is a curious fact, and perhaps wholly unaccountable upon any theory of the propagation of contagion, that pestilential diseases, after running an indefinite course, notwithstanding all the measures adopted to restrain their progress, frequently cease spontaneously, at a time when the walls of the houses, furniture, &c. must still be supposed to be highly impregnated with the contagion. The fact is authenticated by Dr. Ruffell, Dr. Lind, and several other physicians of equal respectability. The cessation is not connected with any sensible changes in the atmosphere. Warm weather is perhaps, on the whole, but not without many exceptions, more favourable to the production of contagious diseases, than cold weather. But the worst fevers have often raged in the coldest seasons, as did the plague in London; and there have been instances of the plague suffering a check as the weather grew warmer. (Wilson on Feb. Dif. p. 448.)

During the prevalence of a contagious epidemic, temperance and regularity, and care in avoiding all causes of debility, (such as cold damp air, &c.) the use of the cold bath, and the preservation of an equal state of mind, are great personal preservatives. The general alarm which prevails during those periods of public calamity, is not among the least of the causes which contribute to extend the evil. It would be, therefore, injudicious to condemn the use of camphor, rosemary, and other aromatic substances, or carrying a quill filled with quicksilver, or other amulets, about the person, since whatever tends to inspire confidence in the mind, contributes to the security of the body.

CONTARINI, in *Antiquity*, a kind of horsemen, whose chief armour was the *cutus*, a kind of long spear.

CONTARINI, GASPARD, in *Biography*, a cardinal of the church of Rome, was not more celebrated as a divine than as a politician. He flourished in the Venetian territories, and was nominated from that republic as ambassador to the emperor Charles V, after which he was raised to a considerable station in the government of his country. He was ambassador also to Rome; and when pope Clement VII. surrendered to the imperial army, a commission was given to Contarini to negotiate for the liberty of the pontiff. In 1535, he was created cardinal by pope Paul III.; and in 1541, he was appointed legate to Germany, and with the other legates was appointed to preside at the general council, which was afterwards held at Trent; he was, however, sent legate to Bologna, before that assembly met, where he died at the age of 59, in the year 1542. He was author of many works, and on various topics, in which he displays considerable talent, and a mind superior to the times in which he lived. The principal pieces are "De Immortalitate Animæ," "De Septem Ecclesiæ Sacramentis," "De Potestatè Papæ," "De Predestinatione," "De Libero Arbitrio," and "Confutatio Articulorum Lutheri."

CONTARINI, VINCENT, a considerable scholar in classical literature and antiquities, was born at Venice, in 1577, and attained the professorship of the Greek and Latin languages at Padua, which he held with great reputation till the year 1614, when he retired to Rome. From whence, taking a journey into Ithria, he fell ill, and died at Venice in the prime of life, in 1617. The works by which he is chiefly known are "De Frumentaria Romanorum Largarione," and "De Militari Romanorum Stipendio." Moreri.

CONTARINO, CAV. GIOVANNI, an historical and portrait painter, who was born at Venice in the year 1549, and who steadfastly pursued the solid and pure style of Titian, notwithstanding the pernicious example of almost all his rival compatriots, who, losing the remembrance of those glowing and rich tints which had so long been the boast of the Venetian school, had adopted a manner in which the lights were so extravagantly contrasted by the most obscure and cutting shadows, as to give to their pictures the appearance and gloom of midnight representations. The principal works of Contarino are at Venice, and evince, independent of the beauties of colouring, a very competent knowledge of fore-shortening and the *sfumato*, with an excellent taste of composition. One of his best and greatest performances is the ceiling of the church of St. Francisco di Paola, where, in the centre, he painted the Resurrection of Christ, and on each side the Annunciation and Nativity, together with the Evangelists and the four Doctors of the Church. He executed several considerable works for the court of the emperor Ridofofus II., who conferred on him the honour of knighthood. His portraits bore so strong a resemblance to nature, that one of them, representing Marco Dolce, is said to have deceived his dogs and other domestic animals, who leaped up to the picture, supposing it their master himself. This artist died in the 56th year of his age, 1605. Lanzi, Storia Pittorica.

CONTAY, in *Geography*. See **CONTY**.

CONTCHOUDSONG, a town of Asia, in the country of Thbet; 380 miles E.N.E. of Lassa. N. lat. 30° 20'. E. long. 97° 25'.

CONTE, DEL, JACOPINO, in *Biography*, was born at Florence in 1510, and is said in his youth to have received some instructions in painting, in the school of Andrea del Sarto. Having completed his studies, he soon gave proofs of superior talents, both in historical and portrait painting. Rome, whither he was invited under pope Paul III., was the theatre of his labours, and he was employed to paint the portraits of that pontiff and of his successor Clement VIII., as well as those of the cardinals, the ambassadors, and other nobles of the court. In historical painting, he had no less success; and the frescoes, which he executed in the church of St. Giovanni Decoliate, rank him amongst the least affected or extravagant of the imitators of Michelangelo. An altar-piece in the same church, representing the taking down from the cross, a composition of many figures, is considered his *chef d'oeuvre*. He died at Rome in 1598. Baglione.

CONTE, DEL, OF FASSI, GUIDO, an artist who was born at Carpi, in the state of Modena, in the year 1584, and was the first inventor of the *scagliola*, a species of composition, or paste, with which the finest marbles are with facility imitated, and which acquires sufficient hardness to bear a polish. Some of the works of Guido, particularly two altars, are still existing at Carpi, where he died in the year 1649.

This art has since been brought to such a degree of perfection in several parts of Italy, that not only the finest marbles have been counterfeited, so as occasionally to deceive the best judges; but likewise bas-relieus, vases, medals, and even pictures of great beauty, have been produced; *see* **HIPO-**

much that it is become an article of commerce. (See **SCAGLIOLA**.) Lanzi, Storia Pittorica.

CONTEMPLATION, an act of the mind, whereby it applies itself to consider, reflect on, and admire, the wonderful works of God, nature, &c.

Contemplation is the height of perfection of the mystic divines. See **MYSTIC**.

CONTEMPORARY, or **COTEMPORARY**, a person, or thing, of the same time, or that existed in the same age, with another. Socrates, Plato, and Aristophanes, were contemporaries: the best histories are those of contemporary authors.

CONTEMPT, in the *Doctrine of the Passions*, is a species of hatred, expressing in its general sense disapprobation or aversion, which arises from the mere consideration of a worthless object, especially if it be proposed to us under a pretence of its possessing excellence, or from misconduct in things not of themselves vicious; as, where a person either acts below his station and character, or affects to do that for which he is not qualified. It is opposed to esteem or to emulation. This is one of those passions which in oratory belongs to demonstrative discourses. Thus Cicero (*De Orat. lib. ii. c. 12*) endeavours to expose Cæcilius, and bring him into contempt of the court, for pretending to rival him in the accusation of Verres, for which he was altogether unfit.

CONTEMPT, in *Law*, is disobedience to the rules, orders, or process of a court, which hath power to punish such offence; and a man may be imprisoned for a contempt done in court, but not for a contempt out of court, or for private abuse. But for contempt out of court, an attachment may be granted. Cro. Eliz. 689.

Attachment also lies for contempt to the court, to bring in the offender to answer on interrogatories, &c. and if he cannot acquit himself, he shall be fined. 1 Lill. 305. If a sheriff, being required to return a writ directed to him, doth not return the writ, it is a contempt: and this word is used for a kind of misdemeanor, by doing something that is forbidden, or not doing what is commanded. 12 Rep. 36. As the degrees of this crime vary, the punishment is less or greater; sometimes a mere fine, and sometimes imprisonment.

If a defendant in chancery, on service of a subpoena, does not appear within the time limited, by the rules of the court, and plead, demur, or answer to the bill against him, he is then said to be in contempt; and the respective processes of contempt are in successive order awarded against him: these are attachment; attachment with proclamation; a commission of rebellion; and, finally, a sequestration. It is a contempt to institute a suit fictitiously, though the demand is real, either to hurt any person, or to get the opinion of the court.

The most remarkable instances of contempts may be reduced to the following heads, *viz.* contempts of the king's writs; contempts in the face of a court; contemptuous words or writings concerning the court; contempts of the rules or awards of the court; abuse of the process of the courts; and forgeries of writs and other decrees tending to impose on the court. 2 Hawk. P. C. c. 22. § 3. For an account of the contempts that are punished by attachment; *see* **ATTACHMENT**.

Contempts or misprisions (*see* **MISPRISION**) are offences against the king and government: such is the non-administration of high officers, in public trust and employment, usually punishable by the method of parliamentary impeachment, and subject to the penalties of banishment, imprisonment, fines, or perpetual disability: such is also the offence of embezzling the public money; and such are those con-

tempts of the executive magistrate, which demonstrate themselves by some arrogant and undutiful behaviour towards the king and government. Contempts against the king's prerogative are a refusal to assist him by advice in his councils, and by personal service in his wars, against a rebellion or invasion. To this class may be referred the neglect of joining the "posse comitatus," or power of the county, when required by the sheriff or justices, according to the statute 2 Hen. V. c. 8; which is a duty incumbent upon all that are 15 years of age, under the degree of nobility, and able to travel. Contempts against the prerogative are also a preference of the interests of a foreign potentate to those of our own, and doing or receiving any thing that may create an undue influence in favour of such extrinsic power; as by taking a pension from any foreign prince, without the king's consent; also, a disobedience to the king's lawful commands, issuing by writs out of his courts of justice, or by summons to attend his privy council, or by letters from the king commanding a subject to return from beyond the seas: and likewise disobedience to any act of parliament; all which contempts are punishable by fine and imprisonment, at the discretion of the king's courts of justice. Contempts and misdemeanours against the king's person and government may be by speaking or writing against them, cursing or wishing him ill, giving out scandalous stories concerning him, or doing any thing that may tend to degrade him in the esteem of his subjects, weaken his government, or excite jealousies between him and his people. Contempts against the king's title, not amounting to treason or præmunire, are the denial of his right to the crown, in common and unadvised discourse; punishable by our law with fine and imprisonment. If any person affirm or maintain, that the common laws of this realm, not altered by parliament, ought not to direct the right of the crown of England; this is a misdemeanour, by stat. 13 Eliz. c. 1, and punishable with forfeiture of goods and chattels. A contempt may also arise from refusing or neglecting to take the oaths, appointed by statute for the better securing of the government; and yet acting in a public office, place of trust, or other capacity, requiring the said oaths to be taken, viz. those of allegiance, supremacy, and abjuration; which should be taken within six calendar months after admission. The penalties inflicted by statute 1 Geo. I. stat. 2. c. 13, are little short of those of a præmunire; being an incapacity to hold the said offices, or any other; to prosecute any suit; to be guardian or executor; to take any legacy or deed of gift; and to vote at any election for member of parliament; and after conviction the offender shall also forfeit 500*l.* to those who will sue for it. Contempts against the king's palaces or courts of justice have always been regarded as high misdemeanours; and by the ancient law, before the conquest, fighting in the king's palace, or before the king's judges, was punished with death. And at present with us, by stat. 33 Hen. VIII. c. 12, malicious striking in the king's palace, where he resides, whereby blood is drawn, is punishable by perpetual imprisonment and fine at the king's pleasure; and also with loss of the offender's right hand. But striking in the king's superior courts of justice, in Westminster-hall, or at the assizes, is made still more penal. By the ancient common law, before the conquest, it was a capital felony; and our modern law substitutes for the loss of life that of the offending limb; the crime, and even drawing a weapon, being punishable with the loss of the right hand, imprisonment for life, and forfeiture of goods and chattels, and of the profits of the offender's lands during life. (See ASSAULT, &c.) A rescue of a prisoner from any of the said courts, without a blow, is punished with perpetual imprisonment, and forfeiture of goods, and of

the profits of lands during life. Even in the inferior courts of the king, an assize, or contemptuous behaviour, is punishable with a fine by the judges there sitting; as by the steward in a court-leet, or the like. Those also who are guilty of any injurious treatment to such as are immediately under the protection of a court of justice, are punishable by fine and imprisonment. Lastly, to endeavour to dissuade a witness from giving evidence; to disclose an examination before the privy-council; or to advise a prisoner to stand mute, are high misdemeanours and contempts of the king's courts, and punishable by fine and imprisonment. If one of the grand jury discloses to any person indicted the evidence that appeared against him, he is guilty of a high misdemeanour, and liable to be fined and imprisoned. Blackst. Comm. vol. iv.

CONTENEbra, in *Ancient Geography*, a town of Italy, in Etruria, mentioned by Livy.

CONTENEMENT, a word, in our *Ancient Law-books*, about whose signification authors are not rightly agreed. According to some, it should signify the countenance, credit, or reputation, a person has, from and by reason of his freehold. In which sense it is used in the stat. 1 Edw. III. &c. where it stands as synonymous with *countenance*.

Others will have it signify what is necessary for the support and maintenance of men, according to their several qualities, conditions, or states of life. Thus, Spelman, *Contentementum est estimatio, & conditionis forma, qua quis in republica subsistit*. And in this sense it occurs in Magna Charta, cap. 14.

CONTENSON, VINCENT, in *Biography*, a French Dominican monk, was born at Cordom, in 1640, and celebrated in his time for considerable pulpit talents. He left behind him a work of reputation, entitled, "Theologia mentis et cordis," which has passed through several editions in folio and in octavo.

CONTENT, in *Mathematics*, a term frequently used for the capacity of a vessel, or the area of space; or the quantity of any matter, or space, included in certain bounds. The content of a tun of round timber is 43 solid feet. A load of hewn timber contains 50 cubic feet: in a foot of timber are contained 1728 cubic or square inches, and as often as 1728 inches are contained in a piece of timber, be it round, or square; so many feet of timber are contained in the piece.

In gauging, the gallon for beer and ale is allowed to contain 282 cubic inches, and the wine gallon 231; the gallon of dry measure 272.

Hence, as oft as 282 cubic inches are contained in any vessel, round or square; so many gallons of ale or beer it holds; and the like may be observed of the other measures.

Multiply, therefore, one side of a square, or oblong, into the other; and divide by one of those numbers, according to the quality of the liquor; the quotient gives the area in gallons, upon an inch deep.

Though the work may be considerably shortened by only multiplying the sides of squares, or the diameters of rounds, into themselves; the product is the number of gallons, and parts, the vessel contains, upon an inch in depth: and when that receives an augmentation, by being two, three, or four inches deep, it then commences a solid body, and contains as many gallons, and parts, as it is inches and parts deep.

A cubic foot contains six gallons and almost a pint of ale and beer; and seven gallons two quarts of wine. A cubic foot of dry measure contains six gallons and a half, and

Something more. A bushel of salt contains 56 pounds avoirdupois. See **GAGING**.

CONTENTIOUS JURISDICTION, in *Law*, denotes a court, or assembly, which has a power to judge and determine differences between contending parties.

The lords chief justices, judges, &c. have a *contentious jurisdiction*; but the lords of the treasury, the commissioners of customs, &c. have none; being merely judges of accounts and transactions.

CONTENTMENT, in *Pathology and Ethics*, expresses the acquiescence of the mind in the possession of the good that is assigned to us. It implies a perception that our lot might have been better, or that it is inferior to what others enjoy, or that it does not fully answer the expectations we had formed. An effort of reason, or of prudence, or of religious principles, is necessary to produce it. We compare our present with our former situation, or with the inferior lot of others; and thus learn to acquiesce in the degree of advantage which we have obtained. A regard to the dispensals of Providence, wise, righteous, and benevolent, will very much contribute to the acquisition and exercise of the virtue of contentment.

CONTESSA, in *Geography*, a small town of European Turkey, in the province of Macedonia, situated in the bay of the same name, with a good harbour, on the coasts of the Archipelago; 54 miles N.E. of Salonica. Long. 41° 35'. At the entrance of the gulf of Contessa is situated the island of *Taffo*. The French navigators also call this bight "Golfe de Rhondine," from the corrupted name of the ancient town of *Rhedine*; but the Greeks designate it under the name of *Orfano*. It is the *Sinus Strymonicus* of the ancients.

CONTESTANI, in *Ancient Geography*, a people of Hispania Citerior, to the south of the Edetani. Their territory extended southwards as far as Beticæ, or at least to the extremity of the Tarragonensis, where are found some places dependent on the Ballitani, who inhabited part of the eastern Beticæ.

CONTESTANIA, a country of Spain, in the Tarragonensis, mentioned both by Pliny and Ptolemy. The former says, that this country was first called "Mavitanica," afterwards "Deitania," and then *Contestania*. Here these authors place the river Tader, the colony of Illici, Lacentum, Dianium, the river Sacro, &c.

CONTESTATIO LITIS, among *Civilians*, denotes a general assertion that the plaintiff hath no ground of action, which assertion is afterwards extended and maintained in his plea.

CONTEXT, among *Divines and Critics*, that part of Scripture, or other writing, which lies about the text, before or after it, or both. To take the full and genuine sense of the text, the context should be regarded.

CONTEXTURE, a word frequently used in speaking both of the works of nature and art; and denoting the disposition and union of the constituent parts with respect to one another.

CONTHIL, in *Geography*, a town of France, in the department of the Meurthe, and district of Chateau-Salius; 2 leagues N.N.W. of Dieuze.

CONTHILA, in *Ancient Geography*, a borough of Greece, in Attica; placed by some in the Ptolemaide tribe, and by others in the Pandionide.

CONTI, GIUSTO DE, in *Biography*, an Italian poet and lawyer. His verses are chiefly amatory; and they appeared under the title of "Bella Manè," on account of the beautiful hand of his mistress, which is the subject of frequent

adulation. He died in 1409, and his poems have been published at Venice, Paris, Verona, and Florence. He has been compared to Petrarch; but the best judges have regarded him as much inferior to that writer. *Moreri*.

CONTI, CESARE and **VINCENZIO**, two brothers, the former, a native of Alcona, was celebrated as an expeditionary painter of grotesques; the latter, born at Rome, was a painter of history.

Baglione enumerates many considerable works, in which both these artists were employed at Rome, under the pontificate of Sixtus V. and Gregory XIII. Vincenzio ultimately settled in Turin, where he was taken into the service of the duke of Savoy. They both died during the pontificate of Paul V. Baglione.

CONTI, DOMENICO, of Florence, was the beloved disciple of Andrea del Sarto, and heir to his designs and studies. In gratitude and veneration to the memory of his great master, Conti, at his own expence, erected the monument still remaining in the cloister of the Nunziata, where the bust of Andrea is finely sculptured by the hand of Raffaello di Monte Lupo. Of Domenico's works in painting little is now known. *Orlandi*.

CONTI, CARLO, an engraver, native of Lorraine, in 1742. He established himself at Vienna, where he was reputed a good artist. He was living in 1790. *Heinecken*.

CONTI, FRANCESCO, an historical painter, born at Florence, in the year 1681. He travelled to Rome, where he became the disciple of Carlo Maratti. On his return, he acquired sufficient reputation to merit a place in the celebrated collection of portraits in the Florentine gallery. He died in the year 1760. *Lanzi, Storia Pitt.*

CONTI, LUCA, an engraver and architect, who was born in 1749, and became the disciple of Clerisseau. He established himself at Paris, where he continued to follow his profession in 1790. *Heinecken*.

CONTI, GIOACHINO. See **GIZZIELLO**.

CONTIGLIANO, in *Geography*, a town of Italy, in the duchy of Spoleto, near a lake to which it gives name; 3 leagues W. from Rieti.

CONTIGNE, a town of France, in the department of the Maine and Loire, and district of Segré; 3 miles N. of Chateaufeuil.

CONTIGUITY, the relation of bodies touching one another. See **CONTINUITY**.

CONTIGUOUS, a relative term, understood of things disposed so near each other, that they join their surfaces, or touch.

The houses in ancient Rome were not contiguous as ours are, but all insulated.

CONTIGUOUS angles, in *Geometry*, are such as have one leg common to each angle; otherwise called *adjoining angles*, in contradistinction to those produced by continuing their legs through the point of contact, which are called *opposite* or *vertical angles*.

CONTINENCE, in *Ethics*, a moral virtue, by which we resist concupiscence. It should seem that there is this distinction between *chastity* and *continence*, in that it requires no effort to be chaste, which results from constitution; whereas *continence* appears to be the consequence of victory gained over ourselves. The verb *continere*, in Latin, signifies *to restrain*.

CONTINENT, in *Geography*, a terra firma, main land, or a large extent of country, not interrupted by seas: so called, in opposition to *island, peninsula, &c.* See **EARTH, OCEAN, &c.**

Sicily is said to have been anciently torn from the conti-

ment of Italy; and it is an old tradition, which some of our antiquaries have still a regard to, that Britain was formerly a part of the continent of France.

Mr. Kirwan supposes (see Irish Tranf. vol. vi. p. 298.) that, when by the rupture of the Thracian Bosphorus, or isthmus which connected the Caspian, the lake of Aral, and the Black Sea, on the one side, and of the African isthmus, which joined Ceuta with Gibraltar on the other, the waters of the Ocean and of the Euxine were forced in upon the Mediterranean, an immense pressure took place upon its bed, under which it sunk or fell into the interior cavity of the globe; during this tremendous tumult the islands of Sicily, Sardinia, Corsica, and those of the Archipelago, were torn off from the Continent, and Italy was lengthened to its present shape. The separation of Sicily from Italy is vouched by ancient traditions, as may be seen in Pliny, Ovid, and Claudian.

“Zancla quoque juncta fuiffe

Dicitur Italia, donec confinia pontus
Abtulit, et media tellurem repulit unda.”

Ovid. Met. l. xv. v. 290.

“Trinacria quondam

Italiz pars una fuit, sed pontus et cæstus
Mutavere situm, rupit confinia Nereus,
Victor, et abscisso inclruit æquore montes.”

Claud. de Rep. Prof. l. i.

The entire separation of Great Britain from the Continent must have happened long after the deluge, and that of Ireland from Great Britain at a still later period; for wolves and bears were anciently found in both, and these must have passed from the Continent into Britain, and hence into Ireland, as it cannot reasonably be supposed that they were imported thither. The divisive force, says Kirwan (*ubi supra*), that separated Britain from Germany, seems to have been directed from North to South, but gradually weakened in its progress. Hence that island is sharpened northwards; but the impression must have been considerably weakened by the opposition of the granitic mountains that form the Shetland and Orkney isles. The rupture of the isthmus that joined Calais and Dover was probably effected by an earthquake at a later period, and gradually widened by tides and currents. Ireland was protected by Scotland from the violence of the northern shock; and therefore its separation from Scotland appears to have been late and gradual. That from England was probably diluvial, and effected by a southern shock. All these changes happened 3600 years ago; and there is no reason for thinking that the general level of the ocean has been since altered; but that of the continents seems to have varied considerably, being in some places higher and in some lower than it was in ancient times.

The world is ordinarily divided into two grand continents; the Old and the New; the Old comprehends Europe, Asia, and Africa; the New the two Americas, North and South.

The separation of the two continents Kirwan (*ubi supra*) supposes to have probably been the effect of excavation by volcanos; at least, he says, this cause is adequate to such an effect, and it still exists in the most northern parts; the superior fertility of the western coast of America may arise from the lavas ejected on that coast. But however this separation was effected, we have no traditional account of it, and the period in which it happened is no less difficult to be ascertained than the causes which produced it.

M. Buffon affirms, that they were not separated when the elephants lived equally in the north of Europe, Asia,

and America, the bones of which have been found in Russia, Siberia, and Canada. Hence he concludes, that the separation of the two Continents must have happened after the abode of these animals in the northern regions. But it has been doubted whether the remains of elephants and of the rhinoceros that have been lately found in Siberia, even allowing that the temperature of this country was ever so suited to the constitution of these animals as to admit of their living in it, belonged to animals which ever lived in it. As to the mode of their formation, we have different conjectures and theories, of which an account will be given under the articles DELUGE and EARTH.

M. Buffon observes (see Smellie's Translation, vol. i.) that the surface of the earth is divided, from one pole to the other, into two belts of land, and two of sea. The first and principal belt is the ancient Continent, the greatest length of which is a line commencing at the most eastern point of the north of Tartary, and extending from thence to the neighbourhood of the gulf of Linchidolin, where the Russians fish for whales, from thence to Tobolski; from Tobolski to the Caspian sea; from the Caspian sea to Mecca: from Mecca to the western part of the country inhabited by the Galli in Africa; from thence to Monocmuci, or Monomotapa; and, lastly, to the Cape of Good Hope. This line is about 3600 leagues in length (each league being about 2000 or 2100 fathoms long, and about 27 of them making a degree), and is never interrupted but by the Caspian and the Red Seas, which are of inconsiderable breadth. This greatest length of the Old Continent forms a diagonal line; for, if measured by a meridian, it will appear, that from the northernmost point of Lapland to the Cape of Good Hope, exceeds not 2500 leagues; and that this line, though shorter, meets with greater interruption from the Baltic and Mediterranean. With regard to all other lines which could be drawn under the same meridians in the Old Continent, they must still be shorter than those above-mentioned. *E. G.* From the most southern point of the island of Ceylon to the northernmost coast of Nova Zembla, the distance is 1800 leagues. Thus also, if the Continent be measured by lines parallel to the equator, its greatest length, without much interruption by seas, will stretch from Trefana, on the west coast of Africa, to Ninpo, on the east coast of China, which is about 2800 leagues. Another line may begin near Brest, and extend to the coast of Chinese Tartary, which will be nearly 2300 leagues. From Bergen in Norway to the coast of Kamtschatka the distance is only 1800 leagues. All these lines are much shorter than the first. Hence the greatest length of the Old Continent extends from the eastern point of Tartary to the Cape of Good Hope, and is about 3600 leagues. This line may be considered as the middle of the ancient Continent; for in measuring the surface on each side of it, M. Buffon found, that, on the left there are 2,471,092 $\frac{3}{4}$ square leagues; and on the right, 2,469,687, which two lines differ only by 1405 $\frac{1}{2}$ leagues, or barely 1 $\frac{1}{2}$ degree square. Hence the Old Continent contains about 4,940,780 square leagues, which is not one fifth part of the earth's surface, and may be regarded as a large belt of earth, with an inclination to the equator somewhat more than 30 degrees.

The New Continent is another belt of earth, the greatest length of which may be taken from the mouth of the river Plata to the lake of the Assinibois. This line passes from the mouth of the river Plata to lake Caracas; from thence to Mataguays, Pocona, Zongo, Mariana, Morua, St. Fé, and Cathagena; then it passes through the gulf of Mexico

Mexico to Jamaica and Cuba; from thence along the peninsula of Florida, through Apalache, Chicachas; and from thence to St. Louis, Fort le Sueur; and terminates in the country bordering on lake Assiniboils, the extent of which is unknown. This line is interrupted only by the gulf of Mexico, is about 2500 leagues in length, and divides the New Continent nearly into two equal parts; that on the left containing $1,069,286\frac{1}{2}$ square leagues, and that on the right $1,070,926\frac{1}{2}$; the difference of which is $1639\frac{1}{2}$, or scarcely $1\frac{1}{2}$ degree square. This line is the middle of a belt of land, called the New Continent, and is inclined to the equator somewhat less than 30° , but in an opposite direction to the former; for that of the Old Continent extends from the N. E. to the S. W.; but that of the New Continent from N. W. to S. E. The superficial contents of the Old and New Continents are about $7,080,993$ square leagues, *i. e.* not near a third part of the surface of the globe, which contains $25,000,000$ square leagues. Of these lines which divide the Continents into equal parts, it may be remarked, that they both terminate at the same degrees of N. and S. latitude; and that the two Continents make mutual advances, or projections, exactly opposite to each other; *viz.* those on the African coast, from the Canary isles to Guinea; and those of America, from Guiana to the mouth of the Rio Janeiro. It appears, therefore, that the most ancient lands on the globe are those which extend from 200 to 250 leagues on each side of the two lines above described.

Agreeably to this idea, it is found that, in the Old Continent, the most ancient countries of Africa are those which stretch from the Cape of Good Hope to the Red Sea and Upper Egypt, and are about 500 leagues broad; and, consequently, that the whole western coast of Africa, from Guinea to the straits of Gibraltar, are new lands. In the same manner, if we trace this line through Asia, and include an equal breadth, we shall find, that the most ancient countries are, the two Arabias, Persia, Georgia, Turcomania, a part of independent Tartary, Circassia, part of Muscovy, &c.; and, of course, that Europe, and perhaps also China, and the eastern part of Tartary, are comparatively new countries.

In the New Continent, we shall likewise find, that Terra Magellanica, the eastern part of Brazil, the country of the Amazons, of Guiana, and of Canada, are new lands, when compared with Tucuman, Peru, Terra Firma, the islands in the gulf of Mexico, Florida, the Mississippi, and Mexico. Moreover it may be observed, that the Old and New Continents are nearly opposite to one another. The Old Continent extends farther north of the equator than south; but the New, farther south than north. The centre of the Old Continent lies in the 16th or 18th degree of N. latitude; and the centre of the New Continent lies in the 16th or 18th degree of S. latitude; so as if they were intended to counterbalance each other. Besides, both continents resemble one another in this respect that they might be divided into two portions, which would be surrounded on all sides by the sea, except the two small isthmuses of Suez and Panama.

It is observable that the prodigious chains of mountains in these two continents run from W. to E. in the Old Continent, and from N. to S. in the New. In the Old Continent there are about 430 rivers which directly fall either into the Ocean, or into the Mediterranean and Black seas. But in the New Continent we know only of 135 rivers which fall immediately into the sea. Both the Old and New Continents appear to have been encroached upon by the Ocean in the same latitudes: both are furnished with a great Mediterranean and a vast number of islands, which likewise lie nearly in the same latitudes. The only difference is, that

the Old Continent, being much larger than the New, has a Mediterranean on its west coast, to which the New Continent has nothing analogous. But both seem to have undergone similar revolutions: These revolutions are greatest near their middle parts, or between the tropics, where the motion of the sea is most violent. For other particulars relating to these Continents, we refer to the description of their respective countries.

It has been remarked, that a considerable portion of the elevated and solid matters or strata which form our Continents, are opposite to a large or deep ocean at the anti-podes or opposite side of the earth: and this circumstance affords matter for important reflections, when we take into our account that these parts, now so considerably elevated above the level of the Ocean, once formed part of its bottom, as appears from the nature and disposition of the strata themselves, but more especially from the shells and other aquatic remains found lodged in them, in a perfect and unbroken state, lying in the same manner and positions, as the shells, &c. of living animals are found to be distributed, on the bottom of the sea, in places where divers have had opportunities of examining them. The following questions here naturally present themselves; has the quantity of water on the surface of the earth been so much diminished, as to lay the continents thus bare; or, has the centre of gravity of the earth been so deranged, as to occasion the waters to accumulate in particular places and leave others uncovered? For a long time there seemed little difficulty in solving the mystery, by answering the first question in the affirmative, on the principles of those who maintained, that the earth was only a hollow crust or shell of matter, and that great part of the waters of the universal ocean had retreated into the internal cavities of the globe. But since the labours of British philosophers have concurred in proving, that the specific gravity of the entire or compound mass of the terraqueous globe is 5 times that of water, while all the water existing in or upon the earth, (of sp. grav. 1, or little more) and all the earths and stones (whose specific gravities do not exceed $2\frac{1}{2}$ or $2\frac{3}{4}$ on the average) are included; we are forced to conclude, not only that the central parts of the globe are solid, but composed also of much heavier materials, than those which constitute the superficial strata. Another circumstance also concurs to shew the improbability, of any large caverns now existing, filled with water in the interior parts of the earth, *viz.* the fissures, which so universally are found, breaking and dividing even the hardest rocks and strata, into comparatively small and irregular fragments, so as to render them incapable of arching or supporting themselves over water without an actual contact or bearing upon each other: and accordingly caverns or grottos of any considerable size are rarely met with in mining, and these principally, if not entirely, in very hard lime-stone strata, near the surface, and carrying but a comparatively small load of superincumbent strata.

This ruptured and broken state of the solid matters of the globe, has probably fitted them for obeying the action of the centrifugal force generated by its diurnal revolution, and for assuming nearly the form of an *ellipsoid* (as the late measurements of degrees upon the earth's surface in various parts of the world have shewn;) otherwise, most probably, the equatorial parts of the earth must have been occupied by a zone of water instead of possessing islands and parts of Continents in common with other parts of the world, as they now do. Let the reader but consider the immense weight of solid matter which exists above the level of the sea, or general ellipsoidal lines of equilibrium, in one of our Continents; and suppose a cylindrical perforation to be made under such Continent, quite through the earth to the opposite ocean, so

as to separate, for the sake of argument, this cylindrical column of the earth and water from the rest of the earth, (as the broken state of the strata and the actual hardness of their fragments entitles us to suppose possible) and it will appear, as a necessary consequence of equilibrium, that the continent and strata under it to the centre of the earth must be equal in weight to the same space of Ocean at the antipodes, and the strata under its bottom extending to the same centre; for if these were different, and we suppose the Continent to preponderate, it is plain from the waters of the Ocean covering the other end of the cylinder being at liberty to recede, that they would do so, and the Continent would sink and the bottom of the opposite Ocean would rise, until the equilibrium was restored: and in like manner if the strata under the ocean be supposed the heaviest, a further protrusion and consequent elevation of the Continent, compared with its surrounding seas, would ensue. This view of the subject leads, in the opinion of the writer of this part of our article, to the conclusion, that a very large mass, or perhaps several masses of matter of a high specific gravity, now occupy the bottom of the Ocean opposite to the Continents and large islands, which were not there at the time that these Continents occupied a lower place in respect to the centre of the earth, and were covered by the universal Ocean: and he thinks, that he has discovered the source whence these very heavy and disturbing masses of matter were derived, in the disappearance of some immense satellite body which apparently for a long period revolved round this earth, very near to its surface, and occasioned tides so rapid and enormous, as to leave up the land and break the strata into innumerable fragments, permanently denuding some parts, when elevated above the point of equilibrium between the earth and satellite's attraction, and pouring down upon other parts of the surface, such torrents of the ruins of abraded strata, as entirely to hide the strata of these districts under alluvial coverings; forming, in numerous instances, hills of great height and extent, containing large and irregular fragments of rocks, and different known strata, thrown together throughout their whole thickness and extent, in the greatest apparent confusion. For other observations and conjectures, relating to this subject; see EARTH.

The discovery of a southern Continent has been an object of curious and diligent investigation; but hitherto without success. Captain Cook's second voyage commenced in the year 1772, was undertaken with a particular view to the decision of the question, concerning the existence of a southern Continent. In the prosecution of this voyage, and while he was proceeding southward in quest of a Continent, he fell in with ice islands, in S. lat. $50^{\circ} 40'$ and 2° of longitude from the Cape of Good Hope; in his farther progress, he was stopped by other fields of ice, which led him to imagine, from a notion that these are formed in bays and rivers, that he could not be at a great distance from land. But having failed in S. lat. $55^{\circ} 40'$ for more than 30 leagues along the edge of the ice without finding any opening, he found that this ice did not join the land; and therefore he thus discovered the fallacy of the general opinion, that ice is always formed in the vicinity of land. The observations of captain Cook confirmed those of other navigators, that the ead of the southern seas is much more intense than that of equal latitudes in the northern hemisphere; and he also ascertained that this cold was not owing to the vicinity of a Continent, as had formerly been imagined. On the contrary, it was now determined beyond dispute, that if any such Continent existed in the eastern part of the southern Ocean, it must be confined within the latitude of 60° . Having advanced as far as S. lat. $62^{\circ} 10'$ and W. long. 172° , he found

the farther he proceeded that the number of ice islands very much increased; and in lat. $6^{\circ} 31'$, and W. long. $142^{\circ} 54'$, he got into such a cluster of these islands that it was both difficult and dangerous to escape them. Finding it impossible to get any farther to the southward, he determined to explore a considerable tract of sea to the north of his present situation, and then again to stand to the south. But in this he was unsuccessful; no land being discovered either in sailing northward, eastward, westward, or southward; though he proceeded in the last direction as far as $71^{\circ} 10'$ S. lat. and $106^{\circ} 54'$ W. long. It was now impossible to advance; and it was the opinion of the captain himself, as well as of most of the gentlemen on board, that the ice by which they were now stopped extended as far as the pole. The most southerly land discovered by this persevering navigator was that on which he bestowed the name of "Southern Thule," and which is situated in S. lat. $55^{\circ} 13' 30''$, W. long. $27^{\circ} 45'$. Here not a single herb of any kind was seen, but very high and barren mountains, the tops of some of which reached above the clouds; and we may observe, that this seems to be the only part of the world hitherto discovered, altogether unfit for the support of animal life. This country was discovered on the 31st of January 1775. Upon the whole, it may be concluded, that the greatest part of the southern Continent, if it has any existence, must be within the polar circle, where the sea is so encumbered with ice, that the land must be inaccessible. So great is the danger in navigating these southern seas, that captain Cook asserts on the most probable grounds, that such lands as lie to the southward of his discoveries could not be explored; and that even no man could venture farther than he had done. Thick fogs, snow-storms, intense cold, and every attendant circumstance that can render navigation difficult and dangerous, must be encountered; and all these difficulties and dangers are heightened to a very great degree by the inexpressibly horrid aspect of the country itself. It is a part of the world deemed by nature never to feel the warmth of the sun's rays, but to be buried in everlasting snow and ice. Whatever ports there may be in the coast, they are almost entirely covered with frozen snow of a vast thickness. If however any of them should be so far open as to invite a ship into it, she would run the risk of being fixed there forever, or of coming out on an ice island. Besides, the islands and floats on the coast, the great falls from the ice-cliffs in the port, or a sudden snow-storm, might be attended with equally fatal effects. For these reasons captain Cook determined to abandon the pursuit of a land, whose existence was so equivocal, but whose utility, if it could be discovered, was certain.

After captain Cook's persevering and fruitless traverses through every corner of the southern hemisphere, who, for the future, says the editor of Cook's third voyage (vol. i. Int. p. 56.), will pay any attention to the ingenious reveries of Campbell, de Broiles, and de Buffon? or hope to establish an intercourse with such a continent as Maupertuis's fruitful imagination had pictured? A Continent equal, at least, in extent, to all the civilized countries in the known northern hemisphere, where new men, new animals, new productions of every kind, might be brought forward to our view, and discoveries be made, which would open inexhaustible treasures of commerce. (See Maupertuis's Letter to the King of Prussia.) The author of the Preliminary Discourse to Bougainville's "Voyage aux Isles Malvaines" computes, that the southern Continent (for the existence of which, he owns, we must depend more on the conjectures of philosophers, than on the testimony of voyagers) contains

8 or 10 millions of square leagues! We can now boldly take it upon us to discourage all expeditions formed on such reasonings of speculative philosophers, into a quarter of the globe, where our persevering English navigator, instead of this promised fairy land, found nothing but barren rocks, hardly affording shelter to penguins and seals; and dreary seas and mountains of ice, occupying the immense space allotted to imaginary paradises, and the only treasures there to be discovered, to reward the toil, and to compensate the dangers of the unavailing search.

CONTINGENCY, in *Metaphysics*, denotes the mere possible existence or non-existence of an object in any future time; and is opposed to *necessity*; which see. See also **CHANCE** and **PROBABILITY**.

CONTINGENCY of blood, in the writers of the laws of Scotland, is used for *proximity of blood*. Bayne, Crim. Law. p. 48.

CONTINGENT, literally signifies what may or may not happen, what is casual or uncertain, and depending upon chance. See **CHANCE**. But in military acceptation, it denotes the quota or proportion of troops, money, and ammunition, which each of a body of leagued or confederated sovereigns, or princes, furnishes on emergencies, when required or called on, in virtue of and in support of the confederation. In the wars of the German empire, each prince and state, and all the members of the Germanic body, were obliged to furnish their contingent. In like manner the princes forming the *confederation of the Rhine*, are, at present, obliged to furnish their respective contingents.

CONTINGENT bill, of a regiment, is an account of the extra charges, which a regiment, in the due course of service, is from circumstances unavoidably and accidentally under the necessity of incurring.

CONTINGENT line, or *tangent-line*, in *Dialling*, denotes the intersection of the planes of the dial and equinoctial, and it intersects the subtile or subltial line at right angles.

CONTINGENT legacy, is a legacy depending on the life of the legatee; if it be left to any person, *when or if* he attains the age of twenty-one, and if he dies before that time, it is a lapsed legacy; but if it is left to be paid when he attains that age, it is a vested legacy; and if the legatee dies, his representatives shall receive it out of the testator's estate at the time, when it would have become payable, if the legatee had lived.

CONTINGENT, or *Executory remainder*, in *Law*, is where an estate is limited to take effect, either to a dubious and uncertain person, or upon a dubious and uncertain event; so that a particular estate, which doth support a remainder, may or may not determine before the remainder may commence. This kind of remainder is opposed to *vested or executed remainders*. 3 Rep. 20. See **REMAINDER**.

CONTINGENT use, in *Law*, is an use limited in a conveyance of land, which may, or may not, happen, to vest, according to the contingency expressed in the limitation of such use. An use in contingency is such which by possibility may happen in possession, reversion, or remainder. 1 Rep. 121. See **USE**.

CONTINGENTS are sometimes also used by mathematicians in the same sense as *tangents*.

CONTINI, GIAMBATISTA, in *Biography*, an architect who enjoyed considerable reputation at Rome in the latter part of the 17th and the beginning of the 18th century. He was born in the year 1641, and after having acquired at the schools a competent knowledge of languages, the Belles Lettres, and geometry, was placed by his father, who was likewise an architect, under the tuition of the celebrated Bernini. The instructions of his master were not thrown away,

and Giambatista became employed by several of the first families of Rome. He constructed many of those magnificent altars and chapels with which the churches of Rome abound, and built the duomo of Vetralla as well as that of Vignarello. His works are enumerated by his biographer Lionc Pascoli, who informs us that he lived highly respected, and died in 1723. Pascoli.

CONTINUAL CLAIM. See **CLAIM continual**.

CONTINUAL proportionals. When in a series of quantities the first is to the second as the second to the third, and the third to the fourth, and the fourth to the fifth, &c. they are called *continual proportionals*: such are 1, 2, 4, 8, 16, &c. where the terms increase in a two-fold ratio; and 36, 12, 4, $\frac{4}{3}$, &c. where they decrease in a triple ratio. Such a series is otherwise called a *progression*.

CONTINUANCE, in *Law*, is much the same as *pro rogation* among the civilians. It denotes the continuing of a cause in court, by an entry upon the records there for that purpose. After issue or demurrer joined, as well as in some of the previous stages of proceeding, a day is continually given and entered upon the record, on which the parties are to appear, from time to time, as the exigency of the case may require. The giving of this day is called the "continuance," because thereby the proceedings are continued without interruption from one adjournment to another. If these continuances are omitted, the cause is thereby discontinued, and the defendant is discharged *sine die*, without a day, for this term: for by his appearance in court, he has obeyed the command of the king's writ; and, unless he be adjourned over to a day certain, he is no longer bound to attend upon that summons; but he must be warned afresh; and the whole must begin *de novo*. It may sometimes happen, that after the defendant has pleaded, nay, even after issue or demurrer joined, there may have arisen some new matter, which it is proper for the defendant to plead; as, that the plaintiff, being a feme-sole, is since married, or that she has given the defendant a release, and the like: here, if the defendant takes advantage of this new matter, as early as he possibly can, viz. at the day for his next appearance, he is permitted to plead it in what is called a plea *puis darrein continuance*, or since the last adjournment. For it would be unjust to exclude him from the benefit of this new defence, which it was not in his power to make when he pleaded the former. But it is dangerous to rely on such a plea, without due consideration; for it confesses the matter which was before in dispute between the parties (Cro. Eliz. 49.) And it is not allowed to be put in, if any continuance has intervened between the arising of this fresh matter and the pleading of it; for then the defendant is guilty of neglect or laches, and is supposed to rely on the merits of his former plea. Also it is not allowed after a demurrer is determined, or verdict given; because then relief may be had in another way, namely, by writ of *audita querela*. And these pleas *puis darrein continuance*, when brought to a demurrer in law or issue of fact, shall be determined in the same manner with other pleas. Blackst. Comm. vol. iii.

Continuances and essons are amendable upon the roll, at any time before judgment:—they are the acts of the court, and at common law they may amend their own acts before judgment, though in another term; but their judgments are only amendable in the same term in which they are given. (3 Lev. 431.) Upon an Original, one term, or two, or three terms may be mesne between the issue and the return; and this shall be a good continuance; for the defendant is not prejudiced by it, and the plaintiff may give a day to the defendant beyond the common day, if he will. But a continuance by *capias* ought to be made from term to term, and

there cannot be any mesne term, because the defendant ought not to stay so long in prison. (2 Dav. Abr. 150.) If a man recover upon demurrer, or by default, &c. and a writ of inquiry of damages is awarded, there ought to be continuance between the first and second judgment, otherwise it will be a discontinuance; for the first is but an award, and not complet, till the second judgment, upon the return of the writ of inquiry of damages. (Ibid. 153.) If the plaintiff be non-suited, by which the defendant is to recover costs; if the plaintiff will not enter his continuances, on purpose to save the costs, the defendant shall be suffered to enter them. (Cro. Jac. 316, 317.) The course of the court of King's Bench is to enter no continuance upon the roll, till after issue or demurrer, and then to enter the continuance of all upon the back, before judgment; and if it is not entered, it is error. (Trin. 16 Jac. B. R.) See DISCONTINUANCE.

CONTINUANCE of a writ, or action, is its holding in force from one term to another, in a case where the writ has not returned, or executed, a former writ issued out in the same action.

CONTINUANCE of assise. If a record in the treasury be alleged by one party, and denied by the other, certiorari shall be sued to the treasury and chamberlain of the exchequer; who, if they certify not that the said record is there, or likely to be in the Tower; the king shall then send to the justices, repeating the certificate, and will them to continue the assise.

CONTINUANDA assisa. See ASSISA.

CONTINUANDO, in *Lacu*, a term used in a declaration of trespasses, where a plaintiff would recover damages for several trespasses in the same action. To avoid multiplicity of suits, a man may in one action of trespasses recover damages for many trespasses; laying the first to be done with a *continuance* to the whole time in which the rest of the trespasses were done; which is done in this form: *continuando transgressionem predictam, &c. à predicto die, &c. usque, &c.* Terms de Ley. 2 Roll. Abr. 545. Lord Raym. 245. 7 Mod. 152.) This declaration of trespasses may be alleged, where the inquiry is continually renewed, as by spoiling or consuming the herbage with the defendant's cattle; in which case the *continuando* is good. (1 Lall. Abr. 307.) Thus also trespasses for breaking a house with *continuando* is good; and until a re-entry is made, the continuation of the possession is a continuing of the trespasses (Lutw. 1312.) But where the trespass is by one or several acts, each of which terminates in itself, and being once done cannot be done again, it cannot be laid with a *continuando*; yet if there be repeated acts of trespasses committed, (as cutting down a certain number of trees,) they may be laid to be done, not continually, but at divers times and days within a given period. Salk. 638, 639. Lord Raym. 823.

CONTINUANDO Processum. See PROCESSUM and CONTINUANCE.

CONTINUANS PUNCTUM. See PUNCTUM.

CONTINUATION OF MOTION. See MOTION and PROJECTILE.

CONTINUATIVE CONJUNCTIVES, in *Grammar*, are those conjunctions, uniting both sentences and their meaning, which join those sentences only, which have a natural connection; in contradistinction to copulative, which join all sentences, however incongruous in signification. The latter merely couple sentences, and are applicable to all subjects, whose natures are not incongruous. The former, on the contrary, by more intimate connection, consolidate sentences into one continuous whole, and are therefore applicable only to subjects which have no essential coincidence.

The principal copulative in English, is, *and*; the continuatives are, *if, because, therefore, that, &c.* E. G. "Lyfippus was a flutary, and Priscian was a grammarian."—"The sun shineth, because the sky is clear." Continuatives, according to the distribution of Mr. Harris (Hermes, p. 244.) are either suppositive, as, *if*; or positive, as, *because, therefore, &c.* E. G. "You will live happily, if you live honestly."—"You will live happily, because you live honestly." The difference between these continuatives is this; the suppositives denote connection, without asserting actual existence; and the positives imply both the one and the other. Moreover, positives are either casual, as, *because, since, &c.*; or collective, as *therefore, then, &c.*; and they differ in this respect, that the causals subjoin causes to effects, thus; "the sun is eclipsed, because the moon intervenes;" but the collectives subjoin effects to causes, thus; "the moon intervenes, therefore the sun is eclipsed." All these continuatives may be resolved into copulatives. Instead of "because it is day, it is light," we may say, "it is day, and it is light."

CONTINUATO, in the *Italian Music*, is used to direct a finger, or player, to continue or hold on a sound, in equal strength or manner; or to continue a movement in an equal degree of time all the way.

CONTINUED FEVER. A fever without remissions or intermissions. See FEVER.

CONTINUED QUANTITY. } See CONTINUUM, CONTINUITY,
CONTINUED BODY, &c. } and QUANTITY.

CONTINUED, or *through bass*, in *Music*, is that which continues to play constantly, both during the recitatives, and to sustain the choir, or chorus.

CONTINUED PROPORTION, in *Arithmetic*, is that in which the consequent of the first ratio is the same with the antecedent of the second: as, 3 : 6 :: 6 : 12. See PROPORTION.

On the contrary, if the consequent of the first ratio be different from the antecedent of the second, the proportion is said to be *discrete*: as, 3 : 6 :: 4 : 8. See DISCRETE.

CONTINUED SOLE, or *sole*, in *Architecture*. See SOLE.

CONTINUED ATTIC, Community, *Pedestal*. See the substantives.

CONTINUI SOLUTIO. See SOLUTIO.

CONTINUITY is usually defined among *Schoolmen*, the immediate cohesion of parts in the same *quantum*. Others define it, a mode of body, whereby its extremes become one; and others, a state of body resulting from the mutual implication of its parts.

Continuation relates to *duration*, and continuity to *extension*. We say, the *continuation* of a work, or an action; and the *continuity* of space or size; *continuation* of the same conduct; and *continuity* of the same building.

There are two kinds of continuity, *mathematical* and *physical*. The first is merely imaginary and fictitious; since it supposes real or physical parts where there are none. *Physical* continuity is, strictly, that state of two or more parts, or particles, wherein they appear to adhere, or constitute one uninterrupted quantity, or *continuum*; or between which we perceive no intermediate space.

The schoolmen distinguish two other sorts of continuity; viz. *homogeneous*, and *heterogeneous*. The first, where our senses do not perceive the bounds, or extremes, of the parts; and this agrees even to air, water, &c. The second, where our senses indeed perceive the extremes of certain parts, yet at the same time observe the same parts closely linked to each other; either in virtue of their situation or figure, &c. and

and this is chiefly attributed to the bodies of animals and plants.

The continuity of bodies is a state merely relative to our sight and touch: *e. gr.* if the distance of two separate objects be such, as that the visual angle they subtend is insensible to the eye, which it will be if less than sixteen seconds, the two separate bodies will then appear *contiguous*. Now, the result of several *contiguous* objects, is a *continuity*: so that any number of visible objects, being placed so as that the distances subtend angles of less than sixteen seconds, they will appear to form one *continuum*.

And hence, as we can determine the distance at which any given magnitude becomes invisible; it is easy to find at what distance any two bodies, however remote from each other, will appear as contiguous; and several, as forming one *continuum*. For the physical cause of continuity, see COHESION.

Leibnitz, an eminent mathematician, has supposed what he calls a law of continuity to obtain in the universe, by which law every thing that is executed or done in nature, is done by infinitely small degrees. He urges, that good sense dictates this truth, *natura non operatur per saltum*, or that nothing can pass from one extreme to another, without passing through all the intermediate degrees. Bernoulli Opera, tom. iii. p. 9. *sq.*

This law seems subject to difficulties: rigorously taken, it supposes actual, and yet infinitely small changes, which some philosophers cannot resist; and if we suppose changes only imperceptible to our senses, but finite, the law of continuity is no less violated, than if the universe were to be suddenly destroyed, as M. Maupertuis justly observes. Mem. de l'Acad. de Berlin. tom. ii. p. 284.

This law of continuity led Mr. Bernoulli to reject all hard bodies as chimeras, and naturally impossible.

CONTINUO, in the *Italian Music*, is sometimes applied to *basso*, to signify the thorough-bass. That *l'asso continuo*, is the continual, or thorough-bass. It is sometimes marked in music books by the letters B, C.

CONTINUO is also used for a species of harmony mentioned by Julius Pollux, and which, says Zarlino, answers to the perpetual burden of our bag-pipes, which now and then must be harmonious.

CONTINUOUS FEVERS. See CONTINUED fever.

CONTINUUM, or CONTINUED quantity, in *Physics*, denotes a quantity, or co-extension, whose parts are not divided, but joined and connected together, so as to leave no room to determine where one begins, and another ends.

It is controverted, among philosophers, whether a *continuum* be infinitely divisible, *i. e.* divisible into infinite proportionable parts?

The ancients attributed the rise of water, in pumps, to the love of continuity, and the abhorrence of a vacuum; because the weight and pressure of the air were not then known.

Mathematicians divide quantity into *continued* and *discrete*. The former being that which is expressed by lines, and makes the subject of geometry; and the latter comprehending those that are expressed by numbers, which make the subject of arithmetic.

In medicine and chirurgery, wounds, ulcers, fractures, &c. are expressed by the phrase *solutio continui*, or *solution of continuity*.

In a critical sense, we say, there ought to be a continuity, *i. e.* a connexion between the parts of a discourse.

In the epic poem, particularly, the action should have a continuity in the narration, though the events, or inci-

dents. be not continued. As soon as ever the poet has opened his subject, and brought his persons on the stage, the action is to be continued to the end; every character must be at work, and no such thing as an idle person to be seen.

F. Bossu observes, that, by retrenching dull languishing incidents, and intervals void of action, which break the continuity, the poem acquires a continued force, which makes it run equally throughout.

CONTOBADDITES, a sect in the sixth century. Their first leader was Severus of Antioch, who was succeeded by John the grammarian, surnamed Philoponus, and one Theodosius; whose followers were also called Theodofians.

Some of them who were willing to receive a book composed by Theodosius on the Trinity, made a separate body, and were called *Contobaddites*, from a place not known, which Nicephorus does not mention, but which must apparently have been the place where they held their assemblies.

The Contobaddites allowed of no bishops; which is the only circumstance transmitted to us concerning them.

CONTOCOOK, in *Geography*, a river of the United States of America, in New Hampshire, which runs into the Merrimack, four miles N. of Concord.

CONTOPECTÆ, of *κοντος, pole*, and *πηκτος, compati*, in *Antiquity*, a sort of artists who supported a pole on their foreheads so firmly, that boys could play, dance, and wrestle together on it.

CONTOR, or CUNTORE, in *Ornithology*. See CONDOR.

CONTORSION, in *Surgery*, a twisting or deformity of some part of the body; arising generally from a diseased structure of the bones, or an irregular action of the muscles. Thus a contorsion of the back may be occasioned by a caries, or a rickety disposition in the vertebrae; and a contorsion, or twisting of the head, so that the chin shall be turned towards one shoulder, may arise from a paralysis, or a spasmodic state of the sterno-mastoid muscle. But the nature of this disease is more particularly described under the article DISTORTION, to which the reader is referred.

CONTORTÆ, or CONTORTI, in *Botany*, the twentieth natural order in the *Philosophia Botanica* of Linnæus, and the thirtieth of the *Prælections*. In the *Philosophia Botanica*, it consists of the following genera: *rauwolfia*, *tevetia*, *cerbera*, *plumiera*, *tabernamontana*, *cameraria*, *periploca*, *nerium*, *vinca*, *apocynum*, *cynanchum*, *ceropogia*, *asclepias*, *stapelia*. In the *synoptic table*, annexed to the *Prælections*, they stand thus: I. Pericarp a follicle; *tabernamontana*; *cameraria*; *plumiera*; *echites*; *nerium*; *ceropogia*; *vinca*; *apocynum*; *asclepias*; *cynanchum*; *periploca*; *argularia*; *stapelia*; **umbotrium*, *Forst.* **rhopala*, *Aubl.*; *plecronia*? *allamanda*. II. Pericarp a capsule; *macrocnemum*; *manettia*; *cinchona*, removed from *cymolfa*; *portlandia*; *rondeletia*; *hillsia*; *genipa*. III. Pericarp a berry; *gardenia*; *musfenda*; *randia*; **lagraea*, *Thunb.*; *carissa*; *pæderia*; *arduaia*; *lycium* and *cestrum*, both removed from *vepoculæ*; **gynopogon*, *Forst.* **willughbeja*. *Schreb.*; *melodinus*, *Linn. jun.* IV. Pericarp a drupe; *rauwolfia*; *cerbera*. Those printed in italics were added by Linnæus himself; those marked with an asterisk, by Giseke from other authors. The order was named by Linnæus, from the form of the corolla, which is twisted in a direction contrary to the sun: its border, when open, resembles a wheel, each segment having generally unequal sides, with the shorter side placed under the longer side of the preceding one. Only three of the genera are natives of Europe, *asclepias*, *vinca*, and *cynanchum*: most of them are lactescent and poisonous;

some highly deleterious. *Root* perennial. *Leaves* undivided, generally opposite, sometimes three or four together, rarely alternate. *In-florescence* of ten singular, the peduncle arising from the side of the stem betwixt the pairs of leaves, not from their axils. *Calyx* one-leaved, five-cleft. *Corolla* regular, monopetalous, five-cleft; structure of the nectaries in most genera very singular. *Stamens* five. *Pistils* two, or one with a double stigma. *Germ* generally superior.

CONTOUR, in *Painting* or *Drawing*, a French word, synonymous with *contours* in the Italian, and outline in the English language. Perfection of outline constitutes, perhaps, the greatest difficulty in painting; although it is, properly speaking, only *one* of the requisites of design; yet the knowledge of it seems necessary to pre-suppose a thorough acquaintance with all the remainder; and hence the adage of Annibale Caracci, not very delicately expressed in the Italian, "Give me but a correct outline, and fill it up as you please!" See **DESIGN**.

CONTOUR, also denotes the compass, limits, or enceinte of a country, place, camp, plan, design, &c. It is the ground work of each of these things.

CONTOURNE', a French term applied to any animal that is standing or passing with its face towards the sinister side of the escutcheon. In English heraldry it is termed *counter passant*.

CONTOURNIATED, or **CONTORNIATED**, a term applied among *Antiquaries* to a species of medals, so called from the Italian *contorniate*, encircled, on account of the hollow circle which commonly runs round them. They are distinguished from medallions, as they are sometimes denominated, not by their size, but by their thinness; faint relief; reverses sometimes in *intaglio*, hollowed, not raised; and, in general, by their peculiar and inferior workmanship. Medallist writers have formed various opinions concerning these singular pieces of coinage. Some suppose that they were struck by Gallienus, to the memory of illustrious men, and celebrated athletes, at the time when he caused all the consecration-coins of his predecessors to be reformed. This sentiment seems nearly to have been adopted by M. Mahudel, who says, (Hist. de l'Acad. des Belles Lettres, tom. v. p. 284.) that the contorniate were struck originally at Rome, about the close of the third century. F. Hardouin conjectures, that they were not earlier than the 13th century; other antiquaries refer them to the fifth century; and others find instances of them as ancient as the time of Nero; others again ascribe the invention of them to Greece, in her days of glory, and they suppose that they were appropriated to the purpose of honouring the memories of great men, and principally of those who had borne away the prize at the solemn games; such are those which bear the names or images of Homer, Solon, Euclid, Pythagoras, Socrates, Apollonius Tysæus, and several Athletes, whose victories are expressed upon them by palms, and chariots, either bigæ or quadrigæ. Havercamp, in an express work on these pieces, thinks they were struck from the times of Constantine I. to those of Valentinian III. on account of the public games. Mr. Pinkerton (Ess. on Medals, vol. i. p. 232.) suggests, that they were tickets for different places in the public games. The dye, appearance, device, inscription of the reverse—every thing—confirmed this opinion; which he has found perfectly consonant to that of two or three of the first medallists in this country. This opinion is so far conformable to that of Havercamp, and others, as it supposes that these pieces were struck upon occasion of the games. But it differs in representing these medals, as mere tickets for places at the games; and still more in supposing them struck in all ages of the empire, from Augustus, downwards. Those who suppose them struck

in the lower empire, are reduced to the deplorable dilemma of imagining, that Christian princes thought Nero's head an honour to their games; and that they preserved the portrait of Apollonius Tyanæus, the enemy of their faith, and those of other Pagan philosophers. Joubert indeed ascribes them to the upper empire, without determining whether they were struck under one prince, or all who gave games. Mr. Pinkerton is convinced, that they were struck under the various emperors whose names they bear; and that when Constantine I. introduced Christianity, they would almost vanish, instead of beginning, according to the opinion of Havercamp. The difference of workmanship, in these pieces, if accurately inspected, may shew this of itself, independently of other reasons. Although these pieces are of different kinds, they are mostly of a size between two and three inches in diameter. Some have, upon the obverse part, the head of the emperor or empress, who gave the games; and almost a series of them might be formed from Augustus down to Gallienus. In confirmation of this opinion, it is further alleged, that those emperors, who were remarkably distinguished by their attachment to public diversions, occur very frequently on these pieces, which Mr. Pinkerton calls "ticket-medals," whereas others appear more seldom, and those who never performed any games, not at all. Those with Nero on their obverse are so common as to be of very little value. Other obverses preserve the portraits of illustrious authors of antiquity, that are no where else to be found. Sallust, Horace, and other Roman writers, were delineated on these tickets, when the memory of their persons was yet fresh to the inhabitants of Rome, and we may therefore depend upon their portraits. This cannot be said of the Greek portraits of Homer, Solon, Pythagoras, Socrates, and others, all which our author supposes to have been struck at Rome, when Grecian actors were to perform, or in the Grecian cities, during the Roman empire. A few obverses present athletes, or actors in the games, and such are commonly represented holding a horse by the rein, or in some other attitude peculiar to their profession. On the reverses there is almost always a charioteer driving a chariot, or some similar device, peculiar to public games. Those struck for the theatre are the most scarce, and have sometimes on the reverse an actor at full length, with "PLACEAS;" *mayest thou please*, or some such legend. One, in particular, has a bust of Sallust on the obverse; and on the other side three persons, one of whom bears an instrument, resembling the common flute; another an instrument like the fœnic flute seen in the hands of Pan; while the third is declaiming. The legend is "PETRONI PLACEAS," *mayest thou please, Petronius*. The person declaiming is Petronius, who was, perhaps, that day, to make his first appearance upon the Roman stage; and the whole design, in this last instance, is so clear, that Mr. Pinkerton cannot forbear being surprised, that the intention of these tickets should so long have escaped the medallist authors. The supposition that they were tickets for different seats, or places, at the games, is further confirmed by the variety of marks to be found on the obverses of them. Some have a sprig of laurel; others a P, with an E below it implying, perhaps, "podium equestræ," or the box of the equestrian order, which last is very common; others bear a particular animal, or some such badge. All these marks, in tickets perfectly preserved, are cut in the brass, and then filed up with silver. The pieces of this class, with imperial portraits, are of little value; those bearing the images of illustrious men, are estimable, though not of great price. Apollonius Tyanæus, who flourished in the reign of Domitian, and Apuleius, who lived in that of Antoninus the philosopher, are, it is believed, the

latest of that description who appear upon these ticket-medals.

CONTRA, or **COUNTER**, in *Composition*. See **COUNTER**.

CONTRA, *Lat.* a preposition frequently used by the Italians in their *Musick*: *contrappunto*, counterpoint; *contra basso*, double base; *contralto*, counter tenor; *contrappunto doppio*, double counterpoint; *contrappunto semplice*, simple counterpoint; *contrappunto fiorito*, florid counterpoint, &c. This Latin word, which the Italians have adopted, was originally applied to all the several parts destined to make harmony to a plain song or melody, as counterpoints or counterparts to the canto fermo. Thus, harmony in four and more parts was formed: as *basso*, base; *medius*, mean or middle part; *alto tenore*, high tenor, from the situation of the clef on the staff; the *discantus*, *soprano*, *triplum*, or treble. When the alto tenore sung the part opposite or against the treble, it was called *contralto* or *counter tenor*; and when a lower part was employed than the base, it was called *contra basso*: the title now given to a double base.

CONTRA, in *Surgery*. See **COUNTER-sUTURE**, **COUNTER-extension**, **COUNTER-opening**, **COUNTER-stroke**, &c.

CONTRA battuta, in *Musick*, against, or out of time.

CONTRA formam collationis, in *Law*, a writ that lay where a man had given lands, in perpetual alms, to a religious house, hospital, school, or the like, and the governor, or managers, had alienated the lands, contrary to the intention of the donor, for the recovery of them. Reg. Orig. 258.

This was founded on the statute of Westm. 2. cap. 1.

CONTRA formam feoffamenti, a writ that lay for the heir of a tenant, in fee of lands or tenements by the lord's charter, to make certain suit and service to his court; who was afterwards distrained for more services than were contained in the charter. Reg. Orig. 176. Old Nat. B. ii. 162.

CONTRA formam statuti, is the usual conclusion of every indictment, &c. laid on an offence created by statute.

If one statute be relative to another, as where the former makes the offence, and the latter adds a penalty, the indictment ought to conclude *contra formam statutorum*. 2 Hale's Pl. C. 173. c. 24. Where there are several statutes, and it does not appear on which the information is founded, the conclusion, "contra formam statuti" is ill. Cro. Jac. 142. Pl. 19. Broughton v. Moor, &c.

CONTRABAND, in *Commerce*, a prohibited commodity; or a merchandize bought or sold, imported or exported, in prejudice, and contrary to the laws and ordinances of a state, or the public prohibitions of the sovereign.

The word comes from the Italian *contrabando*, of *contra* and *bando*, q. d. contrary to edict, or publication of prohibition.

Contraband goods are not only liable to confiscation themselves, but do also subject all other allowed merchandizes found with them in the same box, parcel, or bale, together with the horses, waggons, &c. which conduct them to the same.

In England there are two principal contrabands for exportation, wools and live sheep, which all strangers are prohibited from carrying out, on pain of having the right hand cut off; the other, that of sheep-skins and calf-skins, which all foreigners are in like manner prohibited from exporting, on pain also of having the right hand cut off; yet the subjects of England are allowed to transport the same from France to England. See **WOOL** and **SHEEP**.

Since the year 1662, when bills were formed of contraband goods, as to the import, and which included more

than fifty different sorts, many regulations and statutes have been enacted; and these are so numerous and various, and so liable to change in the fluctuating state of commerce, that in a work of this kind it would be of little permanent utility to recite them.

In 1719 and 1720, an attempt was made in parliament to pass a bill for putting gold and silver, whether in coined species, or otherwise, among the number of contraband goods for exportation; but in vain, by reason of the strong opposition made by those who enrich themselves by the export of these metals; which, by the laws of the kingdom, are allowed to be sent away, upon entering them, paying the duty of the export, and making oath of their being foreign, i. e. of their not being the coin or plate of the kingdom, melted down. See **CUSTOMS**.

CONTRACT, a mutual consent of two or more parties, who promise and oblige themselves voluntarily, to do something, pay a certain sum, or the like.

As a contract is a mutual promise, the obligation of contracts, the sense in which they are to be interpreted, and the cases where they are not binding, will be the same as of promises. See **PROMISE**. From the principle on which the obligation of promises is founded, viz. "that this obligation is to be measured by the expectation which the promiser any how voluntarily and knowingly excites," results a rule, which governs the construction of all contracts; and is capable, from its simplicity, of being applied with great ease and certainty: the rule is, that "whatever is expected by one side, and known to be so expected by the other, is to be deemed a part or condition of the contract." The several kinds of contracts may be comprehended under those of sale, hazard, loan of inconsumable property and of money, and labour, including service, commissions, partnership, and offices. With regard to contracts of sale, the rule of justice, which ought principally to be inculcated in the making of bargains, is, that the seller is bound in conscience to disclose the faults of what he offers to sale. If it be deemed dishonest to magnify beyond the truth the good qualities of the commodity which we have to sell, is it less unjust to conceal its faults? The buyer in many cases has no security from imposition, but in the ingenuousness and integrity of the seller. This rule, however, admits of one exception, namely, where the silence of the seller implies some fault in the thing to be sold, and where the buyer has a compensation in the price for the risk which he runs: as where a horse, in a London repository, is sold by public auction, without warranty; the want of warranty is notice of some unfitness, and produces a proportionable abatement in the price. (See **WARRANTY**.) To this head of concealing the faults of the article which we want to dispose of may be referred the practice of passing bad money. This practice has been sometimes defended by a vulgar excuse, that we have taken the money for good, and must therefore get rid of it: that is, in other words, we have been deceived or imposed upon, and therefore we may deceive or impose upon others. This excuse is much the same, as if one, who had been robbed upon the highway, should allege that he had a right to reimburse himself out of the pocket of the first traveller he met; the justice of which reasoning the traveller possibly may not comprehend. (See **UTTERING of false money**.) Where no monopoly or combination exists, the market price is always a fair price; because it will always be proportionable to the use and scarcity of the article. Innumerable questions relating to this kind of contract are determined solely by *custom*; not, indeed, that custom possesses any proper authority to alter or ascertain the nature of right and wrong; but because the contracting parties are presumed

presumed to include, in their stipulation, all the conditions which custom has annexed to contracts of the same sort; and when the usage is notorious, and no exception made to it, this presumption is generally agreeable to the fact. Thus, in justice as well as in law, what is called "the custom of merchants" regulates the construction of mercantile concerns.

By contracts of hazard are meant *gaming* and *insurance*. See these articles.

Contracts of loan comprehend those pertaining to inconvertible property, and to money. When the identical loan is to be returned, as a book, a horse, &c. it is called "inconvertible," in opposition to corn, wine, money, and those things which perish, or are parted with in the use, and can therefore only be restored in kind. The questions pertaining to this class of contracts are few and simple, and admit of an easy and obvious solution. If the thing lent be lost, or damaged by the use, or by accident in the use for which it was lent, the lender ought to bear the loss or damage. With regard to the loan of money, there exists no reason in the law of nature, why a man should not be paid for the use of his money lent, as well as of any other property into which the money might be converted. (See INTEREST and USURY.) For contracts of labour, see SERVANT, COMMISSION, AGENT, FACTOR, STEWARD, ATTORNEY, and ADVOCATE. See also PARTNERSHIP. Under this head it may be observed, that in many offices, as schools, fellowships of colleges, professorships of the universities, and the like, there is a two-fold contract; one with the founder, and the other with the electors. The contract with the founder obliges the incumbent of the office to discharge every duty appointed by the charter, statutes, deed of gift, or will of the founder; because the endowment was given, and consequently accepted, for that purpose, and upon those conditions. The contract with the electors extends this obligation to all duties that have been customarily connected with, and reckoned a part of, the office, though not prescribed by the founder; for the electors expect from the person they chuse all the duties which his predecessors have discharged; and as the person elected cannot be ignorant of their expectation, if he mean to refuse this condition, he ought to apprise them of his objection. Here it should be observed, that the electors can excuse the conscience of the person elected from this class of duties only; because this class results from a contract, to which the electors and the person elected are the only parties. The other class of duties results from a different contract; and with respect to these a question arises of delicate investigation, and of difficult solution, *viz.* how far the incumbent of an office may be allowed to deviate from the will of the founder, and to suppose him placed in circumstances similar to his own, and, in this new state of things, capable of forming a different judgment, and equally disposed to adapt his regulations and injunctions to the change of circumstances, which, in the course of ages, has occurred?—The best mode of easing the consciences of incumbents, in cases of this kind, is to introduce a reformation in many antiquated establishments, and in the laws, already obsolete, and, as it were, quiescent, by which they were designed by their unenlightened, but liberally disposed, founders to be regulated. Few of these contracts, to which we now refer, have, we conceive, been liberally and punctually fulfilled in modern times; and it would be unquestionably more conducive to the honour and usefulness of ancient institutions, and of official incumbents, to abolish regulations, which it is not thought proper to observe. It has been a question of some magnitude and difficulty, what offices may be conscientiously supplied by a

deputy. A deputy, according to archdeacon Paley, may be allowed in all cases, to which the following objections do not apply: 1. Where a particular confidence is reposed in the judgment and contract of the person appointed to it; as the office of a steward, guardian, judge, commander in chief by land or sea. 2. Where the custom hinders; as in the case of schoolmasters, tutors, and of commissioners in the army or navy. 3. Where the duty cannot, from its nature, be so well performed by a deputy; as the deputy-governor of a province may not possess the legal authority, or the actual influence of his principal. 4. When some inconvenience would result to the service in general from the permission of deputies in such cases; *e. g.* it is probable that military merit would be much discouraged, if the duties belonging to commissions in the army were generally allowed to be executed by substitutes. In this connection, the non-residence of the parochial clergy, who supply the duty of their benefices by curates, presents itself to consideration; but as it will require a more distinct discussion, we refer to the article NON-RESIDENCE. On the subject of this article, see Paley's Principles of Moral and Political Philosophy, vol. i. p. 142—163.

CONTRACT is particularly used in *Common Law*, for an agreement or covenant between two or more persons, with a lawful consideration or cause. As, if I sell my horse for money; or covenant in consideration of 20*l.* to make you a lease of a farm; these are good contracts, because there is *quid pro quo*, or one thing for another. Or, a contract, which usually conveys an interest merely in action, may be thus defined: "An agreement upon sufficient consideration, to do or not to do a particular thing." In all contracts, therefore, our attention is directed to three points, *viz.* the agreement, the consideration, and the thing to be done or omitted, or the different species of contracts. In a contract, considered as an agreement, a mutual bargain, or convention, there must be at least two contracting parties, of sufficient abilities to make a contract, as where A. contracts with B. to pay him 10*l.*, and thereby transfers a property in such sum to B. This property, however, is not in possession, but in action merely, and recoverable by suit at law; so that it could not be transferred to another person by the strict rules of the ancient common law, for no chose in action could be assigned or granted over. See CHOSE *in action*.

This contract or agreement may be either *express* or *implied*. *Express* contracts are where the terms of the agreement are openly uttered and avowed at the time of the making, as to deliver an ox, or ten load of timber, or to pay a stated price for certain goods. *Implied* are such as reason and justice dictate, and which, therefore, the law presumes that every man undertakes to perform. There is one species of implied contract, which runs through and is annexed to all other contracts, conditions, and covenants, *viz.* that if I fail in my part of the agreement, I shall pay the other party such damages as he has sustained by such my neglect or refusal. In short, almost all the rights of personal property (when not in actual possession), do in great measure depend upon contracts of one kind or other, or at least might be reduced under some of them; and this is the method taken by the civil law, which has referred the greatest part of the duties and rights, of which it treats, to the head of obligations *ex contractu*, and *quasi ex contractu*. (Inst. 3. 14. 2.) See ASSUMPSIT.

A contract may also be either *executed*, as if A. agree to change horses with B., and they do it immediately; in which case the possession and the right are transferred together:—or it may be *executory*, as if they agree to change

next week; in which case the right only vests, and their reciprocal property in each other's horse is not in possession but in action:—for a contract executed (which differs nothing from a grant) conveys a *chose in possession*; a contract executory conveys only a *chose in action*. For an account of the consideration, upon which a contract is founded, see CONSIDERATION.

A consideration of some sort or other is so absolutely necessary to the forming of a contract, that a *nudum pactum*, or agreement to do or pay any thing on one side, without any compensation on the other, is totally void in law, and a man cannot be compelled to perform it. However a man may or may not be bound to perform such a contract, in honour or conscience, which the municipal laws do not decide, it is certain that these laws will not compel the execution of what he has no visible inducement to engage for:—and, therefore, our law has adopted the maxim of the civil law, that *ex nudo pacto non oritur actio*. (Cod. 2. 3. 10. & 5. 14. t. Ur. & St. d. 2. c. 24. Bro. Abr. tit. de te, 79. Salk. 129.) But any degree of reciprocity will prevent the pact from being nude; nay, even if the thing be founded in a prior moral obligation, (as a promise to pay a just debt, though barred by the statute of limitations,) it is no longer *nudum pactum*. And as this rule was principally established to avoid the inconvenience that would arise from setting up mere verbal promises, for which no good reason could be assigned (Plowd. 308, 309,) it therefore does not hold in some cases, where such promise is authentically proved by written documents. For if a man enters into a voluntary bond, or gives a promissory note, he shall not be allowed to aver the want of a consideration in order to evade the payment; for every bond, from the solemnity of the instrument (Hardr. 200. 1. Ch. Rep. 157,) and every note from the subscription of the drawer (Lord Raym. 760,) carries with it an internal evidence of a good consideration. Courts of justice will, therefore, support them both, as against the contractor himself; but not to the prejudice of creditors, or strangers to the contract.

The most usual contracts, by which the rights of chattels personal may be acquired by the laws of England, are those of *sale or exchange, of bailment, of hiring and borrowing, and of debt*. See these articles respectively. See also INTEREST and USURY, BOTTOMRY and RESPONDENTIA, INSURANCE, and ANNUITY.

Every contract, whatever be its nature, implies in itself an *assumpsit* in law, for the performance of it; for a contract would be to no purpose, if there were no means to enforce its performance. See ASSUMPSIT.

A *diversity* occurs where a day of payment is limited in a contract, and where it is not so limited. In the former case, the contract is good presently, and an action lies upon it, without payment; but in the latter, it is otherwise. Thus, if a man buy any commodity, the contract is void, if he do not pay the money presently; but if a day of payment be stipulated, there the one may have an action for the money, and the other trover for the commodity. (Dyer, 30. 293.) Where a seller says to a buyer, he will sell his horse for a specified sum, and the buyer says he will give it; if he presently tell out the money, it is a contract; but if he do not, it is no contract. (Noy's Max. 87. Hob. 41.) The property of any thing sold is immediately in the buyer by the contract; though regularly it must be delivered to the buyer, before the seller can bring his action for the money. (Noy, 88.) If a person contract to buy a horse, or any thing else, of another, and no money is paid, or earnest given, nor day set for payment, nor the thing delivered; in these cases, no action will lie for the money, or the thing sold, but it may

be sold to another. (Plowd. 128. 309.) All contracts are to be certain and complete. For an agreement to give so much for a thing as it should be reasonably worth, is void on account of its uncertainty: so is also a promise to pay money in a short time, &c. or to give so much, if a person likes the thing when he sees it. (Dyer, 91. 1 Bull. 92.) But if I contract to give another 10*l.* for such a thing, if I like it on seeing the same; this bargain is said to be perfect at my pleasure, though I may not take the thing before I have paid the money:—if I do, the seller may have trespass against me: and if he sell it to another, I may bring an action on the case against him. (Noy, 104.) If a contract be to have for cattle sold 10*l.*, if the buyer do a certain thing, or else to have 20*l.* it is a good, and sufficiently certain contract. Also, if I agree with a person to give him so much for his horse, as A. B. shall judge him to be worth, when he hath judged it, the contract is complete, and an action will lie on it: and the buyer shall have a reasonable time to demand the judgment of A. B. But if he die before the judgment is given, the contract is determined. (Perk. sect. 112, 114. Shep. Abr. 294.) In contracts, the time is to be regarded, in and from which the contract is made; the words shall be taken in the common and usual sense; and the law doth not so much regard the form of words, as the substance, and the mind of the contracting parties. (5 Rep. 83. 1 Bull. 175.) A contract for goods may as well be made by word of mouth, as by deed in writing; and where it is merely written, but not sealed and delivered, it is the same as if it were verbal. But if the contract be by writing sealed and delivered, and so converted into a deed, it is of another nature; and in this case generally the action on the verbal contract is gone, and some other action lies for the breach of it. (Plowd. 130, 309. Dyer, 90.) Contracts, not to be performed in a year, are to be in writing, signed by the party, &c., or no action may be brought on them; but if no day is set, or the time is uncertain, they may be good without it. (Stat. 29 Car. II. c. 3.) And by the same statute, no contract for the sale of goods for 10*l.* or upwards, shall be good, unless the buyer receive part of the goods sold, or give something in earnest to bind the contract; or some note thereof be made in writing, signed by the person charged with the contract. See SALE.

CONTRACT, *nude* and *quasi*. See the adjectives, and

CONTRACT *supra*.

CONTRACT, *Simple*. See SIMPLE and DEBT.

CONTRACT, *Special*. See SPECIALTY and DEBT.

CONTRACT, *usurious*, is a contract to pay more interest for money than the laws allow.

It is a disadvantage in executors to pay a debt upon an usurious contract. See USURY.

CONTRACT of *Marriage*. The Romanists distinguish the civil contract, which is the consent of the parties, from the *sacrament*, which is the benediction of the priest.

These contracts are said to be *null*, which the law prohibits: such are all contracts between persons incapable of contracting, as minors, religious, lunatics, wives without consent of their husbands, &c.

In order to a good civil marriage, the parties must not only be willing and able to contract, but actually must contract themselves in due form of law. Any contract made, *per verba de presenti*, 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 act (26 Geo. II. c. 33.) deemed a valid marriage to many purposes; and the parties might be compelled in the spiritual courts to celebrate it in *facie ecclesie*. But these verbal contracts are now of no force, to compel a future marriage. See MARRIAGE.

CONTRACT,

CONTRACT, *Originalis*, in *English History*, denotes that reciprocity of protection and subjection, which subsists between the king of Great Britain and his subjects. The duties resulting from hence are what, according to judge Blackstone, (Comm. vol. i.) were meant by the convention in 1688, when they declared that king James had broken the "original contract" between king and people. But however, as the terms of that original contract were in some measure disputed, being alleged to exist principally in theory, and to be only deducible by reason and the rules of natural law; in which deduction different understandings might very considerably differ; it was, after the revolution, judged proper to declare these duties expressly, and to reduce that contract to a plain certainty. So that, whatever doubts might be formerly raised by weak and scrupulous minds about the existence of such an original contract, they must now entirely cease, especially with regard to every prince, who hath reigned since the year 1688. As to the terms of the original contract between king and people, these the learned judge apprehends to be now couched in the *coronation oath*; which see. See also **CONSTITUTION** and **KING**.

CONTRACT is also used for the instrument in writing, which serves as a proof of the consent granted, and the obligation passed between the parties.

Among the ancient Romans, contracts, and all voluntary acts, were written, either by the parties themselves, or by one of the witnesses, or by a domestic secretary of one of the parties, whom they call a *notary*; but who was no public person, as among us.

The contract, when finished, was carried to a magistrate, who gave it a public authority by receiving it *inter acta*, into the number of the acts under his jurisdiction; giving each of the parties a copy thereof, and sealed with his seal. Which practice passed into France, where it obtained a long time. The conscientious performance of private contracts between man and man is frequently recommended in the Koran. For the prevention of disputes, all contracts are directed to be made before witnesses, and in case such contracts are not immediately executed, the same ought to be reduced into writing in the presence of at least two witnesses, (which seems to have been also required by the Jewish law, even in cases where life was not concerned,) who ought to be Moselems and of the male sex; but if two men cannot be conveniently had, then one man and two women may suffice. The same method is also directed to be taken for the security of debts to be paid at a future day; and where a writer is not to be found, pledges are to be taken. Hence, if people trust one another without writing, witnesses, or pledge, the party on whom the demand is made is always acquitted if he denies the charge on oath, and swears that he owes the plaintiff nothing, unless the contrary be proved by very convincing circumstances. Sale's Koran, Introd. p. 139.

CONTRACTS, in *Rhetoric*, furnish one head or class of external arguments. (See **ARGUMENT** and **TOPICS**.) In this view of them, they are either public or private. Public contracts denote transactions between different states, as leagues, alliances, and the like; which depend on the laws of nations. Those are called private, which relate to lesser bodies, or societies of men, and single persons, and they may be either written or verbal. With respect to the force and obligation of contracts, the Roman law declares, that "nothing can be more agreeable to human faith, than that persons should stand to their agreements." Therefore in controversies relating to this kind of human testimony, the party, whose interest it is, that the contract should be maintained, will plead, that such covenants have the force of private laws, and ought religiously to be observed, since the common affairs of mankind

are transacted in that manner; and therefore to violate them is to destroy all commerce and society among men. On the other side it may be said, that justice and equity are chiefly to be regarded, which are immutable; and besides, that the public laws are the common rule to determine such differences, which are designed to redress those, who are aggrieved. Indeed, where a compact has been obtained by force or fraud, it is in itself void, and has no effect either in law or reason. But on the other hand, the Roman lawyers seem to have very rightly determined, that all such obligations, as are founded in natural equity, though not binding by national laws, and are therefore called "*nuda pacta*," ought however in conscience and honour to be performed.

CONTRACTED VEIN, in *Hydraulics*, (*Vena contracta* of Newton,) is a name given to the contraction which has been observed in a stream of fluid issuing out of an aperture. When water, or other fluid analogous to water, issues out of an aperture in the thin side or bottom of a vessel containing that fluid, as at A, fig. 1 and 2; *Plate I. Hydraulics*, the size of the aperture being very small in proportion to the side or bottom of the vessel, the stream AB is not of the same shape throughout its whole length, nor is it of an uniform size. When the aperture is circular, the distance of the narrowest part of the stream, from the inside surface of the vessel, is about equal to the radius of the aperture. This narrowest part of the stream has been called the *contracted vein*; the whole stream itself having been usually denominated the *vein of fluid*, by writers on the subject. From the place of the contracted vein forwards, the stream enlarges its dimensions, and sometimes divides itself into different smaller streams. The diameter of the contracted vein, or narrowest part of the stream, is subject to a little variation, arising from the size of the vessel in proportion to the aperture, and partly from the charge of the vessel, (*viz.* from the height of fluid in the vessel above the level of the aperture); hence the diameter of the contracted vein, as measured by different authors, has not turned out exactly of one invariable dimension; the difference, however, is not very material; as appears from the following table, which contains the different measurements of the contracted vein; calling the diameter of the circular aperture *one*.

<i>Authors of the experiments.</i>	<i>Diameter of the contracted vein.</i>
Poleni (de Castellis, § 35.)	0.790
Micheletti; Sperin. Idraul. tom. II. Exp. 4.	0.800
Boffut (Hydrodyn. art. 437. Exp. 5.)	0.818
Venturi, with 35 inches charge, and a horizontal circular orifice of 18 lines in diameter	0.798

From a mean of the above measurements, it may be concluded, that the diameter of the contracted vein is little more than eight-tenths of the diameter of the aperture. That short part of the stream which stands between the aperture and the greatest contraction, is not uniformly conical, but it approaches to the figure of an hyperbolic conoid.

This contraction of the stream is undoubtedly owing to the different directions, and different velocities, with which the various parts (or, as they are called, *filaments*) of the fluid run towards the aperture, as is indicated by the *figs.* 1 and 2. Hence it has been observed, that when the aperture is very large in proportion to the size of the vessel, the contraction of the stream is less evident. And such, also, is in great measure the case, when the side of the vessel in which the aperture is made, is not very thin.

The various filaments of the fluid, which run from every part of the vessel in oblique directions towards the aperture, partly cross each other at the contracted vein; and this crossing, or tendency to cross, is one of the causes which enlarge the stream beyond that place. It is evident, that with apertures of different shapes, the form of the contracted vein, that is of the stream of that place, must vary considerably. But professor Venturi, desirous of determining the effects of some of those variations from the circular shape, made the following experiments with orifices of peculiar shapes.

"In the orifice A B C D, (*fig. 3.*) the two sides A, B, are parallel to the horizon; the extremities are rounded; the width of this aperture is less than two lines, its length 18 lines, and the charge 32.5 inches. The section of the stream which issues from this orifice, first assumes the form E F, after which, the two extremities E, F, approaching nearer and nearer to enlarge the middle part of the section of the stream, at 4.5 inches distance from the orifice, acquire the quadrangular form G H. The stream afterwards extends itself in the perpendicular direction, in the form of a large fan K L. I have repeated the experiment, by placing the longitudinal axis of the orifice C D vertically. In this case the same phenomena were produced, E F becoming vertical, and K L horizontal, both preserving their form."

"The fluid filaments, which, issuing out of the orifice, pass near the two opposite borders A, B, are very near each other, and becoming convergent, they tend to unite at a very short distance from the orifice itself. The filaments C, D, are more remote, and, perhaps, less convergent; they cannot unite but at a greater distance than the two former. In this case, therefore, there are movements which tend to form two contractions, the one nearer, and the other more remote from the orifice; these two contractions counter balance each other in part. Their mutual opposition carries the effect, G H, to a distance five times greater than that of the contracted vein of a circular orifice, having a diameter of the same breadth as that of this orifice."

"In this experiment we see the cause of a phenomenon, which has been observed in some particular cases by Poleni and others, without giving the explanation. In every orifice of a right-lined figure through a thin plate, the angles of the contracted vein answer to the sides of the orifice and the contrary. When the quadrangular orifice has the situation M N O P, the greatest contraction of the stream is made at a greater distance than in a circular aperture; it assumes the form and situation Q R S T. The reason is, that the opposite angles M, P, are more remote from each other, than the sides I, V, whence the same thing happens as in the long orifice A C B D. In the same manner, the triangular orifice in the situation X, produces a contraction of the form, and in the situation Z, &c."

When the horizontal oblong aperture, C D, (*fig. 3.*) was used, the distance of the contracted vein from that orifice, was found to vary with the height of the fluid; as shewn in the following table; from which it appears, that the contraction of the stream takes place at a greater distance, under strong charges, than in those which have but little elevation.

Height of the charge above the orifice C D.	Distance of the greatest contraction G H.
<i>Inches.</i>	<i>Lines.</i>
32.5	52.
18.	48.
10.	40.
6.	36.

If a cylindrical tube be fitted to a circular aperture in the

side of the reservoir, or vessel containing the fluid, and part of it be pushed into the interior part of that vessel, the contraction of the vein will be greater, and the quantity of fluid that runs out in a given time, will be less, than without such tube. If to the external part of the circular orifice, a short tube be adapted exactly of the shape of the contracted vein, or very nearly so, as in *fig. 4.* (it being a tube nearly conical, but with its sides a little convex inwardly,) the quantity of fluid that runs out in a given time, will be the same, or very nearly the same, as when the simple aperture is used, without such tube.

The velocity of the fluid is far from being the same in every part of the stream; for since the same quantity of fluid must pass through every transverse section of the stream in a given time, it follows, that the velocity must be inversely as the area of each transverse section. Therefore the velocity at the contracted vein is greater than at the circular aperture; and since the areas of the sections at those two places, are as the squares of their diameters, and the diameter of the contracted vein is to that of the circular aperture nearly as eight to ten, or as four to five; hence we say, as 16 is to 25, so is the velocity at the aperture, which we shall call *one*, to the velocity at the *vena contracta*; that is, as one to 1.56.

CONTRACTILE FORCE, that property, or power, inherent in certain bodies, whereby, when extended, they are enabled to draw themselves up again to their former dimensions. For the cause of this property, which is of the utmost consequence to a right understanding of the animal economy, see **FIBRE**.

CONTRACTION, in *Surgery*, from *contraho*, to draw together; a rigid or stiffened state of any part in the body, but especially of the joints. This rigidity may arise from a morbid condition, either of the bones, ligaments, or muscles; and may proceed from a great variety of causes. Cullen has given four species of contractions; but Sauvages has multiplied them to the number of eleven! The surgeon who knows the cause and seat of this complaint, will not, however, pay much regard to those nosological distinctions, in his method of cure. If the morbid change arises from inflammation and thickening of the parts affected, he will use discutient remedies, fomentations, and emollient poultices; or, after the inflammatory stage has subsided, he will employ electricity, friction, stimulant embrocations, and moderate extension of the affected muscles, &c. If the rigidity be very obstinate, and the ligaments yield with great difficulty, the surgeon will use mechanical force more freely, and perhaps will enjoin the exercise of alternate bending and straightening the limb, by means of pulleys or steel springs, besides the occasional administration of the vapour-bath, or hot ablutions. The principles of the art being understood, and the nature of the case which comes before us, it will not be difficult, by steady perseverance, to overcome a great number of obstacles which present themselves, in the treatment of contractions.

When the disease is occasioned by an union of the bones which form a joint, the mobility of the limb is not to be expected. This species of contraction is named *anchylosis*, and is explained at large in a separate article of this work. (See **ANCHYLOSIS**.) When one muscle is found in a state of permanent contraction, e.g. the sterno-mastoid of the neck, it is sometimes requisite to divide the muscle in order to effect the cure. (See **DISTORTION of the neck**.) We understand that Mr. Carpus, surgeon of his majesty's forces, has invented many ingenious mechanical instruments, which will soon be made public, for the relief of this class of diseases.

CONTRACTION, in *Grammar*, the reduction of two vowels, or syllables, into one; as, *may'nt*, for *may not*; *shouldest*, for *shouldest*, &c.

The Greeks abound with contractions, both in their verbs and their nouns.

In this language, two simple vowels concurring in the same word are generally combined into a diphthong; and in this case the concurrent vowels are said to be contracted. Contraction is either *simple* or *compounded*; *simple*, when constituent vowels are retained unchanged; and *compounded*, when a new sound results. *E. G.* The contraction of *ευχῆ* into *ευχῆ* is simple; that of *ευχῆ* into *ευχῆ* is compounded. The first sort of contractions is called *synaresis*, the second *crasis*. When two succeeding vowels have dots above them, they are separately founded; but when contracted, they have over them the circumflex accent; hence *ευχῆ* has three syllables, but *ευχῆ* only two. Every contraction, whether simple or compounded, is the coalition of two short vowels; and it takes place in nouns of every declension, in adjectives, in verbs, and in the combination of the article and prepositions with the succeeding words. Simple contractions are all reducible to the following rule.—Let the concurring vowels, instead of being founded separately, be expressed by a single impulse of the voice; as *αι*, *αι*, *ου*, *αι*, *υ*, *υ*, &c. The difficulty lies in the compounded contractions; but all the varieties of these may be comprehended under the four succeeding cases. 1. If the two short vowels to be contracted be the same, they are already represented by one of them lengthened. Thus *αι*, *υ*, *υ*, are contracted into *αι*, *υ*, *υ*, respectively. Note, however, that, in the common tongue, the contraction of *ει* is not into *η*, but into its equivalent *η*; and the contraction of *οι* is not into *ω*, but into *ου*. 2. If the concurrent vowels be not the same, that which is predominant in sound prevails over that which is subordinate to it. The predominant vowel must in most instances be the prepositive; since this pre-occupies the organs, and thus demands a fuller enunciation. The subjunctive, therefore, is lost in the contraction; and its only effect is to lengthen the prepositive, when a *doubtful vowel*, but to convert it, if *short* by nature, into its correspondent long one. Hence *αι*, *ει*, *ου*, and *οι* are contracted into *αι*, *η*, *ω*, and *ω* respectively. The exceptions to the above principle are the following: verbs in *μι* of the first class, in order to be distinguished from the third person plural, have in the three singular, *αι* contracted into *η*. The diphthongs *αι*, *οι*, when succeeded by *ς* are contracted, the former into *αι*, and the latter into *ου*. If a vowel, or *ς*, precede *ει*, they are contracted into *αι*. By attention to the pronunciation of *οι*, *οι*, it will be perceived that the first, having a fuller sound, predominates over the second and third; and, therefore, *οι* are contracted, not into *αι*, but into *η*. In the concurrent vowels *ου*, the latter prevails in sound over the former, and consequently, the contraction is into *ου*, not into *ω*. Conformably to the second case *οι* would be contracted into *ω*; but its contraction, in the common tongue, like that of *ου*, is generally into *ου*. 3. The vowels *υ*, being predominant in sound, and from their nature incapable of coalescing with those subjoined to them, cause the subjunctive to be expelled: as *ιγαυ*, *ιγαυ*, a hawk, *οιδαι*, *οιδαι*, a serpent, *ιχθυαι*, *ιχθυαι*, fishes, &c. 4. As the contraction is the union of two short vowels into one compound sound, it follows, that a short vowel preceding a long one, as having no effect in lengthening a sound which does not admit of different degrees of length, is dropped in the contracted form; as *Απαιλις*, *Απαιλις*, *Apelles*, *Εσσιλιαι*, *Βασιλιαι*, kings, *τιμααι*,

τιμααι, I honour, &c. When a vowel precedes a diphthong, it is either itself rejected, or it causes to be rejected one of the constituents of that diphthong; thus, *αι* preceding *αι*, *αι*, expels the subjunctives *ι*, *υ*; but preceding *οι*, *αι* is itself rejected. In like manner, *ει* is rejected, when preceding *αι*, *οι*, or *ου*. When *ο* precedes *αι*, it requires in nouns and adjectives the rejection of the subjunctive: also in the infinitive mood of verbs in *ου*, *ο* preceding *αι* requires *ι* to be rejected; but in the second and third persons singular indicative, the prepositive is dropped. Before *οι* and *ου*, *ο* is itself rejected. In the adjectives *διπλο* simple, *διπλο* double, *ο* is expelled;—thus, *οπλο*, *διπλο*. See Jones's *Grammar of the Greek Tongue*, on a new and improved Plan, part ii. chap. 1.

CONTRACTION, in *Logic*, or *Composition*, a species of reduction, wherein the thing that reduces does also abridge, or bring the thing reduced into a lesser compass.

The design of contraction is to bring things, which before were too lax and diffusive, nearer together; that so their mutual relation may appear the more clearly, and they may better strengthen and support each other.

To this head are referred the arguments, as they are called, of poems and orations; the titles and summaries of chapters, &c. See ABRIDGMENT.

CONTRACTION, in a general sense, means diminution of the bulk, or extent, of any thing; the nearer approach of its parts to one another. This word is generally used in philosophy, in surgery, in grammar, in the arts, &c. In philosophy the contractions mostly noticed, are those which arise from a diminution of temperature. The shortening of the dimensions of a body is the general effect; but at certain periods of their contraction, bodies change their apparent state of existence; thus the vapour of water is contracted by a diminution of temperature from a higher degree, down to about 212° of Fahrenheit's scale; but below that degree, its contraction is very great, and it is thereby converted into fluid water, in which state it occupies not more than about the 1800th part of the space it took up a little before its conversion into water. Similar phenomena are to be observed with most other bodies, and the particulars which need be remarked concerning them, are the rate, the quantity, and the limits of contraction in different bodies. But those particulars being the reverse of the phenomena which are described under the denomination of *expansion* or *dilatation*, are with more perspicuity stated under those articles, to which the reader is referred. It is, however, necessary in this place briefly to state a few particulars which seem less regular, and some which arise, not from a simple cause, but from the compound effect of pressure, and of diminution of temperature.

“When an elastic fluid is contracted by cold within certain limits, determined by a degree of pressure to which it is exposed, as well as by the nature of the fluid, its particles become subjected to the force of cohesion; they rush still nearer together, and form a liquid. Thus, when steam under the common atmospheric pressure, is cooled below the heat of boiling water, it is instantly condensed, and becomes water; but with a pressure of two atmospheres, it would be condensed at a temperature 36° higher, and with the pressure of half our atmosphere only, it might be cooled without condensation 33° lower than the common temperature of boiling water. And similar effects take place in vapours of other kinds at higher or lower temperatures, a double pressure producing, in all cases, an equal disposition to condensation, with a depression of temperature of between 20 and 40 degrees, and most commonly

of about 35° of Fahrenheit. Thus the vapour of spirit of wine is usually condensed at 175° of Fahrenheit; but with a double pressure it is condensed at a temperature 39° higher; and with the pressure of half an atmosphere, at a temperature 35° lower; and the vapour of ether, which is commonly condensed at 102°; requires a temperature 38° higher, with a double pressure, or as much lower with half the usual pressure. If the temperature be below the freezing point of the liquid, the pressure being sufficiently lessened the vapour may still retain its elasticity, but a further reduction of temperature or increase of pressure will convert it immediately into a solid."

Water, and all aqueous fluids, are gradually contracted by a diminution of temperature, until they arrive at a certain point which is about eight degrees above the freezing point; but below that point they begin to expand and continue to do so according as their temperature is lowered. Effects nearly similar have been observed with a few metallic substances.

Speaking of contraction, a remarkable phenomenon, of considerable importance in manufactures, obtrudes itself on our notice. It is the hardness which certain bodies acquire in consequence of a sudden contraction, and this is particularly the case with glass and some of the metals. Thus glass vessels suddenly cooled after having been formed are so very brittle, that they hardly bear to be touched with any hard body. The cause of this effect is thus properly explained by Dr. Young, "When glass in fusion is very suddenly cooled, its external parts become solid first, and determine the magnitude of the whole piece; while it still remains fluid within. The internal part, as it cools, is disposed to contract still further, but its contraction is prevented by the resistance of the external parts, which form an arch or vault round it, so that the whole is left in a state of constraint; and as soon as the equilibrium is disturbed in any one part, the whole aggregate is destroyed. Hence it becomes necessary to anneal all glass, by placing it in an oven, where it is left to cool slowly; for, without this precaution, a very slight cause would destroy it. The Bologna jars, sometimes called proofs, are small thick vessels, made for the purpose of exhibiting this effect; they are usually destroyed by the impulse of a small and sharp body, for instance, a single grain of sand, dropped into them, and a small body appears to be often more effectual than a larger one; perhaps because the larger one is more liable to strike the glass with an obtuse part of its surface." See *Prince Rupert's Drops*.

The hardening of steel is an effect of the same sort. The piece of steel is made red-hot, and, in that state, is suddenly cooled and contracted by immersion in water; in consequence of which it remains so brittle and hard, as not to suffer its being filed or hammered. If, instead of water, the piece of red-hot steel be plunged in oil, its contraction is not so sudden, and of course its hardness will not be so great. If it be plunged in quicksilver, which cools it much quicker than water, its hardness becomes so great as to render it capable of cutting or scratching glass like a silicious body. But, on the other hand, if the piece of steel, after its having been rendered red-hot, be suffered to contract gradually in the air; then its texture will easily yield to the hammer or to the file.

The necessity and importance of attending to the minute variations in the bulk of bodies by heat and cold, was never before, perhaps, so strikingly exemplified, as in the government Trigonometrical Survey, begun under general Roy,

in the year 1784, by the measurement of a base of 27424.3 feet in length on Hounslow Heath, near London. This was first measured by long deal rods, which were soon laid aside, on account of their great and variable contraction and expansion, and long glass rods or tubes were next tried wherein the sum of the expansions of the rods, during the operation, reduced to 6.2° of Fahrenheit's thermometer, amounted to 6 inches very nearly, and of the contractions to 1.8 inch nearly, making an addition of 4.2 inches to the length of the base, as measured by the glass rods, on account of their expansion and contraction during the operation; see *Phil. Transf.* 1785, p. 477. In 1791, this base was remeasured with a steel chain made for the purpose by Ramsden, with all imaginable attention to accuracy, and the correction necessary to be applied to the length of the base, on account of the excess of the expansions over the contractions of the chain during the operation, was found to be 34.2 inches, but from which 27.11 inches was afterwards deducted, for reducing the base to the length which would have resulted, from a measurement in the temperature of 62°, to which point of the thermometer's scale all lengths in this survey are supposed to be reduced. See *Phil. Transf.* 1795, p. 433.

CONTRACTION of Strata, in Natural History. That clay and argillites have contracted during their hardening in the strata of the earth, Mr. Bergman infers from having observed, that the petrified shells found in these are commonly compressed and flattened, and that argill hardens by contraction, but those found in lime-stone retain their primitive shape, because these harden chiefly by infiltration.

CONTRACTION is frequently used, by anatomical writers, to express the shrinking up of a fibre, or an assemblage of fibres when extended.

Convulsions and spasms proceed from a preternatural contraction of the fibres of the muscles of the part contracted.

On the contrary, paralytic disorders generally proceed from a too great laxness of the fibres of the parts affected; or from the want of that degree of contraction necessary to perform the natural motion or action of the part.

In the first, therefore, the animal spirits are supposed to flow either in too great a quantity, or irregularly; and, in the last, the animal spirits are either denied a free passage into the part affected, or the tension of the fibrillæ is supposed insufficient to promote the circulation.

Contraction evidently appears to be the true natural state of all muscles; for, if a muscle be at any time freed from the power of its antagonist, it is immediately found to contract; and is not, by any action of the will, or the spirits, to be reduced to a state of dilatation.

CONTRACTION of the heart, arteries, lungs, &c. See *SYSTOLE, HEART, ARTERY, PULSE, &c.*

CONTRADICENTE. See *NEMINE contradicente.*

CONTRADICTION, a species of direct opposition, wherein one thing is found diametrically opposite to another.

The schoolmen usually define it, *oppositio inter ens & non-ens metho carens*: where, by *ens*, and *non-ens*, are understood any two extremes, whereof one affirms, and the other denies; and it is said to be *metho carens* to distinguish it from the other species of composition; the extremes, here, neither agreeing in subject, as in the case in privation; nor in essence and kind, as in contrariety.

CONTRADICTION, *freedom of*. See FREEDOM.

CONTRADICTION, *imply a*. See IMPLY.

CONTRADICTOR, in a legal sense, a person who has a right or title to contradict or gainsay.

An inventory of the effects of a minor ought to be made in presence of his guardian, or trustee, who is the legal *contradictor*: a decree against a farmer has no effect on the landlord, the first not being the legitimate *contradictor*.

CONTRADICTORY PROPOSITIONS, are opposites, one of which imports a mere, and naked, denial of the other.

Of these, therefore, one must be positive, and the other negative; as *sitting*, and *not sitting*: *white*, and *not white*. Contradictory propositions mutually destroy each other.

To have two propositions truly contradictory, they must be opposite, both in quantity and quality, *i. e.* one must be universal, and the other particular, which make the opposition of quantity; and the one affirmative, and the other negative, which make the opposition in quality. Thus, *v. gr.* "All use of wine and silver is evil;" false:—"Some use of wine and silver is not evil;" true. To this it is necessary, that the one deny and the other affirm, the same thing, of the same subject, considered in the same circumstances: unless the question be about an essential attribute, in which case, no regard is had to circumstances; every thing having always its own essence. Thus the logicians express by *affirmare* & *negare idem, de eodem, secundum idem*.

There may likewise be contradictory propositions on a particular subject; *e. gr.* an individual. These are called *single* contradictory propositions; as "Peter is innocent. Peter is not innocent, or is a criminal." Now to have these propositions contradictory, Peter must be considered at the same time, without which they may be both true; since there may be a time wherein Peter was innocent, and another wherein he was a criminal.

CONTRA-FISSURE. See COUNTER-FISSURE.

CONTRA-HARMONICAL PROPORTION, that relation of three terms, wherein the difference of the first and second is to the difference of the second and third, as the third is to the first.

Thus, *e. gr.* 3, 5, and 6, are numbers contra-harmonically proportional; for $2 : 1 :: 6 : 3$.

To find a mean contra-harmonically proportional to two given quantities: the rule is, divide the sum of the two squared numbers by the sum of the roots; the quotient is a contra-harmonically mean proportional between the roots.

CONTRA-INDICATION, in *Medicine*, denotes such a symptom, or set of symptoms, as indicate the necessity of remedies, which other symptoms, or the disease in general, forbid us to employ.

Thus, when inflammation of the lungs supervenes to a low or typhous fever, or *vice versa*, the nature of the fever requires cordials and strengtheners for its cure, whilst the inflammation indicates, on the contrary, the use of blood-letting, and other debilitating expedients. Contra-indications are always perplexing occurrences.

CONTRAIT, Fr. restrained. This word is synonymous with *stretto*, in Ital. (which see.) It is an adj. which, in *Musick*, implies, whether in melody or harmony, the *constraint* of a theme or ground.

CONTRALTO, Ital. the Counter-tenor. The compass of this kind of voice is usually very limited; it seldom goes lower than G, in the 4th space of the bass, or higher than C, in the 3d space of the treble. Senefino had no more than

six or seven good notes in his voice; nor had Guadagni, in his younger days, when he was content with the force of his natural compass, which, like Senefino's, were full, rich, and flexible. This species of voice is an octave above the bass; and its clef, that of C on the 3d line, the same as the *alto viola*, or *tenor*, among instruments.

CONTRAMANDATIO PLACITI, in *Law-Books*, signifies a respiting, or giving the defendant further time to answer; or, an imparlance, or countermaning of what was formerly ordered. Leg. H. I. c. 59. See COUNTERMAND.

CONTRAMANDATUM, a lawful excuse, which the defendant, by his attorney, allegeth for himself, to shew that the plaintiff has no cause to complain, *si dies placiti sit contramandatus*. II Hen. I. See COUNTERMAND.

CONTRAMURE, in *Civil Architecture*. See COUNTERMURE.

CONTRAMURE, in *Fortification*, is a wall built before another to strengthen it, and to prevent its receiving any damage from the adjoining buildings. See RAMPART.

CONTRA-POINTS, in *Musick*. See COUNTER-POINT.

CONTRA-POSITIO, in *Law*, a plea or answer. Leg. H. I. c. 34.

CONTRA-POSITION, in *Logic*. See VERSION.

CONTRAPPUNTO. See COUNTER-POINT.

CONTRARIENTUM ROTULUS. See ROTULUS.

CONTRARIETY, that which denominates two things contrary to each other.

Contrariety consists in this, that one of the terms imports a negation of the other, either mediately or immediately; so that contrariety may be said to be the contrast, or opposition of two things, one of which implies the absence of the other.

CONTRARIETY, *freedom of*. See FREEDOM.

CONTRARIES, are positive opposites; which being of the same kind, or same common nature, and subsisting by turns in the same subject, are as remote from each other as possible, and mutually expel each other. Such are whiteness and blackness, cold and heat, &c.

Hence, properly speaking, only qualities can be contraries: *contrariety*, in effect, only agrees to qualities *per se*; to other things it agrees *per accidens*, or *in ordine ad qualitatem*.

CONTRARY, however, is often used in a more extensive signification, *viz.* for any inconsistency or difference between the nature and qualities of things. It is a popular maxim in philosophy, that *contraria juxta se posita magis elucescent*; contraries set off one another. In this sense is the word *contrario* used in the schools; and hence an argument *à contrario*.

This method of improving things, *à contrario*, is much used, and with good success, by F. Bourdaloue, in his Sermons.

CONTRARY, in *Rhetoric*. Contraries are things which, under the same genus, are at the utmost distance from each other: so that what we grant to the one, we utterly deny the other; *e. g.* "Virtue ought to be embraced, therefore vice should be avoided." F. de Colonia lays down three kinds of contraries in rhetoric; *viz. adverbatives, privatives, and contradictories*.

Adverbatives are those that differ much in the same thing, as virtue and vice, war and peace: thus Tully, "Si stultitiam fugimus, sapientiam sequamur; & bonitatem, & mansuetudinem."

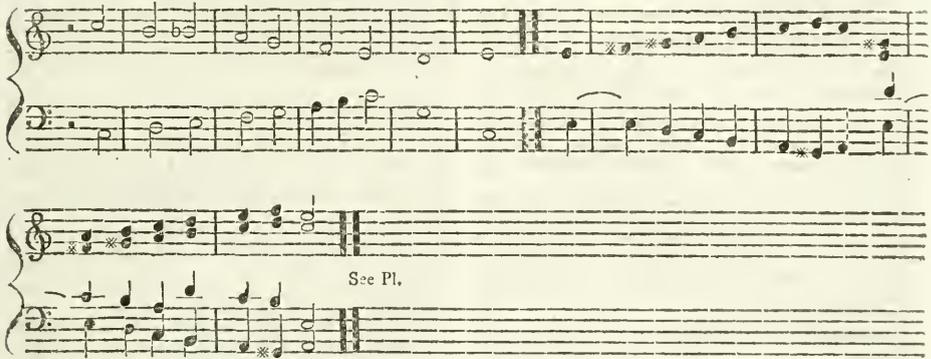
tiam." And Quintilian, "Malorum causa bellum est, eum emendatio pax." Drances argues thus in Virgil:

"Nulla salus bello: pacem te poscimus omnes."

Privatives are habits, and their privations. *Contradictio-*

nes are those, one of which affirms, and the other denies, the same thing of the same subject.

CONTRARY motion, in *Music*, is when one part ascends while another descends, and *vice versa*, opposed to *moto recto*, and *moto obliquo*, which see.



Contrary motion of the parts, in composition, and of the hands in thorough-bass, has a pleasing effect, and precludes the succession of 5ths and 8ths.

CONTRARY propositions, in *Logic*, universal propositions, one of which affirms, and the other denies, the same predicate of the same subject; as "every square is a parallelogram," and "no square is a parallelogram." These propositions differ in quality, but not in quantity, and therefore are distinguished from contradictory propositions, which differ in quantity and quality.

Contrary propositions cannot be both true, but may both be false: whereas, in contradictory propositions, one is necessarily true, and the other false.

CONTRARY point of flexure. See *POINT*.

CONTRA-SOGGETTO, in *Music*, a 2d subject in a fugue or canon, or a new subject, in contrary motion to the first.

CONTRA-TONES, in the *German Musical Writings*, are such as lie below the great octave of their tablature or literal notation, for the notes of the gamut. All notes on an organ, or other instrument which lie, more than two octaves below the tenor cliff note, or



are said to be

contra-tones. See *TABLATURE*.

CONTRAST, in *Music*, is often productive of agreeable effects, when, in the same movement, we pass from loud to soft, and soft to loud; from quick to slow, and slow to quick; from a simple to an elaborate accompaniment, and *e contra*; from low to high, and high to low; and when the harmony is full and thin alternately.

CONTRAST, in *Painting or Drawing*. The proper introduction and management of contrasts of lines, forms, colours, lights, and shadows, form a very principal, and indeed indispensable, branch of the study of a painter; and there is perhaps nothing in the art which so necessarily requires a more than ordinary share of judgment and discretion. If contrasts are only sparingly used, they seldom fail to produce a striking and happy result; if they are too frequent, confusion in the composition, and a spotty disagreeable effect is the consequence; when they are entirely omitted,

insipidity ensues. Contrasts in painting may, therefore, be compared to discords in music, which, when skillfully introduced, give double relish to the harmony, by preventing that nausea naturally attendant on an uninterrupted succession of sweets of any kind soever. The subject of contrasts is necessarily connected with our inquiries respecting the great component parts of painting. We therefore beg to refer the reader to those articles. See *INVENTION*, *COMPOSITION*, *DESIGN*, *EXPRESSION*, *CLAIR-OBSCURE*, and *COLOURING*.

CONTRAST, *to*, in *Architecture*, is to avoid the repetition of the same thing, in order to please by variety; as is done in the great gallery of the Louvre, where the pediments are, alternately, arched and angular.

CONTRAST, or *CONTRATE wheel*, in *Horology*, denotes that wheel in watches which is next to the crown, whose teeth and hoop lie contrary to those of the other wheels; whence its name. See *WATCH-work* and *WHEEL*.

CONTRAVALLATION, or *COUNTERVALLATION*, in *Fortification*. See *CIRCUMVALLATION*.

CONTRAVENTION, a man's failure of performing or discharging his word, obligation, or duty, or the laws and customs of the place. The penalties imposed in cases of contravention, only pass for comminatory.

In a more limited sense, contravention implies the non-execution of an ordinance, or edict.

Contravention is supposed to be a degree below prevarication; and to be only the effect of negligence or ignorance.

In the French and other services, every commanding officer, of whatever rank, was responsible for the wrongs and trespasses committed by the troops under his command. He was obliged to pay the damages; and if himself set an example of such things, he was considered as doubly culpable, and was not only bound to pay the damages, but was otherwise punished.

CONTRAYERVA, in *Botany*. See *DORSTENIA*.

CONTRAYERVA, in the *Materia Medica*, *Dorstenia Contrayerva*, Linn. This is a perennial plant of South America, the root of which has long been used in medicine, and is still retained, though its medicinal powers are but moderate. It is said to have been first brought into Europe by Sir Francis Drake, about the year 1581, and from him called *Draken*.

It was then esteemed a very great alexiterial, and a foreign antidote against poison.

Its juice is a violent poison, said to be used by the Peruvians to poison their arrows. *Contrayerva* signifies *counter-poison*, because the root of it is said to be an antidote against the poison of its juice.

The root is knotty, reddish brown externally, and pale within: its taste is sub-astringent, warm, and somewhat bitter; but its acrimony is much flattered by the very large quantity of mucilage which it contains. *Contrayerva* is a gentle stimulant. Its use is almost entirely confined to the pulvis *contrayervæ* compoſitus, in which it is mixed with crab's claws and chalk. The London Pharmacopœia directs the preparation of it, by mixing 5 ounces, by weight, of powdered *contrayerva* with 1½ pound of compound powder of crab's claws.

There is another kind of *contrayerva* brought from Virginia, more ordinarily called *serpentaria*: this is very aromatic; it is but seldom preferred singly, though said to have the same success against poisons and venoms with the *contrayerva* of Peru. This is an excellent substitute for the *contrayerva*. See Lewis's *Mat. Med.* and Newman's *Chem. Works*.

CONTRE, Fr. in combination with words. See COUNTER.

CONTRE-dance, Fr. *Country-dance*, taken from the lively and familiar dance of our peasants and villagers in England. Some, however, imagine that, during the Norman line, we had this rural dance from the French *contre-dance*, in which the partners are placed opposite or against each other. Of this opinion was the late Mr. Donoyer, dancing-master to the royal family.

CONTRE-sens. The French make use of this expression, in *Musick*, for an absurdity in composition or performance.

CONTRE-temps, Fr. is a breach of time, or false accentuation. Rousseau. But M. Framery (*Encycl. Meth.*) is not satisfied with this definition. According to him, an air is *à contre-temps*, or out of measure, when the cloſes are prepared on the accented part of a bar, and made on the unaccented part. The ear expects that the cloſe or final part of an air or movement should be on an accented part of a bar; in common time of four crotchets, on the first and third; and in triple time, on the first note of a bar. To this we accede, except in Polish airs, called *Polonesi*, or *alla Polacca*, where the cloſe is made on the second note of a bar. See POLONESE.

CONTREBIA, in *Ancient Geography*, *Santavert*, a town of Spain, in the country of the Carpetani, east of Complutum. This town, in 571 or 572, was besieged by the Romans, under the conduct of Q. Flavius Flaccus; and, in consequence of the delay of succour, solicited from the Celtiberians, was obliged to surrender. When the Celtiberians afterwards arrived, they were surpris'd by the Romans, and totally defeated.

CONTREKI, in *Geography*, a town of Arabia, 180 miles S. of Moscat.

CONTRES, a small town of France, in the department of Loir and Cher, and chief place of a canton in the district of Blois. Its population amounts to 1401, and that of the canton to 10,105 persons, divided among 16 communes, upon a territory of 265 kilometres in extent. It is situated 10 miles S. of Blois.

CONTRI, ANTONIO, in *Biography*, was the son of a lawyer at Ferrara. In his youth he spent some time in the study of design, which he practis'd many years in the two capitals of Rome and Paris. Upon his return to Italy, he settled at Cremona, where he studied the painting of land-

scape, under Francesco Bassi. His pictures were frequently embellished with flowers: a species of painting in which he most excelled. But his claim to a place in this work rests principally on a very extraordinary discovery which he made, of the method of transferring pictures, painted in fresco on the wall, to canvas, without in the smallest degree impairing the original beauty of the painting. This he effected by means of a strong cement, or rosin, which he spread over a cloth, the same size as the picture he was desirous of removing. This was then firmly applied to the face of the fresco. A panel of the same size was then fastened to the back of the cloth, when the plaster or fresco was cut round to the size of the cloth. After some days, the board with the cloth was removed from the wall, drawing with it the painting. Another cloth, prepared with a cement still stronger than the first, was then applied to the back of the picture; after which the former cloth was removed, leaving the picture in its original state of perfection. He succeeded in many experiments of this kind in Cremona, Ferrara, and Mantua. This secret, however, has been seldom divulged; and the late pope, Pius VI., for many years, gave a considerable pension to the only person who was acquainted with it at Rome, upon the condition of his removing no fresco paintings from the Ecclesiastical State without his permission: wisely judging, that though the temples and palaces of Italy might be despoiled of oil pictures, the frescos of the great masters would at all times furnish sufficient example for students, and amply gratification to the curious traveller. Antonio Contri died in 1732, leaving a son named Francesco, who followed the footsteps of his father. Lauzi, Storia Pittorica.

CONTRIBUTA, in *Ancient Geography*, *Medina de los Torres*, a town of Spain, in the eastern part of Bética; called also "Julia Contributa."

CONTRIBUTION, the payment of each person's quota, or the part he is to bear in some imposition, or common expence.

Contributions are either *involuntary*, as those of taxes and imposts; or *voluntary*, as those of expences for carrying on some undertaking for the interest of the community.

When goods are cast into the sea, for the safe guard of a ship, or other goods, &c. aboard, in a tempest, there is a contribution among merchants, towards the loss of the owners. (See INSURANCE.) And where a robbery is committed on the highway, and damages are recovered against one or a few persons, in an action against the hundred, the rest of the inhabitants shall make contribution to the same. 27 Eliz. c. 13. See ROBBERY.

CONTRIBUTIONS, *Military*, denote impositions, duties, or taxes, which places and sometimes frontier countries pay to redeem themselves or purchase exemption from being pillaged, plundered, and insulted by the enemy.

It would cost a prince often too much to make war entirely at his own expence. If he adopt just measures according to his finances not to run short of money, he takes them also with his general for finding the means of augmenting or at least sparing his funds. These means are contributions, which are of two kinds, *viz.* those which are exacted in subsistence and commodities, and those which are received in money.

Those that are paid in commodities, or subsistence, are different sorts of grain, forage and provisions, carriage for things wanted as well by water as by land, word of every species, pioneers, and a particular treatment or entertainment of troops in their winter-quarters and lodgings.

No levy ought to be made or taxes raised till a just statement is procured of the situation of the country intended

to be laid under contribution, that the imposition may be rendered as equitable and little burthenfome as possible. No demand, for example, is made of wood on those places that have only grain or meadows, or of land-carriages on those who make use of water-carriage.

The levy of different sorts of grain is made on those tracts or districts of country, that have quietly and peaceably reaped their harvest, and as it were by way of gratitude or acknowledgment for the tranquillity they have enjoyed, through the good behaviour and discipline of the army.

That of oats and other grain for horses should be made under the colour or pretext of regularity or good order, by which means a country is infinitely less burthened than it would be, were it abandoned to the avidity of horsemen, who would carry off the grain, wherefoever they might find it, either in a regular or irregular manner, or with orders or without orders.

That of forage should be made in the same manner, and a convenient time should be fixed on for the carriages that are to carry it to the places, where it is resolved it shall be consumed and made use of.

That of provisions is usually made, if it be possible, in those districts of country, where the troops cannot winter, to prevent the occasioning of a scarcity in that where they are to take up their winter-quarters.

Carriage, whether by land or by water, is necessary for filling the magazines made in the rear of the armies with ammunition and provisions; or for the taking of heavy artillery and ammunition to a place besieged; or for the removing of sick and wounded; or for the transport of materials destined for works.

Impositions of wood are made for palisades, for the construction of caernes and stables, &c. and for fuel to the troops in winter.

Pioneers are assembled or collected together to fortify posts destined for wintering the troops in; for throwing up with promptitude and expedition lines of circumvallation round a place besieged; for repairing roads and opening defiles; for the construction of lines made with a design to cover a country and thereby exempt it from contributions; and for levelling and filling the works made before a place after it is taken.

Utensils and necessaries for the troops taken in an enemy's country are raised or obtained in two ways. The places, where they winter, should not furnish more of them than the conveniencies which the foldier finds in the house of his landlord, supposing there are no barracks in these places. But if there are barracks, the contribution in money is compensated by these commodities, and ought to be less than that which is raised on a level country or in towns, where there are no troops lodged.

The contribution in money is extended as far as possible. It is established in two ways; voluntarily over tracts of country within reach of posts and places destined for winter-quarters; or by force, whether by the army itself whilst it is advancing, or by large parties that are detached for penetrating into these parts which you wish to lay under contribution.

It is made also behind the places belonging to the enemy and rivers by means of terror, whether by incendiaries disguised, who spread and disseminate billets, or by different ways, in which small parties are made to pass the rivers, who endeavour to carry off some persons of consideration in the country, or to burn some large habitation, or dwelling place, or building.

A prince in such ought to have an exact account kept

of all contributions, and have those particularly looked after, who are employed in raising and collecting them, since it is but too common for them to make an improper use of what they raise or collect for their own personal advantage. And when the contributions are not judiciously assessed and demanded, the particular interest of those who impose them, or receive them, always prevails over the interest of the prince or sovereign.

It is a great relief and easement in contributions, when they are imposed with justice, equality, and in an exact proportion to the abilities of those on whom they are raised; and when they are collected without insolence, without feverity or oppression, and without being converted to the profit or benefit of individuals; and when, in default of money, other goods and commodities are taken, as cloths, provisions, &c. but most of all when an army quits its own country to make war in that of the enemy or any other, whatever it may be.

Frederic II, or the Great, in speaking of the conduct of an officer sent out to levy contributions, expresses his sentiments in the following words: "Contributions are generally levied under one of the following circumstances; either being superior to the enemy you cover the whole country; or you possess a part of it till the arrival of the enemy; or you are interrupted by their light troops.

"In the first case it is common for the commander in chief to fix the sum to be raised by the inhabitants, under pain of military execution. Upon this duty the officer must vigorously exert his utmost authority to make his soldiers observe the strictest discipline and decorum, lest the inhabitants should be ruined beyond recovery.

"The second case requires great circumspection in the officer, and a perfect knowledge of the country, that he may not be surpris'd by the unexpected arrival of the enemy; he must pre-determine his plan of retreat, and fix the place of general defence; and for his farther security he must advance small detachments towards the enemy, that he may have early notice of their approach, and so interrupt all communication with the inhabitants.

"On his first arrival in the country, he will dispatch circulating billets of delivery, the duplicates of which are to be carried by the parties which are sent to levy the contributions. These parties are to have orders to return at a certain time, besides which they are to have sealed instructions indicating the places of second and third rendezvous, but these orders are not to be opened unless in cases of necessity.

"When contributions are to be raised in this manner, with the enemy at your heels, all lenity is out of the question. Where there is no coin to be had you must take any thing, that may be easily transported, or cattle, or hostages; but these only as your last resource. If you are close pressed by the enemy, it is best to divide your booty and send it different roads, that you may save at least some part of it.

"In the third case, namely, when the enemy hinders the inhabitants from delivering their quota, the peasants are in great danger of total ruin. Nevertheless, as the exigencies of the army require it, you are to proceed with all possible rigour, and even to punish those who neglect to deliver their proportion at the time required, that the rest through fear may be more punctual in obeying the orders they have received."

CONTRIBUTIOE FACIENDA, in *Laws*, a writ which lies where several persons are jointly bound to the same thing, and one or more of them refuse to contribute their share.

If tenants in common, or joint, hold a mill *pro indiviso*, and equally share the profits of the same; the mill falling to decay,

decay, and one or more of them refusing to contribute to its reparation, the rest shall have the writ of *contributions siccinda* to compel them. And if there be three coparceners of land that owe suit to the lord's court, and the eldest performs the whole; then may he have this writ to compel the refusers to a contribution. So when one suit is required for land, and that land being sold to divers persons, suit is demanded of them all, or some of them by distress, as entirely as if all the land were still in one. Reg. Orig. 175. F. N. B. 162.

CONTRITION, in *Theology*, expresses a real sorrow, resulting from the thought of having offended God; from the sole consideration of his goodness; without any regard, or, at least, independently of any respect, to the punishment annexed to the sin; accompanied with a detestation of sin, and of ourselves on account of it. With this act of the mind, it is said, that repentance, properly speaking, begins.

Some of the Romish doctors avow, notwithstanding the practice of their church, that contrition is valid, and carries with it every thing necessary to obtain pardon, without the ceremony, or as they call it, the *sacrament* of confession and absolution.

And in this they make the difference between contrition and **ATTRITION** (which see) to consist. This doctrine was maintained by F. Seguenot upon St. Anguline; but it was censured by the faculty of Paris.

CONTROL. See **COMPTROL**.

CONTROLLER. See **COMPTROLLER**.

CONTROLES, Fr. the same as **MUSTER-ROLLS**, or **REGISTRY-BOOKS**; which see.

CONTROLEUR General d'Artillerie, controller general of artillery. This appointment was of an old standing in France, and was next to that of grand master or master general of artillery, except that of *garde general d'artillerie*. It was however suppressed, and in 1703 Louis XIV. created two offices in lieu of it, *viz.* that of directors general of artillery, and that of commissary general of powder and salt-petre. But by his declaration of the 21st July 1716, he suppressed these offices, and several others, and attached to that of controller general all the ancient functions, which that officer afterwards exercised in their full extent, and which had been established by the edicts and declarations of Francis I. and his successors.

It is an office of great military importance, and much responsibility. He has a number of commissaries paid by the state to act and manage under him, by his orders, and in his name. They assist at the various proofs of powder and pieces of ordnance, and can take and demand an account of the purchases made in their absence by the principal officer of artillery.

CONTROLEURS Provinciaux d'Artillerie, provincial controllers of artillery. These officers in France used to control all the expences and purchases in general, of whatever kind they might be, that concerned the artillery, and could refuse or reject the arms, ammunition, and in short every thing that proved defective, on the deliveries of articles purchased or contracted for. They have each of them a key of the magazines where they reside. And upon entering on the exercise of their office, they caused inventories to be given to them by the *gardes-magazins* of every article in them, of which they made a register, and on it added the receipts, returns, and expences of stores, that they might be always able to render an account to the controller general, and the commandants of artillery. They often made their visits, and chiefly at the same time that the commandants of artillery made theirs. They gave certificates of the dead

and wounded, and made an inventory and sale of the effects of the dead, with the concurrence of the commissaries, or the *major des equipages*.

CONTROLEUR General de depenses de l'Artillerie, controller general of the expences of the artillery. These officers kept registers or accounts of the receipt and expenditure in money which was made by the treasurer general of artillery, as well as of the receipt and expenditure of pieces of ordnance, ammunition, and of purchases.

CONTROLEURS des Guerres, war controllers. The functions of a *controleur des guerres* are to keep a register and control of the musters and reviews of troops. See the article **MUSTER-MASTERS**.

CONTROLEURS d'Artillerie, controllers of artillery. See the article **CONTROLEURS Provinciaux d'Artillerie**.

CONTROLEUR General des Vivres, controller general of provisions. The undertakers used to choose for this employment an old commissary who was perfectly acquainted with the business, and was a person deserving of confidence. He had a very extensive commission for inspecting and taking cognizance of every thing that concerned provisions; and the exercise of his duty was considered as consisting of two parts; namely, that he should in the first place make himself properly acquainted with the state of the magazines that were to supply the army, and in the second place accompany the director general of provisions, to whom he was subordinate when he should take the field.

The first thing which the controller-general of provisions used to do, was to make a list or statement of all the places that depended on him, and of the commissaries who did duty there. He inquired what were their functions, into their character for zeal and spirit, the extent of their genius, their capacity, what offices they had been employed in, what families they were of, or had, the places of their birth, their age, and their manners.

He examined if the registers of the magazines were in proper form, both as to receipts and expences, and expences; as to the receipts, if the quantity in them is well specified, the quality, the different names of the measures, the weights of the country reduced to avoidupoise weight, in case it should be different; if the name of the seller, the place of his abode, and the date of the purchase, are set forth in the article.

As to the expence, he examined what supplies the commissary had sent to the magazines, or procured, the nature of the grain and flour, the quantities, and the copies of letters of carriage of the articles sent. After taking an extract of the receipts and expences, he saw what remained in the magazine, he himself counted the sacks, and made a certified state of the whole to be given to him.

The duties of this office, in short, were so many and troublesome, that if this officer, who, we have already observed, was subordinate to the director general of provisions, literally fulfilled them, he could not have had so much as one day of rest or repose during the whole continuance of a campaign. See **COMMISSARY-GENERAL of Stores**.

CONTROLEUR des Hopitaux Militaires, controller of military hospitals. Whenever a sick or wounded person enters an hospital, this officer writes upon a register endorsed and marked by a commissary of war, the military appellation or designation of the person sick or wounded, the name of his family, the place of his nativity, and the city nearest to that place. He makes also two statements of his money and his effects, one of which serves as an *etiquette au paquet*, or ticket to the parcel or packet, and the other is returned to the sick or wounded man, in case of whole death an account is rendered to the major of the regiment to which he belonged.

For

For the most part, however, the undertakers are the heirs or inheritors, for after a year and a day no part of either can be demanded from them.

This officer signed the billets of soldiers when they entered an hospital, and made them report themselves to him when they went out. He obliged the overseers of infirmaries to render him an account of the dead immediately after their decease, that he might take them off from his register. In hospitals where there was no controller, every thing now mentioned was executed by the director.

CONTROVER, in *Law*, a person who of his own head devises or invents false or feigned news. 2 Infl. 227.

CONTROVERSIAL DIVINITY. See POLEMICAL DIVINITY.

CONTROVERSY, or CAUSE, *State of a*, among *Ancient Rhetoricians*, denotes the principal point in dispute between contending parties, upon the proof of which the whole cause or controversy depends. Ancient writers have expressed it by several other names, as "the constitution of the cause," "the general head," and "the chief question." (Quint. Infl. Orat. l. iii. c. 6.) As this is the principal thing to every controversial discourse, it also requires the primary consideration of the speaker, and should be well fixed and digested in his mind, before he proceeds to investigate arguments for its support. See Antony's account of his own method of pleading, in Cic. de Orat. l. ii. c. 27. Quintilian (Infl. Orat. l. iii. c. 6.) describes the subject of this article to be "that kind of question which arises from the first conflict of causes." In judicial cases, it immediately succeeds the charge of the plaintiff, and plea of the defendant. Our common law expresses it by one word, *viz.* the ISSUE: which fee. This interpreters explain by describing it to be "that point of matter depending in suit, upon which the parties join, and put their cause to the trial." Thus, in the cause of Milo, the charge of the Clodian party is, "Milo killed Clodius." Milo's plea or defence is, "I killed him, but justly." Hence arises the grand question, or "state of the cause," "whether it was lawful for Milo to kill Clodius?" That Clodius was lawfully killed by Milo is what Cicero, in his admirable oration, in defence of Milo, principally endeavours to prove. The whole of his discourse is to be considered as centering at last in this point. Again, in the case of Roscius, the charge made against him is "that he killed his father." But he denies the fact. The grand question therefore to be argued is, "whether or not he killed his father?" Cicero's design in his defence of him is to shew, that his accusers had not made good their charge.

Besides the principal question, there are subordinate questions that occur in the course of a dispute, which should be carefully distinguished from it: and more particularly that, which arises from the reason or argument alleged in proof of the principal question. Thus, in the cause of Milo, his argument is, "I killed Clodius justly, because he assassinated me." Unless the Clodian party be supposed to deny this, they give up their cause. Hence therefore a subordinate question arises; "whether Clodius assassinated Milo?" Cicero spends much time in the proof of this, as the hinge, on which the rest of the question, and consequently the whole cause depended. But whatever may be the number of subordinate questions, they are all dependent upon the first; and though each of them has its particular state, yet neither of these is what the rhetoricians call "the State of the Cause," which is to be understood only of the principal question. Besides these subordinate questions, incidental ones are often introduced, having some reference to the principal question and contributing towards the proof of it, though they are not necessarily connected with it, or dependent upon it. Each

of these has its "state," though different from that of the "cause." Many questions of this sort occur in Cicero's defence of Milo, occasioned by aspersions that had been thrown out by the Clodian party to the prejudice of Milo. To each of these Cicero replies, before he proceeds to the principal question. And therefore, though the question, in which the "state of a Controversy" consists, is said by Quintilian to arise from the "first conflict of causes," yet we find from the instance of Cicero, now adduced, that it is not always the first question in order, upon which the orator treats. It sometimes happens, that the same cause or controversy comprehends more than one state. Thus in judicial causes, every distinct charge occasions a new state. All Cicero's orations against Verres relate to one cause, founded upon a law of the Romans against unjust exactions, made by the governors of provinces upon the inhabitants; but as that prosecution is made up of as many charges, as there are orations, every charge, or indictment, has its different state. It may be observed, that discourses of a deliberative and demonstrative kind, as well as judicial, are managed in a controversial way; and all controversies have their "state." And therefore Quintilian very justly observes (Infl. Orat. l. iii. c. 6.) that "states belong both to general and particular questions; and to all sorts of causes demonstrative, deliberative, and judicial." As to the number of these "states," Cicero and Quintilian reduce them to three. "Three things," says the latter (Infl. Orat. l. iii. c. 6.) "may be inquired into in all disputes; whether a thing is, what it is, and how it is. And this is the method which nature prescribes. For, in the first place, it is necessary the thing should exist, about which the dispute is; because no judgment can be made either of its nature or quality, till its existence be manifest; which is therefore the first question. But though it be manifest, that a thing is, it does not frequently appear what it is; and when this is known the quality yet remains; and after these three are settled, no further inquiry is necessary." The first of these three states is called the *conjunctural* state; the second is called the *definitive* state; and the third is called the state of *quality*. The first occurs when it is inquired, "whether one person killed another?" The second appears in an example of Cicero; "whether to take a sacred thing out of a private house be theft, or sacrilege?" The third is manifest, when the contending parties are agreed both as to the fact, and the nature of it; but the dispute is, "whether it be just or unjust, profitable or unprofitable, and the like?" as in the cause of Milo. Aristotle (De Rhet. l. iii. c. 26.) and from him Vossius (Infl. Orat. l. i. c. 6. § 7.) add a fourth state, namely that of *quantity*; e.g. "Whether an injury be so great as it is said to be?" Quintilian, however, thinks (ubi supra) that this may be referred to one or other of the preceding states; since it depends upon the circumstances of the fact, as the intention, time, place, or the like. The importance and use of the preceding observations require little illustration. Whenever a person engages in a controversy, he ought in the first place to consider the main question in dispute, to fix it well in his mind, and to keep it constantly in his view: and it is equally necessary for his hearers duly to regard this point, as they will thus be enabled to distinguish and separate from the principal question what is only incidental, and to observe how far the principal question is affected by it; to perceive what is offered by way of proof, and of illustration; and not to be misled by digressions, but to discern when the speaker deviates from his subject, and when he resumes it; and so to accompany him through the whole discourse and through his whole chain of reasoning, as to be able to judge, upon the whole, how far his conclusion is fairly

fairly drawn from his assumed premises. A constant regard to the state of the cause, and principal point in dispute, is very necessary for this purpose. Although rhetoricians treat of these facts only as they relate to epitrochies, and become the subject-matter of dispute between differing parties; yet every discourse has one or more principal heads which the speaker chiefly proposes to prove or illustrate. Ward's Orat. vol. i. lect. vi.

CONTUBERNALES MAGISTRATUM, companions of the magistrates. These were young men destined for civil and military employments, whom the magistrates, in the time of ancient Rome, took into their department to be formed under their eyes and in their houses.

The same appellation of *contubernales* was also given to tent-diers, who lived in one and the same room or under one and the same tent.

CONTUBERNIUM, in *Antiquity*, denotes a sort of connection or cohabitation that took place between male and female slaves in the middle ages. Although their masters or proprietors did not permit them to marry, they were allowed to form this kind of union. This practice so much prevailed, that during several centuries after the barbarous nations embraced Christianity, slaves, who lived as husband and wife, were not joined together by any religious ceremony, and did not receive the nuptial benediction from a priest; when this conjunction between slaves came to be considered as a lawful marriage, they were not permitted to marry without the consent of their master, and such as ventured to do it without obtaining that, were punished with great severity, and sometimes were put to death.

CONTUCCI, ANDREA, in *Biography*, likewise called Andrea Sanfovino, from a town in the Tuscan dominions, which gave him birth in the year 1460. Like Giotto he was the son of a simple shepherd, and, like him, his genius for design discovered itself in childhood, by the drawings which he made in the sand, and the models which he amused himself with forming out of clay. These youthful productions were seen and admired by Simone Vespucci, then chief magistrate of the town of Sanfovino: he perceived in them the prognostics of the future fame of our young artist, and obtained the permission of his father to carry him to Florence, where, under the tuition of Antonio Pollajuolo, he made a rapid progress, and ultimately became one of the most celebrated architects and sculptors of his age. The chapel of the sacrament, in the church of Santo Spirito at Florence, although small, is a beautiful specimen of the perfection which he attained in the former art, and is so finely put together that it appears as if chiselled out of one stone. By this, and other works, he soon acquired an extended reputation; inasmuch, that he was invited into Portugal, where he erected many edifices, and amongst others a palace with four towers for the king. After nine years residence in that country, he returned, loaded with presents, to Italy, and was employed by Leo X. in many considerable works; especially in the statues and basso-relievs which ornament the Santa Casa of Loretto. Several of his other productions in sculpture are at Rome, particularly two sepulchres within the choir of the Madonna del Popolo, and a fine group representing St. Anne, Christ, and the Madonna, in the church of St. Agostino. He died much regretted in the year 1529, at the place of his nativity. Milizia, Mem. degli Architetti.

CONTUMACY, in *Law*, a refusal to appear in court when legally summoned; a disobedience to the rules and orders of a court having power to punish such offence.

The word is used in civil as well as in criminal matters; but more rarely in the first, wherein the words *default*, and

contempt, ordinarily supply its place: the refusing of the charges of contempt, judged at the hearing, is also the penalty of contumacy. In a criminal sense, the contumacious is condemned, not because the crime is proved on him, but because he is absent.

By the Roman laws, there was no process in case of contumacy, during the first year of absence: they only took an inventory of the goods of the fugitive, and if he died in the year, he died *integro flatus*; but, after the year was expired, he was deemed culpable.

In England, contumacy is to be prosecuted to outlawry. In France, all contumacies are annulled, if the accused make his appearance in five years: if he die in that time, his relations are allowed to purge his memory.

CONTUS, *contus*, in *Antiquity*, a long spear, chiefly used by the horse.

CONTUSION, in *Surgery*, a bruise, from the Latin *contusio*. This term is applied to that kind of lesion which is occasioned by the application of a blunt substance to the surface of the body, with more or less violence, but without dividing the skin: it is also used, when any part has been pinched, compressed, or stretched. The first effects of a contusion are a laceration of fibres, or an entire loss of tone in the bruised part; and its common symptoms are swelling and inflammation. A violent contusion occasions considerable lacerations; amongst the many symptoms of which, effusion of fluids into the neighbouring cellular texture, and even fractures of the bones, are the most frequent. (See *Echyrosis* and *Contused Wounds*.) A violent contusion operates not only upon the part at which it immediately takes place, but also upon remote parts of the body; and the lesions thus produced are termed counter-injuries. See **COUNTER FISSURE**.

The degree of the contusion does not always depend upon the force which has occasioned it, but also often upon the nature of the parts that have been bruised. The contusion is always violent, when there is a bone in the injured part, which is little covered with fleshy substance. In every such case of contusion, inflammation, with all its bad consequences, is to be apprehended. In healthy persons, violent contusions often produce as serious consequences; but in persons whose solids are previously debilitated, slight contusions frequently produce gangrene and ulceration. Extravasated fluids, even though in large quantity, are dissolved and reabsorbed, especially when they are situated in parts of a loose spongy texture, or where there are many absorbent vessels. In the more solid parts, for example, in tendinous and aponeurotic parts, small effusions cannot be dissolved, and when situated near to bones, they easily give rise to caries by their pressure.

With regard to the cure, contusions frequently occasion more trouble to the surgeon than fractures; according as the operation and counter-operation of the force applied has been more or less violent, and also according as the patient does or does not give the injured part the requisite repose, which is equally necessary in cases of contusion as it is in fractures. The slighter degrees of contusion require nothing more than the use of external discutient and astringent remedies; the best of which are cold water, wine, brandy, vinegar, and solutions of sal ammoniac, or of alum, or decoction of Peruvian bark, &c. The weakened and stretched parts (if there be not much pain or inflammation) may also be supported by the pressure of a tight bandage; and when the contusion is of considerable extent, by bandaging the whole limb. When the patient is plethoric, and the bruised part is of importance, a vein must be opened, or leeches applied to it.

In the more violent degrees of contusion, the patients require evacuations, especially cooling purgatives frequently repeated. External pressure and friction, when the extravasation is considerable, will greatly aid its absorption, and is therefore beneficial. The more important is the bruised part, and the more copious the extravasation, the more assiduously must all these remedies be employed; but in less extensive contusions, the external applications may be sufficient.

However, the cold fomentations and spirituous affrings must not be applied without proper selection. A decoction of discutient herbs in wine, or in a mixture of equal parts of wine and water, especially when aponeurotic and tendinous parts have been much injured, produces often the greatest benefit; and to this may be added also sal ammoniac, when the pain and tension have abated. But if the skin be abraded, these saline applications cannot well be employed.

Sometimes the pain increases, in spite of these applications, to such a degree, that emollient cataplasms and oleaginous frictions become necessary: the following method is particularly recommended in such cases. Rub well the whole bruised part, above and below the contusion, especially below it, with good oil, and then cover the whole with a mixture of olive oil and strong wine-vinegar, formed into a kind of liniment by agitation. This mixture may best be applied upon thick lint, wrapped round the whole part; thus, when the ankle has suffered the contusion, a part of the leg and foot must be covered with it. These dressings are to be renewed twice or thrice a day, till the swelling and pain disappear. The whole part must then be frequently rubbed with camphorated spirit of wine. When this has been done for about three or four days, a cloth may be applied, spread with a thick ointment composed of white of egg mixed with crude alum. This may be repeated about three times, with intervals of 12 hours.

The yellow or blue spots that remain after the cure of contusions, may easily be made to disappear, by applying to them a mixture of bran, salt, and vinegar, boiled together till the bran has imbibed the fluids.

When the quantity of extravasated blood is very large, or when it is situated in a part where it cannot easily be absorbed, or when it gives rise to symptoms which demand speedy relief, it must be immediately evacuated by an incision, and the sore treated like a wound combined with contusion. The same practice must also be observed, when the internal hæmorrhage by which the extravasation is produced, proceeds from a large vessel, continues, and requires to be stopped by some particular applications; or when, besides the extravasation, other lesions of the parts are also present, as, for example, when the bone has been shattered. Should there still remain lumps of coagulated blood behind, after the use of the discutient remedies, these must also be removed by incisions, if they threaten to produce further mischief by their pressure.

Blows and contusions of the *joints* deserve particular attention: for in these situations, especially in the knee joint, they are always dangerous. The consequences are violent pain and impeded motion; the pain is generally severe at first, but sometimes not. In the first case the ligaments, and in the second the glands, or interior parts, of the joint have been principally affected. In the latter case the consequences are dropsy, or even suppuration of the joint, which frequently proves fatal. When the ligaments or other external parts of the joint have been injured, the part must be kept quiet, and treated, according to the peculiar circumstances of the case, with the remedies formerly mentioned, but especially we should have recourse to leeches: it may

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afterwards be washed with spirituous and saline applications. When the pain has ceased, and there remains behind, as often happens, a stiffness in the part, the soap, liniment, and vapour bath may be employed with advantage. Should arthritic affections be superadded, speedy relief must be procured, and the dangerous consequences obviated by cupping, blisters, friction with flannel, and the internal use of camphorated remedies. When the ligaments have been stretched and relaxed by a fall, the German surgeons apply, with good effect, small bags filled with the warm powder of plaster of Paris, mixed with a fourth part of sal ammoniac and common salt.

When the glands, or internal parts of the joint, have been injured, the surgeon ought not to intermit the application of appropriate remedies, till the pain has entirely ceased, especially repose, blood-letting, and cold fomentations. The lesion of a joint, particularly of the knee, by a fall, blow, &c. easily gives rise to a white swelling of the part. In such cases the surgeon cannot employ too great care and attention, as the symptoms are so numerous and diversified, that it is in vain to expect a fortunate result from a careless and hurt practice.

Internal contusions are attended, more or less, with distressing and serious symptoms. If the head be violently contused, there is danger lest the brain should have suffered at the same time; or lest the effused blood, lying long upon the cranium, should injure the bone by its pressure, if it be not speedily absorbed.

When the thorax has been violently contused, the heart, lungs, and large blood-vessels within the chest, are liable to partake of the injury; or a rib may be fractured, and may pierce the lungs, so as to occasion alarming consequences, if not death itself.

A general contusion of the abdomen, or a blow received upon it, may perhaps hurt the liver, stomach, uterus, bowels, &c. or may rupture an important blood-vessel, and thus cause the death of the patient by the internal bleeding, inflammation, or suppuration.

The judicious surgeon will therefore, in such cases, consider what internal parts are likely to have sustained an injury, and will adapt his means to the peculiar circumstances which arise. See CONCUSSION, FRACTURE, and HÆMORRHAGE.

CONTWIG, in *Geography*, a small town of France, in the department of Mont Tournon, and chief place of a canton in the district of Deux Ponts, with 780 inhabitants. The canton itself is composed of 16 communes, and reckons 4114 inhabitants.

CONTY, a small town of France, on the river Seille, in the department of Somme, 12 miles S.E. of Amiens, which formerly gave the title of prince to the second line of the house of Bourbon Condé. It has only 759 inhabitants, but is the chief place of a canton, which, in 27 communes, and upon a territorial extent of 220 kilometres, reckons 6675 persons, and forms part of the district of Amiens; $3\frac{1}{2}$ leagues N.N.E. of it.

CONTZ, a small town of France, in the department of Sarre, and chief place of a canton in the district of Treves. The number of its inhabitants does not exceed 351, and the whole canton has 31 communes, and a population of 4972 individuals.

CONTZEN, ADAM, in *Biography*, a Jesuit, and native of the duchy of St. Juliers, has been celebrated for his deep knowledge in the learned languages which he taught in the college of Munich, where he died in the year 1635, after having published "Commentarii in Evangelia in Epit. Pauli ad Rom. et ad Corinth." 2 tom. folio. He wrote

likewise some able pieces in defence of the Catholic religion as opposed to the Protestants. Moreri. Nouv. Hist. Dict.

CONVALESCENCE, in *Medicine*, the insensible recovery of health; or that state in which, after the cure of a disorder, the body which has been reduced, has not yet regained its vigour, but begins to resume its powers. Proper aliments conduce to the re-establishment of the languid faculties; but as the tone of the bowels is weakened, the digestive faculty is not equal to its office, which is shewn by light sweats over the whole body; and the smallest excess in this respect is oftentimes the occasion of dangerous relapses. A person in this state is like a taper relumed, which the least degree of wind is sufficient to extinguish. *Encycl.*

CONVALESCENT, recovering or returning to a state of health. In this country hospitals are established in different districts, for the preservation and recovery of our troops when ill or indisposed. Among others, there is in each district a convalescent hospital.

List of convalescents, is the return made out by the surgeon belonging to a battalion, hospital, &c. in order to ascertain the specific number that may soon be expected to be able to do duty.

CONVALLARIA, in *Botany*. Linn. Gen. 425. Schreb. 575. Willd. 649. Gart. 67. Juss. 42. Vent. 2. 145. Muegt. *Encyc.* Class and order. *hexandria monogynia*. Nat. Ord. *Sarmentacea*, Linn. *Aparagi*, Juss. *Asparagoides*, Vent.

Gen. Ch. *Cal.* none. *Cor.* monopetalous, bell, funnel, or wheel-shaped, smooth, more or less deeply six-cleft; segments open or reflexed. *Stam.* Filaments six, awl-shaped, inserted into the corolla or the receptacle; anthers oblong, erect. *Pist.* Germ superior, globular; style filiform; stigma obtuse, trigonous. *Peric.* Berry globular, spotted before it ripens, three-celled. *Seeds* one, two, or more in each cell, one or two of the cells frequently abortive.

Eff. Ch. *Cor.* six-cleft. Berry superior, when unripe, spotted; three-celled.

* *Corollas bell shaped*. *Lilium convallium*, Tourn.

Sp. 1. *C. majalis*, sweet-scented lily of the valley. Linn. Sp. Pl. 1. Mart. 1. Poir. 1. Willd. 1. Flor. Dan. tab. 854. Lam. Ill. tab. 248. Eng. Bot. 1035. Gart. tab. 16. fig. 6. (*Lilium convallium alpinum & latifolium*; Bauh. Pin. 304. Polygonatum; Hall. n. 1241.) "Scapus semi-cylindrical; flowers in racemes, somewhat unilateral, nodding." *Root* perennial, matted, creeping. *Leaves* radical, two, on long petioles, elliptical, ribbed, entire, acute; petioles equitant, invell'd with scales. *Scapus* extra-foliceous, solitary, erect, simple. *Flowers* white, pedicelled, alternate, bracteate, sweet-scented; segments recurved; pedicels recurved; stamens short; style club-shaped, triangular upwards. *Berry* leaflet when ripe. It varies in having broader or narrower leaves. A native of woods, particularly in hilly countries. 2. *C. japonica*, grass-leaved lily of the valley. Linn. Jun. Supp. 204. Mart. 2. Poir. 2. Willd. 2. Thunb. Flor. Jap. 139. (Monds. Kamp. Amcen. with a figure.) "Scapus two-edged; flowers in racemes, unilateral; leaves linear, three times longer than the scapus." *Root* perennial, tuberous. *Root-leaves* about ten, two feet long, drawn to a point at the bottom, triangular, striated, bent back. *Scapus* finely striated, seven inches long, quadrangular. *Flowers* white; peduncles aggregate, from two to six together, from one to four flowered; bracts lanceolate, white, shorter than the peduncle; divisions of the corolla lanceolate, spreading. *Berry* blue, about the size of a pea, egg-shaped. *Seed* solitary, filling the berry. There is a variety with leaves about seven inches

long, twice the length of the scapus. A native of Japan, introduced into England in 1784. 3. *C. japonica*. Mart. 3. Poir. 3. Willd. 3. Thunb. Jap. 141. "Scapus striated; raceme spiked; flowers aggregate." *Root* perennial, fibrous. *Leaves* linear, narrowed towards the base, somewhat obtuse, much striated, longer than the scapus. *Scapus* from four inches to a foot high, upright, simple, angular, striated, smooth. *Flowers* violet, clustered without order in a spike-like raceme; peduncles very short, cylindrical, spreading, smooth, one-flowered; corolla almost globular, so deeply divided as to appear six-petaled; divisions egg-shaped, obtuse, concave; filaments inserted into the germ. Thunb. (receptacle, Poir.); anthers egg-shaped, erect, two-celled; germ six-striated, smooth; style erect, white, shorter than the filaments; stigma simple. *Fruit* not sufficiently known. A native of Japan, flowering in September.

* * *Corollas funnel-shaped*. Polygonatum, Tourn.

4. *C. verticillata*, narrow-leaved Solomon's seal. Linn. Sp. Pl. 2. Mart. 4. Poir. 4. Willd. 4. Eng. Bot. 128. (Polygonatum; Hall. n. 1244. P. angustifolium non ramosum; Bauh. Pin. 303. Tourn. Inst. 78. β . ramosum; Bauh. Pin. 304.) "Leaves in whorls." *Root* perennial, fleshy, creeping. *Stems* two feet high, erect, commonly simple, angular, smooth, naked near the bottom. *Leaves* three or four in a whorl, five or seven at the top of the stem, lanceolate, acute, sessile, glaucous underneath; stipules none. *Flowers* white, green at the tip; peduncles axillary, solitary, slender, branched, drooping, two or three-flowered; corolla a little narrowed at the mouth of the tube; divisions bearded within under the tip, rather obtuse; stamens short, inserted into the mouth of the tube; style short. *Berry* globular, blue. There is a branched variety, described by Clusius and others as a distinct species. A native of many parts of Europe, of Scotland, but not of England. 5. *C. polygonatum*, angular Solomon's seal. Linn. Sp. Pl. 3. Mart. 5. Poir. 5. Willd. 5. Flor. Dan. tab. 377. Eng. Bot. 280. Woodv. Med. Bot. tab. 44. (Polygonatum latifolium vulgare; Tourn. Inst. 78. Hail. Helv. n. 1242. P. latifolium flore majore odoro; Bauh. Pin. 303. Barrel. Ic. 711.) "Leaves alternate, half-embracing the stem; stem angular; peduncles axillary, generally one-flowered." *Root* perennial, creeping, fleshy, full of knots, which, when cut obliquely, are figured with veins, with somewhat of the appearance of a seal, whence it is said to have obtained the name of Solomon's seal. *Stems* several, a foot and half high, erect, nodding at the top, simple, leafy half way down, angular, somewhat two-edged, zig-zag, smooth. *Leaves* nerve'd, smooth, unilateral. *Flowers* white, with a green line down the segments, nodding, sweet-scented; * unilateral on the side opposite the flowers; peduncles axillary, solitary or in pairs, almost always one-flowered; corolla oblong, a little narrowed in the middle; divisions spreading, bearded; stamens inserted into the middle of the tube; anthers projecting beyond the base of the divisions; style half an inch long. *Berry* blue, with three seeds. A native of England and other parts of Europe. The root is mucilaginous, and in times of scarcity has been made into bread. It has long been employed as a discutient poultice to various kinds of tumours, but more particularly to bruises, accompanied with extravasation of blood in the cellular membrane. It is also recommended as a cosmetic; and in the time of Galen was used by women to remove pimples and freckles of the skin. The berries, flowers, and leaves are extremely acrid, and said to be poisonous; but Poirct has often eaten the young shoots in spring and found them as tender and wholesome as those of asparagus. 6. *C. multi-*
flora.

flora. Many-flowered or common Solomon's seal. Linn. Sp. Pl. 4. Mart. 7. Poir. 6. Willd. 6. Flor. Dan. tab. 152. Eng. Bot. tab. 279. (Polygonatum latifolium maximum; Bauh. pin. 303. Tourn. Inst. 78. Hall. helv. n. 1242.) "Leaves alternate, embracing the stem, stem cylindrical; peduncles axillary, many-flowered." Root perennial, creeping, fleshy, knotted. Stems two feet high or more, simple, leafy, nodding. Leaves elliptical, nerved, a little paler than those of *C. polygonatum*. Flowers white, green at the base and tip; peduncles solitary, about five-flowered; tips of the divisions of the corolla scarcely bearded; stamens inserted into the top of the tube; style half an inch long. Berry bluish black. A native of England and other parts of Europe, chiefly in mountainous parts of the country. The root has similar properties to those of the preceding species; the young shoots are likewise esculent. 7. *C. birta*. Poir. 7. Bosc. act. soc. h. nat. Paris. "Leaves alternate, a little embracing the stem; stem hispid; peduncles with about three flowers." Root spreading. Stem about a foot high, crooked, angular, sprinkled with white stiff hairs. Leaves egg-shaped, broad, ending in a long obtuse point; nerves of the inferior surface hairy. Flowers nodding, unilateral; peduncles axillary, about an inch long, villous. A native of North America, introduced into the Paris garden in 1789. 8. *C. latifolia*. Mur. syst. veg. 334. Mart. 6. Poir. 8. Willd. 7. Jacq. Aust. 2. tab. 222. "Leaves alternate, embracing the stem, acuminate; stem angular; peduncles axillary, many-flowered." This species has the habit of *C. multiflora*, the flowers of *C. polygonatum*, and the leaves of *C. majalis*. Root small, spreading, fleshy, very mucilaginous. Stem a foot and a half or two feet high, cylindrical at the base, then angular to the summit. Leaves egg-shaped, much nerved, quite entire; nerves of the under surface slightly villous when viewed through a lens. Flowers three times larger than those of *C. multiflora*, white, green at the top, and marked lengthwise with greenish lines, nodding; peduncles slightly villous; stamens attached to the middle of the tube. Berry globular, bluish black. Seeds three or four, sometimes five, in each cell. A native of Austria, on woody mountains.

*** Corollas wheel-shaped. Smilacæ, Tourn.

9. *C. racemosa*. Linn. Sp. Pl. 5. Mart. 8. Poir. 9. Willd. 8. Bot. Mag. tab. 899. (Polygonatum racemosum; Corn. Canad. 36. tab. 37. Pluk. Alm. 301. tab. 311. fig. 2.) "Leaves sessile; raceme terminal, compound." Linn. "Leaves alternate, sessile, egg-shaped, acuminate; panicle terminal, naked." Willd. Stem two or three feet high, stiff, angular, flattened, zig-zag. Leaves nerved, thin, flexible, green on both sides, slightly ciliated at the edges. Flowers white, very small, on small alternate branches, with short peduncles; corolla open, divided almost to the base; divisions egg-shaped, a little shorter than the stamens; anthers large, yellowish. Berries small, red. A native of North America, called *Oiole Nowote*, child's physic, by the Cherokee Indians. It is a hardy perennial, easily propagated by parting the roots, but thrives most in a light soil and shady situation. 10. *C. stellata*. Linn. Sp. Pl. 6. Mart. 9. Poir. 10. Willd. 9. (Polygonatum virginianum. Moris. hist. 3. tab. 4. fig. 7. P. canadense; Corn. Canad. tab. 33.) "Leaves embracing the stem, numerous." Linn. "Leaves alternate, embracing the stem, elliptical, somewhat acute; raceme terminal, simple." Willd. Root white, spreading horizontally. Stem about two feet high, thick, not angular, weak, almost hollow within. Leaves growing very near together, large, even surfaced, smooth, slightly ciliated, green on both sides. Flowers white, in a close spike;

corolla large, open, stellate, divided almost to the bottom; segments linear, obtuse, stamens half the length of the corolla; filaments capillary; anthers yellow, small, roundish; style the length of the stamens; stigma obtuse. Berries red. A native of North America. 11. *C. trifoliata*. Linn. Sp. Pl. 7. Mart. 10. Poir. 11. Willd. 10. (*C. floribus racemosis, foliis ovatis oblongis*; Cmel. Sib. 1. tab. 6.) "Leaves embracing the stem, in threes; raceme terminal, simple." Root perennial, long, jointed, knotty, with short slender filaments at each joint. Stem about three or four inches high, slender, crooked. Leaves generally three together, oblong, rarely lanceolate, rather acute, even-surfaced, smooth, nerved, green on both sides. Flowers small, on long simple peduncles; corolla open, deeply divided; divisions ovate-acute; stamens very short, inserted into the receptacle; germ roundish. Berries red, round. Seeds two or three, yellowish, compressed, pointed. A native of the forests in Siberia. 12. *C. bifolia*. Linn. Sp. Pl. 8. Mart. 11. Poir. 12. Willd. 11. Flor. Dan. tab. 291. Bot. Mag. Pl. 510. (Lilium convallium minus; Bauh. pin. 304. Barrel. Icon. 1212. Unifolium; Hall. helv. n. 1240.) "Leaves heart-shaped; flowers tetrandrous." Root perennial, small, fibrous, creeping. Root-leaves solitary, on long petioles, springing from distant parts of the root. Stem from a different part of the root, two or three inches high, slender, slightly angular. Stem leaves generally two, petioled, a little nerved, heart-shaped, acute, with two rounded lobes and some stiff hairs at the base. Flowers white, small, shorter than the peduncles; peduncles very slender, quite simple, sometimes two together, from the axil of a small scale at their base; corolla deeply four-cleft; divisions oval, open; stamens four; filaments long; anthers small, shorter than the corolla; style short, thick; stigma slightly bifid or trifid. Berries red, small, two or three-celled. A native of the mountainous parts of Europe, abundant in Sweden. Poiret observes that the petioled leaves are a rare singularity in the family of the Liliacæ.

Propagation and Culture.—The lily of the valley requires a loose sandy soil and a shady situation. It is propagated by parting the roots in autumn, placing the sets a foot asunder. This should be done every third or fourth year; their flowers will else be small and few. All the sorts of Solomon's seal are hardy. They prefer a light soil and shady situation, and are proper to ornament plantations which are not crowded with shrubs. They are propagated in the same manner and require the same treatment as the lily of the valley. Miller.

CONVENÆ, in *Ancient Geography*, a people of Gaul, who derived their name from the Latin *convivere*. They were established by Pompey, after his return from the Spanish war, against Sertorius, at the foot of the Pyrenees. Their country is Cominges.

CONVENT, from the Latin *conventus, meeting*, of *convivere, to come together*; a monastery of religious, of either sex. See MONASTERY.

Convents are very numerous in Greece, as well as in many Popish countries; and they are generally, though not universally, sanctuaries consecrated to ignorance, superstition, and most frequently to sloth. In the Grecian islands, the monks are denominated *caloyers*, from *καλος, kalos*, good, and *γειος, geios*, old man, *q. d.* good old man. However, the Grecian convents are the habitations, not merely of old men, but of young boys, from 10 to 12 years of age, clothed in the habit, which consists of a plain long black gown, confined by a girdle.

CONVENTA PACTA. See PACTA.

CONVENTI, GIULIO CESARE, in *Biography*, a Bolognese

nese sculptor, who is spoken of in high terms by Malvasia, in his description of the magnificent funeral of Agostino Caracci, upon which occasion Conventi modelled a beautiful figure of virtue, which, with another, personifying honour, was represented, crowning with laurel, the bust of the deceased artist. The celebrated sculptor, Algardi, received his first instruction in modelling from this master. Malvasia.

CONVENTICLE, a diminutive of *convent*, denoting, properly, a cabal, or secret assembly, of a part of the monks of a convent, to make a bribe or party in the election of an abbot.

From the ill use of these assemblies, the word is come into disrepute; and now stands for any mischievous, seditious, or irregular assembly. F. Doucine observes, the occidentals always esteemed the fifth general council an unlawful conventicle. The term conventicle is said, by some, to have been first applied in England to the schools of Wickliff, and has been since used to signify the religious assemblies of all in this country, who do not conform to the established doctrines and worship of the church of England.

Conventicle, however, in strict propriety, denotes an unlawful assembly; and cannot, therefore, be justly applied to the legal assemblies of protestant dissenters, in places of worship certified, or licensed, according to the requisitions of law. See TOLERATION.

This term occurs in the statutes 2 Hen. IV. c. 15, and 1 Hen. VI. c. 3; and 16 Car. II. c. 4. (A. D. 1664), which statute was made to prevent and suppress conventicles. This statute, which was enacted for three years, having expired, was revived A. D. 1670, by 22 Car. II. c. 1. which enacted, that if any persons of the age of sixteen years, subjects of this kingdom, shall be present at any conventicle, where there are five or more assembled, they shall be fined 5s. for the first offence, and 10s. for the second; and persons preaching incur a penalty of 20l. for the first, and 40l. for the second offence. Also, suffering a meeting to be held in a house, &c. is liable to 20l. penalty. Justices of peace, on the oath of two witnesses, or any other sufficient proof, may record the offence under their hands and seals, and this record shall be taken in law for a full and perfect conviction, and shall be certified at the next quarter-sessions. They, and also constables, head boroughs, &c. have power to enter such houses, and seize persons assembled, &c. And if they neglect their duty, they shall forfeit 100l. And if any constable, &c. know of such meetings, and do not inform a justice of peace, or chief magistrate, &c. he shall forfeit 5 l.

“One clause in this act,” says Mr. Hume (Hist. vol. vii. p. 457), “is remarkable; that if any dispute should arise with regard to the interpretation of any part of the act, the judges should always explain the doubt in the sense least favourable to conventicles; it being the intention of parliament entirely to suppress them. Such was the zeal of the commons, that they violated the plainest and most established maxims of civil policy, which require, that in all criminal prosecutions, favour should always be given to the prisoner.” The persecution under this act continued to be very severe, till the operation of the act was suspended by the exercise of a dispensing power, and the king’s declaration of indulgence, A. D. 1671–2. However, alderman Love, member for the city of London, in the name of the dissenters, disavowed the dispensing power, though it had been exercised in their favour, because, as he declared in his speech, “he had rather go without his own desired liberty, than have it in a way so destructive of the liberties of his

country, and the protestant interest; and this (he said) was the sense of the main body of dissenters.” At length it was ordained, by the stat. 1 W. & M. II. c. 18. that protestant dissenters shall be exempted from penalties; though if they meet in a house with the doors locked, barred, or bolted, such dissenters shall have no benefit from that statute. By stat. 10 Anne, c. 2. officers of the government, &c. present at any conventicle, at which there shall be ten persons, if the royal family be not prayed for in express words, shall forfeit 40l. and be disabled. See NONCONFORMISTS and TOLERATION.

CONVENTION, in our *Law-Books*, is used when a parliament is called, which sits and is dissolved without any act passed, or judgment given. It is then said not to be a *session* of parliament, but a *convention*. See CONVENTION *infra*.

CONVENTION of Rouen, the same with burse of Rouen.

CONVENTION, a treaty, contract, or agreement between two or more parties. See CONTRACT.

Every convention between men, provided it be not contrary to honesty, and good manners, produces a natural obligation, and makes the performance a point of conscience.

Every convention has either a name, and a cause or consideration, or it has none: in the first case, it obliges civilly and naturally; in the latter only naturally.

CONVENTIONS *entre souverains pour restitution des deserteurs*, conventions among sovereigns for restitution of deserters. By these sorts of *conventions*, the deserters from all armies are taken up or arrested, if they get into the territories of a power, that is in agreement with that whose colours they have deserted. Notice is given to the nearest commandant, who should send people to find the deserters at the expence of the corps, and should pay those who took them up, for their sustenance or support during the time of their detention.

CONVENTION *secrètes entre les officers d'un corps*, secret conventions among the officers of a corps. See CONCORDAT.

Secret conventions are also made in a treaty of peace, reciprocally agreed on, and concluded between the parties, who have received powers to treat. Then these conventions remain secret and concealed, till what was agreed on between the treating and contracting parties is put in execution.

CONVENTION is much used both in ancient and modern pleadings, for an agreement or covenant,

In the book of rolls of the manor of Hatfield in Yorkshire, we have a record of a pleasant convention, anno 11 Edw. III. between Robert de Roderham, and John de Ithen; the latter of whom sold the devil in a siring for three-pence halfpenny to the former, to be delivered on the fourth day after the convention; when, the purchaser making his demand, the seller refused to give him livery, to the great loss (as the record represents it), of forty shillings to the purchaser, &c. But it appearing to the court, that such a plea does not lie among Christians, the parties were adjourned to hell for judgment.

CONVENTION is also the name given to an extraordinary assembly of parliament, or of the states of the realm, held without the king’s writ. Of this kind was the parliament which restored Charles II. This parliament met above a month before his return, the lords by their own authority, and the commons, in pursuance of writs issued in the name of the keepers of the liberty of England, by authority of parliament; and sat full seven months after his restoration, and enacted several laws still in force.

The necessity of the case, in this instance, superseded all law; for if they had not so met, it was morally impossible that the kingdom should have been settled in peace. After the king's return, the first thing that was done, was to pass an act, declaring this to be a good parliament, notwithstanding the defect of the king's writs. (Stat. 12 Car. II. c. 1.) Nevertheless, though the king himself, who alone had a right to object, consented to waive the objection, it was at that time a great doubt among the lawyers (1 Sid. 1.) whether even this healing act made it a good parliament, and held by very many, says judge Blackstone, in the negative: though, as he adds, it seems to have been too nice a scruple. And yet, out of abundant caution, it was thought necessary to confirm its acts in the next parliament, by statute 13 Car. II. c. 7. & c. 14.

The convention of estates, in 1688, after the retreat of king James II. upon mature deliberation, came to a conclusion, that king James, by his practices here, and his flight hence, had abdicated the kingdom; and that the throne was vacant; and therefore devolved to king William and queen Mary. Upon this their assembly expired as a convention, and was converted into a parliament.

In this case, the lords and commons, by their own authority, and upon the summons of the prince of Orange (afterwards king William) met in a convention, and therein disposed of the king and the kingdom. On this occasion, the peers and bishops, to the number of near 90, addressed the prince, desiring him to summon a convention by circular letters. In order to satisfy his mind by a more general and express declaration of the public consent, the following judicious expedient was adopted. All the members who had sitted in the House of Commons during any parliament of Charles II., were invited to meet; and to them were added the mayor, aldermen, and fifty of the common council of London. This was regarded as the most proper representative of the people that could be summoned during the present emergency. They unanimously voted the same address with the lords. The prince, being thus supported by all the legal authority which could possibly be obtained in this critical conjuncture, wrote circular letters to the counties and corporations of England, and his orders were universally complied with. Accordingly, the English convention was assembled, June 22, 1689, and a vote was passed in a few days by a great majority of the commons, and sent up to the peers for their concurrence. The words which expressed it were these, "that king James II. having endeavoured to subvert the constitution of the kingdom, by breaking the original contract between king and people; and having, by the advice of Jesuits, and other wicked persons, violated the fundamental laws, and withdrawn himself out of the kingdom, has abdicated the government, and that the throne is thereby vacant." (See ABDICATION.) The vote was carried to the upper house, and there met with great opposition. After long debate, and free conference between the houses, and after having obtained the sentiments of the prince, with regard to the settlement of the government, the chief parties agreed, and the convention passed a bill; in which they settled the crown on the prince and princess of Orange; the sole administration to remain in the prince; the prince of Denmark to succeed after the death of the prince and princess of Orange; her posterity after those of the prince's, but before those of the prince by any other wife. The convention annexed to this settlement of the crown, a declaration of rights, where all the points which had of late years been disputed between the king and people, were finally determined; and the powers of royal pro-

rogative were more narrowly circumscribed, and more exactly defined, than in any former period of the English government. See CONSTITUTION.

This convention was assembled upon a similar principle of necessity with that of the restoration; that is, upon a full conviction, that king James had abdicated the government, and that the throne was thereby vacant; which supposition of the individual members was confirmed by their concurrent resolution, when they actually assembled. In such a case as the palpable vacancy of the throne, it follows "*ex necessitate rei*," that the form of the royal writs must be laid aside, otherwise no parliament can ever meet again. Let us suppose, for the sake of argument, that the whole royal line should at any time fail, and become extinct, which would indisputably vacate the throne; in this situation, it seems reasonable to presume, that the body of the nation, consisting of lords and commons, would have a right to meet and settle the government, otherwise there must be no government at all. Upon this, and no other principle, says judge Blackstone, did the convention in 1689 assemble. The vacancy of the throne was precedent to their meeting, without any royal summons, not in consequence of it. They did not assemble without writ, and then make the throne vacant; but, the throne being previously vacant by the king's abdication, they assembled without writ, as they must do if they assembled at all. Had the throne been full, their meeting would not have been regular; but, as it was really empty, such meeting became absolutely necessary. Accordingly, it is declared by statute 1 W. & M. II. c. 1. that this convention was really the two houses of parliament, notwithstanding the want of writs, or other defects of form.

A similar convention, by circular letters from the prince, was summoned at Edinburgh, on the 22d of March 1689. As soon as the purpose of this convention was discovered, the earl of Balcarras, and viscount Dundee, leaders of the tories, withdrew from the city; and the convention having passed a bold and decisive vote, that king James, by his mal-administration and abuse of power, had forfeited all title to the crown, they made a tender of the royal dignity to the prince and princess of Orange.

The constitution of Great Britain having placed the representation of the nation, and the expression of the national will in the parliament, no other meeting or convention, even of every individual in the kingdom, would be a competent organ, to express that will; and meetings of such a nature tending merely to sedition, and to delude the people into an imaginary assertion of rights, which they had before delegated to their representatives in parliament, could only tend to anarchy and confusion; and to overturn every settled principle of government.

Accordingly, an act of parliament was passed in Ireland, in the year 1793, to prevent any such meetings or conventions; and a few ignorant individuals, who in the same year had dared to assemble under that title in Scotland, were quickly dispersed, and their leaders convicted of seditious practices; for which they were sentenced to transportation.

CONVENTIONAL ESTATES *for Life*, are those that are expressly created by the acts of the parties, in contradistinction to such as are merely *legal*, or enacted by constraint and operation of law. See ESTATE.

CONVENTIONAL Subrogation. See SUBROGATION.

CONVENTIONARY RENTS, in *Rural Economy*, is a term which is sometimes applied to the reserved rents of life leases. See LEASE.

CONVENTIONE FACIENDA, in *Law*, is a writ which lies for the breach of any covenant in writing. Fitzherbert calls it a writ of *covenant*.

CONVENTUAL, something belonging to a convent. See **COENOBITE**.

CONVENTUAL is particularly used, since the year 1250, for a religious who actually resides in a convent; in contradistinction to those who are only guests, or are entertained there, or are in possession of benefices depending on the house.

CONVENTUAL likewise denotes a class of the order of Franciscans, who adopted the relaxation introduced into that order by pope Innocent IV. which allowed of property and possessions in their community. They were so called in opposition to the "Brethren of the Observance." This division took place in the year 1368.

CONVENTUAL Church, denotes a church that consists of regular clerks, professing some order of religion; or of dean and chapter, or other societies of spiritual men.

CONVENTUAL Prior, differs from a *claustral prior*, in that the former has the full right and authority of an abbot; the only difference between them being in the name: whereas the claustral prior is a dependent of the abbot, and derives all his authority from him.

The conventual prior is obliged to take priest's orders in a year, or at most in two years, from the day of his admission: in default whereof, the benefice becomes vacant. Some priories are actually conventual, *i. e.* they are stocked with religious: others are only conventual in *habitu*, *v. gr.* where there have been no religious during the space of forty years: the continuance of one single religious, keeps the priory *conventual actu*; for, in default of one, the priory becomes simple. See **PRIOR**.

By a declaration of the king of France, in 1680, it was decided, that a conventuality never degenerates, or ceases, while there are regular places subsisting in it for twelve religious, with revenues for their support.

CONVENTUAL Auditors. See **AUDITOR**.

CONVERGENCY of Meridians, in *Geographical Surveying*, is the angle formed between the meridian of any other place, drawn through the first mentioned place. Thus, if P (*Plate II. Surveying, fig. 10.*) be the pole of the earth, EQ a portion of the equator, PE a meridian drawn through a place or station G, and PQ a meridian drawn through another place R: then, if GR be a portion of a great circle passing through the places G and R, and *ab* be a portion of a small circle passing through G, parallel to the meridian of R (PQ), or perpendicular to the great circle *GR*, which is itself a perpendicular to the meridian PQ, in the point R, then is the angle *aGP* the angle of convergency of the two meridians PG and PR, at the place G. It is to be observed, that at the equator any two meridians, as EP and QP, are parallel to each other; but on their departure from thence, they converge more and more as they approach towards the pole, where the angle of convergency (*aGP*) becomes equal to the angle of longitude EPQ. It may also be remarked, that the angle of convergency, augmented by the excess of the three angles of a spherical triangle above 180°, is equal to the angle of longitude at the pole, on a sphere. Phil. Transf. 1787, p. 218. The principles for applying this to an ellipsoid figure of the earth, or to any other given spheroid, may be found in Mudge and Dalby's Trig. Survey. vol. i. art. 60, &c.

The late general Roy (Phil. Transf. 1787, p. 216.) has explained the mode of applying the convergency of two me-

ridians, obtained by reciprocally observing the azimuth of a station on each, from the other, compared with the meridian there (determined by observations of the pole-star), to the finding of the difference of longitude, or angle at the pole between the meridians of those two stations, by a method somewhat different from that recommended by the Rev. Mr. Mitchell. Phil. Transf. lvi. In the progress of the Government Trigonometrical Survey, this method was first applied in the finding of the difference of longitude between Botley Hill station in Surrey (lat. $51^{\circ} 16' 41\frac{1}{2}''$ N. and long. $0^{\circ} 0' 3''$ E.) of Greenwich Royal Observatory) and Goudhurst people in Kent, about 23 miles distant; as also for settling the latitude of the latter place. Phil. Transf. 1790, p. 206. It was afterwards applied, in a most complete manner, to the determination of the difference of longitude between Beachy Head station in Suffex (lat. $50^{\circ} 44' 23.7''$, long. $0^{\circ} 15' 11.9''$ E.), and Dunnofe station in the Isle of Wight, wherein the bearing of each of these places, with the meridian of the other, was accurately settled by observation, although the places are more than 64 miles apart; and whence, the length of a degree of a great circle of the earth, perpendicular to the meridian in latitude $50^{\circ} 41'$, was calculated to be 61182.3 English fathoms. The latitude of Dunnofe station, as determined by this operation, has since been verified by a series of accurate observations, made with a capital zenith sector, the last work of the celebrated Ramsden, and has been found to err only $\frac{1}{2}$ of a second in defect. See **DUNNOSE**. This method of determining longitudes of stations, by the convergency of meridians, has since been applied to finding the longitudes and latitudes of Black-Down station in Dorsetshire, long. $2^{\circ} 32' 22.4''$ W. lat. $51^{\circ} 41' 14.7''$ N. of Butterton station in Devonshire, long. $3^{\circ} 52' 47.5''$, lat. $50^{\circ} 24' 47.2''$, and of St. Agnes Beacon in Cornwall, long. $5^{\circ} 11' 55.7''$, and lat. $50^{\circ} 18' 27.9''$. Phil. Transf. 1800. But these deductions seem not to have all the pretensions to accuracy, of which the method is susceptible, for want of reciprocal observations; the three last stations being so chosen as to be all invisible from each other: and although the first of them is visible from Dunnofe, that station was not visited again, for the purpose of completing the observations; but one of the angles of this, and both the angles of the other two polar triangles, were made to depend on those of the intermediate chains of triangles. It is with the utmost regret that we observe any opportunities omitted of submitting this grand trigonometrical survey to all the possible tests of its accuracy, or of collecting and recording observations, likely to be of future use in drawing conclusions relative to the anomalies in the figure of the earth. The writer of this, from having assisted in the making of some hundreds of observations with the admirable theodolites, which are in the hands of major William Mudge, and his able assistants employed on the trigonometrical survey, and from having been a witness to the great skill and pains with which they are always used by these gentlemen, and from having since applied his multiplied observations in accurately calculating the situation of many different objects, by series of 4 or 5, and in some cases 10 or 12, independent triangles, is enabled to assert, that an extreme degree of accuracy in the distances and horizontal angles may be obtained in this survey, perhaps unparallelled in any similar undertaking. He laments, therefore, that Ramsden's fine zenith sector (described Phil. Transf. 1804) should, during any favourable season of the year, lie idle in the Tower, instead of being employed in determining the actual latitudes, and, with a theodolite, making pole-star observations, for obtaining the correct azimuths of all the many principal

principal stations, whose horizontal bearings and distances have been so very accurately settled in this survey; which does equal honour to the government that patronizes it, and to the gentlemen by whom it is conducted.

CONVERGING CURVES. See CURVE.

CONVERGING, or CONVERGENT *Lines*, in *Geometry*, are those which continually approximate, or whose distance becomes continually less and less: in opposition to *divergent lines*, whose distance becomes continually greater. Lines that converge one way, diverge the other.

CONVERGING *Rays*, in *Dioptrics*, are those rays which in their passage out of one medium into another, of a different density, are refracted towards one another; so that, if far enough continued, they will meet in a point, or focus.

All convex lenses make the rays converge, and concave ones diverge, *i. e.* the one inflects them towards a centre, and the other deflects them from it; and the more, as such lenses are portions of smaller spheres. On which properties, all the effects of lenses, microscopes, telescopes, &c. depend.

Rays coming converging out of a denser medium into a rarer, become more convergent, and concur sooner than if they were to continue their motion through the first. Rays coming converging out of a rarer into a denser medium, converge less, and concur later, than if they had continued their motion through the first medium.

Parallel rays, passing from a denser into a rarer medium, *v. gr.* from glass into air, the surface of the glass being towards the air, will become convergent, and concur in a focus.

Diverging rays, or rays coming from a point, under the same circumstances, become converging, and meet in a focus; and as the radiant point comes nearer, the focus recedes farther off: if the radiant be near, the focus will be infinitely distant; *i. e.* the rays will be parallel: and if the point be brought nearer still, the rays will diverge.

CONVERGING SERIES, in *Mathematics*. See SERIES.

CONVERSANO, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Bari; the see of a bishop, suffragan of Bari; 15 miles E.S.E. of it.

CONVERSATION, DISCOURSE; these two words denote an interlocution between two, or among more persons: with this distinction, that the conversation is used for any general intercourse of sentiments whatever; whereas a discourse means a conversation limited to some particular subject. Thus we say, a conversable man; meaning a man able to converse on a variety of subjects, or a man of general knowledge; but we do not say a discursible man. The word discourse is generally used when we mention a superior talking to an inferior.

CONVERSATION *Point*, in *Geography*, a head-land on the south side of a bay on the coast of California. N. lat. $32^{\circ} 30'$. W. long. 119° .

CONVERSAZIONI, denote evening assemblies held at Rome, where persons of both sexes met, not for instructive or even amusing conversation, but in order to see and pay transient compliments to one another; and where a person may enjoy the happiness of being squeezed and pressed among the best company in the city. Several of these take place in the same evening, and they are formed by the passing visits of the same persons, who thus seek amusement by a mere change of place and company. These assemblies generally break up about 9 o'clock; a small party excepted, who are invited to supper. They resemble our modern routs. Moore's View of Society, &c. in Italy, vol. i. p. 337. &c.

CONVERSE, in *Geometry*, &c. A proposition is said

to be the converse of another, when, after drawing a conclusion from something first supposed, we proceed to suppose what had been before concluded, and to draw from it what had been supposed. Thus, it is demonstrated in geometry, that if the two sides of a triangle be equal, the two angles opposite to those sides are equal also: the converse of the proposition is, that if the two angles of a triangle be equal, the two sides opposite to those angles are equal also.

CONVERSE *Direction*, in *Astrology*, is used in opposition to *direct* direction, *i. e.* by the latter, the promoter is carried to the significator, according to the order of the signs: but by the former it is carried from east to west, contrary to the order of the signs.

CONVERSERA, in *Geography*, an island of the Adriatic, near the coast of Iliria. N. lat. $45^{\circ} 20'$. E. long. $18^{\circ} 44'$.

CONVERSION, in a *Moral Sense*, a return from evil to good; resulting from a sense, either of the natural deformity of the one, and amiableness of the other: or of the advantages and disadvantages that spring from the one and the other, respectively.

Or, it is the change of the heart, with regard to the morals, passions, desires, and pursuits; and of the mind, with regard to the sentiments, &c. See REGENERATION. For an account of the conversion of St. Paul, considered as an argument for the truth of Christianity, see PAUL.

CONVERSION, in *Law*, is where a person having the goods of another in his possession, converts them to his own use, without consent of the owner; for which the proprietor may maintain an action of trover and conversion against him.

This action of trover and conversion was, in its original, an action of trespass upon the case, and a recovery of damages against the offender, from which it derived its name. Refusal to restore goods is, *prima facie*, sufficient evidence of a conversion, though it does not amount to a conversion. 10 Rep. 56. See TROVER.

CONVERSION, *Contrivisio*, in *Logic*, a circumstance or affection of propositions, wherein the order of the terms, or extremes, is changed; so that the subject comes into the place of the predicate, and the predicate into that of the subject; without any alteration in the quality of either.

As, "No virtuous vice; No vice is virtue." in which we see the subject of the former, made the predicate of the latter, and the predicate the subject; yet both true.

Conversion is usually defined a due change of the order of the extremes, *i. e.* under such a habitude and coherence with respect to each other, that the one is rightly inferred from the other.

Hence, in every legitimate conversion, two things are required: 1. A communication, or reciprocation of terms; not in respect of words, but of order. 2. The inference of one proposition to the other.

Aristotle makes two kinds of conversion; the one *simple*, by others called *universal*; wherein nothing is changed beside the order of extremes, *i. e.* the terms are transposed, without altering either the quality or quantity thereof: as, "No mind is body; No body is mind."

The second, *per accidens*, called also *particular*; wherein, beside changing the places of the terms, there is a change of an universal sign into a particular one; as, "Every good man studies the welfare of his country; some man that studies the welfare of his country is good."

To these, some of Aristotle's followers add a third kind of conversion, called by *contraposition*: as, "Every man is an animal; every non-animal is non-man."

CONVERSION,

CONVERSION, in *Rhetoric*, &c. is understood of arguments which are retained, retorted, and shewn on opposite sides, by changing the subject into the attribute, and the attribute into the subject.

There are conversions of arguments, from one figure to another, and also from general propositions to particular ones. Thus Cicero against Antony: "Doletis tres exercitus P. R. interfectos? Interfecit Antonius. Desideratis clarissimos cives? Eoque vobis eripuit Antonius. Auctoritas hujus ordinis afflicta est? Afflicti Antonius."

CONVERSION, in *War*, denotes a military movement or manoeuvre, which turns the front of a battalion, where the right or left flank was, when either flank is attacked.

CONVERSION of *Diseases*. A disease is said to be converted, when new symptoms arise in its progress, which require a different designation, and which either put a period to the original disorder, or combining with it, alter the physician's views respecting the prognostics, or the method of cure. Many instances of this kind are familiar; as the conversion of intermittents into continued fevers, or obstructions of the viscera; of hæmoptoe into phthisis; of jaundice into dropsy, and the like. Others are more unusual, and unexpected, and deserve to be noticed, because they occasion much perplexity in practice, when they occur, and especially as this subject has been much overlooked by medical writers.

We owe the first observation on the subject of conversion, to Hippocrates, and his annotators. Hoffman has curiously touched on it, in his short dissertation *de morborum transmutationibus*. Baglivi, though very desirous that it should be treated at length, and though liberal in promises of assistance, confines his recital of facts in a great measure to those of Hippocrates. An express treatise was written on the subject by Rodericus à Castro, under the quaint title of *Quæ ex Quibus*, a work better conceived than executed. And an excellent essay was more recently published by Dr. Ferriar, of Manchester, in the 2d vol. of his "Medical Histories and Reflections," in which the substance of this article will be found.

This subject was formerly arranged under two divisions: when the original disease subsisted after the accession of the second, it was termed a case of *epigenesis*, or *propagation*; when the second disease put a period to the first, it was called an instance of *metapostis*, *metastasis*, or *translocation*. But this is a loose distinction, which excludes many cases of conversion. The chief difference between the *metapostis* and *epigenesis* is, that the relation of the successive morbid appearances, and their dependence upon each other, cannot be so clearly perceived in one case as in the other. It would have been more useful, to have distinguished conversions by their influence on the event of the disease; as some are dangerous, and generally fatal; others, while they terminate the original disorder, conduce to a more speedy restoration of health. Thus, when a continued fever supervenes to pneumonic inflammation, the patient is in great danger, it is *gravi malo grave malum accedere*; when a diarrhoea supervenes to continued fever, in certain stages, it terminates the fever earlier than the regular course of the disease could have done.

All cases of conversion may perhaps be conveniently referred to the following heads. 1. The supervening disease may be produced by the remote causes of the original disorder: in this case, the action of those causes, after producing its first effect, is prolonged so as to excite a new train of symptoms. 2. The supervening disease may arise from the excess or combination of the symptoms of the original complaint. 3. The state of the habit, produced by the first disease, may give rise to a new disorder. 4. Conversion

may happen, from the imprudent suppression of habitual diseases.

I. The application of certain remote causes, may be sufficiently powerful to produce a fresh disease, after the first has been brought on by their action. It is common to find pneumonic inflammation supervene to typhus, by a continuance of the application of cold or dampness, which operates as a remote cause of the fever. On the contrary, from the tendency of the system to inflammation, or from the manner in which cold has been applied, the pneumonic symptoms precede the fever in some cases, and even run their course, before the fever assumes a regular form. In a fatal case of the conversion of pleurisy into typhus, the left lobe of the lung was destroyed by suppuration. (Lieutaud. Hist. Anat. Med. tom. i. Obs. 378.) I have seen, says, Dr. Ferriar, a case of peripneumonia notha end in typhus, and the typhus in mania. He also relates, chiefly from his own observation, the conversion of acute rheumatism into typhus in the first week, a circumstance which we have also witnessed;—the conversion of the mild synochus, or typhus, into inflammation of the peritoneum, or villous coat of the intestines;—of cholera into typhus;—of dysentery and diarrhoea into continued fever;—of hysteria into epilepsy and insanity, &c.; changes which are not very infrequent.

Cases of hysterical conversions, which belong to the head, are very common sources of error to young practitioners, and sometimes deceive even the most experienced. Sydenham long ago enumerated an ample catalogue of the diseases, the symptoms of which the mania, hysteria, frequently assumes. This matterly essay, with which Dr. Ferriar appears to have been unacquainted, contains a full disclosure of the conversions of this disorder. The symptoms of apoplexy, paralysis, epilepsy, cough, the iliac passion, jaundice, stone in the kidneys, and in the bladder, vomiting, diarrhoea, rheumatism, lumbago, &c. have been terminated by the accession of a complete hysterical paroxysm. (See Hysteria.) "We are ignorant," says Dr. Ferriar, who has described a similar variety of hysterical conversions, "by what laws the body possesses a power of representing the most hazardous disorders, without incurring danger; of counterfeiting the greatest derangement in the system, without materially altering its movements; of producing madness, conscious of its extravagancies, and of increasing the acuteness of sensation, oppressing the common sensorium. In hysterical affections, all these appearances are excited, which are incompatible with the reasonings of every system-maker, who has yet endeavoured to explain the inexplicable. Nature, as if in ridicule of the attempts to unmask her, has, in this class of diseases, reconciled contradictions, and realized improbabilities, with a mysterious versatility, which inspires the true philosopher with diffidence, and reduces the systematic to despair."

II. The symptoms of an idiopathic disease may, by their violence, assume the appearance, and require the attention due to a new complaint; or affections of particular viscera, which, in their incipient state, are only regarded as symptoms of general indispotion, may, as they gain ground, extinguish the original disease, or be protracted beyond it. This head comprehends such a variety of cases, that to treat it fully, would be to give the history of all symptomatic diseases. A few illustrations will suffice.

Dr. Percival mentions, that he had seen an effusion into the cavities of the brain, produced by the succussions of coughing, in a confirmed pulmonary consumption, which effusion terminated fatally, with a previous suppression, more than a week before death, of all the pulmonic symptoms.

It is one of the most perplexing occurrences in medicine, when the supervening disease is produced by a symptom of some latent complaint : when, for example, phthisical symptoms arise in a scrofulous or gouty patient, who exhibits, at first, no other appearance of those two diseases. Dr. Ferriar saw an instance, in which all the characters of confirmed phthisis pulmonalis were present, that terminated in recovery, upon the patient's coughing up some solid particles, which, upon examination, proved to be chalk-stones. Dr. Percival relates, that a gentleman of rank was supposed to be in an advanced state, of what is called a galloping consumption, having an incessant cough, an expectoration apparently purulent, continued heats, and night sweats: yet his cure was accomplished by giving wine- whey copiously, and by administering doses of hartshorn and spermaceti. A gentle fit of the gout was produced by this cordial regimen. The fever, cough, and spitting, were progressively diminished, and the health of the patient was soon perfectly re-established.

There is, indeed, a strong resemblance between hysteria and gout, in the power of counterfeiting different diseases, but with this material distinction; that the hysterical representations are commonly void of danger, while those produced by gout are often more dangerous than the simple disorder which they imitate. The hysterical hæmoptœe, for example, is seldom productive of bad consequences, but the arthritic apoplexy, pneumonia, and cardialgia, are much more alarming, and run their course quicker than similar complaints originating from other causes. But these diseases agree in this respect, that the accession of the regular paroxysm puts a favourable period to the irregular symptoms.

The prognosies, in conversions of this second class, must evidently vary according to the seat and degree of the supervening disease, and its favourable action upon the original disorder.

III. The original disease, if acute, when it has run its usual course, may leave the habit in a state favourable to the production of another disease: or if the original be a chronic disorder, such a state of the habit may take place during its continuance, and the accessory disease may be simply superadded, or it may vary the form, or affect the duration of the former.

Continued fevers are converted into different diseases, the production of which admits one general explanation. During the increased action of the circulating system, if any part of the body be originally weak, or have been rendered infirm and irritable by preceding disease, congestion, and its consequences, may be expected there. It is therefore easy to conceive, why one patient should suffer a paralytic affection, another phthisis, or a third nephritis, in consequence of tedious cases of typhus. The glandular suppurations, consequent on fevers, seem to depend on the same principle; for although they are represented as critical, by the older medical writers, we sometimes see striking proofs of the contrary. The exanthemata are frequently converted into diseases, which become both chronic and dangerous. The small-pox often produces severe coughs, diarrhœa, and ophthalmia. In some rare instances, tumours of the joints supervene, which suppurate and destroy the patient. The pneumonic inflammation attending the measles, is too often converted into phthisis pulmonalis. Glandular swellings, and general dropsy, frequently succeed the scarlatina anginosa.

There is a curious case in Dr. Percival's Essays, Medical and Experimental, (vol. i. p. 148.) of a woman, in whom a conversion of fever took place, first into palsy, afterwards into epilepsy, and then into amaurosis. Fevers often terminate in hysteri-

cal disorders, especially in women. Nephritis also is a common conversion of fever: it seldom supervenes with considerable violence, excepting in persons who have formerly undergone it; but when it has been familiar to the patient, a very large quantity of gravel is commonly passed, with extraordinary pain in the state of conversion. The accession of nephritis always extinguishes the fever. Other conversions of fever have been noticed, some of them peculiar to certain epidemics.

Various instances of conversion of diseases, under this head, may be found in the writings of physicians. Jaundice is said, by Baglivi, to be converted to tympantites; tympantites, by Dr. Ferriar, to diarrhœa and ichuria; dyspeptic complaints of long standing, to general dropsy; ascites to chronic inflammation of the bowels, and diarrhœa, which generally prove fatal; mania, as observed by Dr. Mead, to fatal epilepsy; and also to a cutaneous eruption, with recovery; &c. &c.

IV. Conversions may arise, when a disease, regular in its usual course, or long familiar to the habit, is violently terminated by improper methods, or suddenly extinguished by accidental circumstances.

Thus epileptic fits have been produced by the retrocession of the itch, in consequence of some external application; the epilepsy having resisted all the usual methods of treatment, was only cured by producing the itch. Instances of the production of melancholy and madness, by the suppression of eruptions, or the healing of old ulcers, and habitual drains, are common in practical writers.

The diseases originating from the suppression of the menstrual and hæmorrhoidal discharges are also well explained in different books. Dr. Hoffman's treatise, *De Morborum transmutatione*, relates almost entirely to this class of disorders. Tedious dyspeptic cases are often converted to cutaneous eruptions, in distinct pimples, of a fiery red colour; such eruptions extinguish the complaint in the stomach. Examples of conversions might be multiplied infinitely: but we must here content ourselves with adverting to the important conclusions, respecting the prognosies and cure of diseases, which may be drawn from an observation of those phenomena. The following most obvious deductions have been pointed out and illustrated by Dr. Ferriar.

1. Whenever local inflammation supervenes to an acute disease, it shortens or extinguishes the original disorder. The danger, or salubrity of this conversion, appears to depend greatly on the nature of the part attacked by its inflammation. In fever, for instance, if it be a conglomerate, or conglomerate gland, the prognosis will be favourable, but if the brain, the pleura, or the peritonæum, be inflamed, the danger is increased. In the former case, the cure of the fever may be in a great measure trusted to the supervening disease; in the latter, the progress of the inflammation will demand our chief attention. Thus, however, contra-indications will be avoided, and the safety of the patient will be better consulted, than by the temporizing practice usually adopted on such occasions.

This deduction serves also to explain the action of blisters, which, by producing local inflammation, imitate the process, and, in proportion to their action, exhibit the effect of this kind of conversion. It explains also the salubrity of the gouty inflammation, when it seizes a part not necessary to life.

2. It is so far certain, that medicines operate by producing conversions, that we perceive very considerable diseases resulting from the use of certain remedies, such as mercury; and we judge of the extinction of the original complaint, in some measure, by the increase and permanency of the

remedial disease. Thus when we give diuretics, or cathartics, we endeavour to excite a disease in the intestines, or kidneys; for an extreme increase of natural action, in any part, is certainly morbid. In like manner, Dr. Darwin has observed, that some derangements of mind cannot be removed, without exciting an artificial delirium.

3. The convulsion denominated hysterical, when it seizes the muscular fibre, in cases of conversion, is always salutary, and may be regarded, in many instances, as the crisis of chronic disorders.

4. Internal inflammation, supervening to chronic diseases, has a less tendency to extinguish the original complaint, than a similar conversion of acute disorders, and is equally dangerous.

5. Cutaneous eruptions often extinguish dangerous diseases. Excepting the regular exanthemata, such conversions seldom happen in acute disorders. But madness and melancholy, epilepsy, delirium, protracted after fever, dyspepsia, various pulmonary affections, are all observed to be mitigated, or removed, on the appearance of cutaneous disorders; especially on the return of those, which, after becoming familiar, had been suddenly suppressed.

6. As it appears that many conversions are processive, constituted by nature for the cure of diseases, and that some of the most active remedies operate in a similar manner, we may not only improve the history of diseases, but the practice of medicine, by paying closer attention to the connection and operation of disorders upon each other. With this view of the subject, the most complicated cases will admit an instructive development, and every additional fact may find an useful place. See METASTASIS.

CONVERSION of equations, in Algebra, is when the quantity sought, or any part thereof, being in fractions, the whole is reduced to one common denomination; and then, omitting the denominators, the equation is continued in the numerators only.

Thus, suppose $a-b = \frac{aa+cc}{d} + b+b$; multiply all by d , and it will stand thus, $da-db=aa+cc+db+db$.

In arithmetic, we use the term *proportion by conversion of ratio*, for a comparison of the antecedent, and consequent, in two equal ratios.

Thus, as there is the same ratio between two and three, as between eight and twelve; it is concluded there is the same ratio between two and one, as between eight and four.

Or, according to Euclid (lib. v. Def. 17.), it is the inference, in the case of four proportionals, that the first is to its excess above the second, as the third is to its excess above the fourth.

E.G. If we have - - - - - 8 : 6 :: 4 : 3.
Then convertendo, or by conversion, 8 : 2 :: 4 : 1.
Or, if we have - - - - - a : b :: c : d.
Then convertendo - - - - - a : a-b :: c : c-d.
CONVERSION, Centre of. See CENTER.
CONVERSOS. See CONVERT.

CONVERT, a person who has undergone CONVERSION.

CONVERT is chiefly used in respect of changes from one religion, or religious sect, to another.

Converts with relation to the religion turned to, are denominated *apostates* with regard to that they have relinquished.

The Jews formerly converted to Christianity in England, were called *convertus*. Henry III. built them a house in London, and allowed them a competent subsistence for their lives; which house was called *domus converforum*. But the

number afterwards increasing, they became a burthen to the crown; upon which they were distributed among the monasteries; and after the expulsion of the Jews under Edward III. the *domus converforum* was given for keeping of the rolls.

CONVERTS, in a *Monastic Sense*, are lay-friars, or brothers, admitted for the service of the house; without orders, and not allowed to sing in the choir.

Till the eleventh century, the word was used for persons who embraced the monkish life at the age of discretion; by which they were distinguished from those devoted to their childhood by their parents, called *oblati*.

But in the eleventh century, when they began to receive into monasteries illiterate persons, incapable of being clerks, and only destined for bodily labour; the signification of the word was necessarily changed. F. Mabillon observes, that it was John, first abbot of Vallombrosa, who first introduced these *brother-converts*, distinguished by their state from the monks of the choir, who were then either clerks, or capable of becoming so.

CONVERTIBILITY of elements into one another. See ELEMENTS.

CONVERTIBILITY of spirits into one another. See SPIRITS.

CONVERTIBLE HUSBANDRY, in Agriculture, is that sort of farm-management in which the land is cultivated, under the alternate systems of tillage and grass.

The lands which are the most proper for this kind of husbandry are those in which the soil is of the more dry and friable description, and in which there is a disposition to take on or produce grass. Wet clayey soils are considered by Mr. Davis as wholly unfit for this sort of management. All the loamy sorts of land which are capable of producing good turnips, and the rich sandy soils, are particularly suited to this method of husbandry. And on many other varieties of land it may be had recourse to with considerable benefit and advantage, where proper care is taken in the cultivation; but it is unquestionably a mode of culture which stands in need of great attention, in order to conduct it in the most proper and beneficial manner, both for the land and the farmer.

It has however been observed by Mr. Nairnith, in his "Elements of Agriculture," that "though it were possible to make drill culture universal, and cultivate the whole country like a garden, it is doubtful if it would be provident. It is to be feared that it would be something like the conduct of a person who consumes part of his capital yearly, along with his annual revenue. Whatever may be said to the contrary, all soils certainly suffer some degree of deterioration by long, unremitted tillage. When divested of that clothing with which nature always defends it if undisturbed, and when turned up naked to abide the force of the blast, the happy medium of confidence is deranged, its best particles carried away in torrents; and it is left a feeble skeleton, possessing only the faint semblance of departed fertility. This is strongly exemplified, he says, in the once fertile island of Barbadoes, in the West Indies. It has been said that this island, no doubt somewhat hyperbolically, since it began to be cultivated by the Europeans, has loaded more vessels with produce than would have been sufficient to have carried away the whole island; and now, it is reported, that the soil is so exhausted, that no kind of culture or manure can restore its fertility. We have correspondent accounts from the county of Norfolk, and other districts, where unceasing tillage has been practised: the species of crop which has been most run upon is now less productive than formerly. In short, there are numerous instances within the personal knowledge

of many, that wherever the ground has been long dunged and laboured for cropping, without rest, though the crops may be as bulky, they are generally less productive than they were at an earlier period.

“Convertible husbandry, or regular alternations of tillage crops and pastures, seem therefore, he says, to be the only system by which the fertility of the country can be preserved and improved. The provisions of a country are not derived from tillage crops alone. A considerable proportion is obtained from the dairy and the fables. Contrasts have been made to shew the vast disproportion between the quantity of food obtained from any given extent of land in a cultivated crop, and what the same extent of pasture yields. But it should be remembered, that the fertility of a cultivated field is often acquired by its having lain in pasture. The quantity of food from cultivated crops is not always in proportion to the extent of the land cultivated. The county of Ayr, in the west of Scotland, contains, he says, a great deal of good soil. It is not much more than forty years since he remembers the inhabitants of that county passing in crowds with horses, pack-saddles, and empty bags, to the East, to bring pease and barley, of which they made a kind of bread to serve them in summer. At that time the farmers were under no restraint as to the proportion of their farms, which they might have in tillage. Soon after, a gentleman who had the management of a great estate in that county, made a regulation in the leases, by which the farmers were bound to have never more than a third of their farms in tillage. Other proprietors adopting the same regulations, it became general: and the farmers were afterwards restricted to plough no more than one fourth. Of late, this county, though not less populous than formerly, sends always a great deal of grain to the neighbouring districts; and instead of empty bags and pack-saddles, sends carriages loaded with cheese to Leith, to be shipped for London. Thus by laying land which has been in tillage, frequently in pasture, the future fertility of the country is enhanced, and its present produce is not diminished.

“But it has been stated, he remarks, from high authority, that there is nothing more difficult than to bring old tillage lands to produce good pasture. A person who has been in the habit of attending to the culture of the fields, will have some difficulty in comprehending this position. He will have observed, that when the seeds of any of the grasses are permitted to vegetate on land which has been long under tillage culture, they grow with remarkable luxuriance, if they be not overwhelmed by the growth of weeds in their infancy. If his experience has been of a long standing, he will remember the introduction of clover and rye-grass into this country, and will recollect that the first time these seeds were sown on old tillage lands, the crops of grass were generally more weighty than any that have succeeded on the same ground. Having found such grounds so much disposed to produce grass, he will be at a loss to conceive why they should not produce good pasture. As grass seeds vegetate best on ground which is of a pretty solid consistence, they will sometimes fail, when the texture is too loose, unless that fault has been remedied by early ploughing, or by sufficient rolling, or both. But the best native *gramina* (grasses), having numerous fibrous roots, extending horizontally, are not easily ejected, after they have gained strength, and become unshaking. In the instances which have given rise to the above position, the ground must not, he thinks, have been stocked with those perennial plants proper to compose a good pasture. In a long course of tillage, the seeds and roots of the native grasses are worn out and banished: the plants introduced from artificial hay frequently fail in a few years;

and the ground is left naked, or stocked only with such coarse weeds as have kept footing in the ground, or had their seeds carried there by winds and birds. But to make tillage grounds bear standing pasture, they should be stocked with the seeds of such indigenous perennial plants as are known to be adapted to that purpose.

“The chief of which are, he says, *antioxanthum odoratum*, *lolum perenne*, and *alopurus pratensis*, for spring pasture, to be followed by *cymsurus cristatus*, *poa trivialis*, &c. The leguminous plants for pasturage, he adds, are of the genus *trifolium*, the *pratense*, the *repens*, the *lupulinum*, and the *procumbens*; of the genus *vicia*, the *cracca* and *sepium*, the *lathyrus pratensis*, &c. If lands which have been long in tillage are stocked with the seeds of these, and care taken not to suffer the young plants to be overwhelmed by rank weeds before they get themselves established in the ground, all difficulties will be overcome, and such grounds will be found to yield the most substantial and unshaking pasture.

“As all vegetables are composed of the same elements, and nourished by the same kind of juices, it may appear somewhat unphilosophical, in a speculative view, to maintain that the fertility of the soil is preserved by cultivating one species of plants upon it one year, or series of years, and plants of a different species and quality the following.

“But it is a generally received aphorism, he observes, that nature delights in variety, and this aphorism is supported by experience in this as well as in other respects. Some kinds of vegetables extend their roots near the surface, others penetrate deeper into the soil, some by overhanging the earth with their broad leaves render it soft and mellow; others, whose naked stalks admit the free circulation of the air, consolidate the soil; some derive the greatest part of their nourishment from the juices lodged in the earth; others draw a considerable proportion from the atmosphere; some, having a longer period of existence, continue long to demand nourishment; others arrive more quickly at maturity, and must be easier supported. Besides, among the various tribes of insects so feeble in themselves, but so formidable and destructive by their numbers, each has some vegetables which it prefers to others for its food, and resorts to the places where such food is produced; and as they propagate their kind where their food is found, they must become more numerous, and consequently more destructive, where the cultivation of the same plant is often repeated. There are weeds too, he says, which bear in this respect some analogy to those insects, and as they cannot be at all times fully eradicated, propagate the more, the oftener they meet with the crop most agreeable to them. By the effects which the growth of different vegetables produce on the soil, the proper medium of consistence is in some measure preserved, the vegetable food better husbanded, and the injuries from noxious insects and weeds somewhat eluded. On all these accounts, the maxim of modern agriculturists, that crops of a different nature and quality should succeed one another, is just tied.

“But the arguments in favour of alternations of tillage and pasture, are, he remarks, still more urgent. The derangement of that happy medium between extremes of too great friability and compactness, which he has endeavoured to shew is essential to the general purposes of vegetation, is the unavoidable consequence of long repeated tillage.

“This is always, he contends, in some degree restored, when land is left to rest. If it has been properly treated when in tillage, and well stocked with perennial herbage, when left to rest, it will quickly assume a close cover over its surface, which, from whatever principle it proceeds, experience has always shewn, has a powerful influence in disposing the soil to fertility. In this state, the washing to which til-

lage lands are exposed in times of rain, is, he supposes, completely suspended, and the water flows away limpid. While the ground continues covered with a close turf, the root-leaves of the herbage spreading over the surface, absorb and digest the carbonic acid of the atmosphere, and perhaps, also, earthy particles which probably float continually in the air, as before stated. As those leaves are smothered and decay, they are perpetually increasing the stock of carbon and vegetable mould. The celebrated Mr. Kirwan, indeed, is, he says, of a different opinion. He supposes, that ground lying in pasture is annually diminishing in fertility, though in a less degree than that from which a vegetable crop is carried off, because a part is restored in the excrements of pasturing animals. But though poor soils which are incapable of producing a close turf over their surface, gain little by lying at rest, it is evident, that every soil, which either from its natural conformation, or from the improvements made on it by proper culture, has attained a close cover of sweet herbage, is perpetually gaining. Whenever the temperature is mild, a continual reproduction is taking place; and all the horizontal foliage, which escapes the mouths of pasturing animals, falls into decay and accumulates on the surface. On breaking up such old pastures a surfaced stratum may be observed, differing in colour and conformation from that which lies under it, the thickness of which is in proportion to the time the ground has lain at rest. What is here stated, is, he thinks, corroborated by the following experiment. Having sometimes observed a kind of turf formed over the hardest stones in certain situations, he collected some of it which had grown to more than an inch thick on some flat stones, lying in a damp place, at the foot of a northerly declivity under some trees. It seemed to have commenced with the growth of some of the smaller *musci* and *algæ*. On this ground the *fesluca ovina* and *poa glauca* had taken root, and formed a strong turf. After it was dried, he subjected a pound of it to combustion on an iron shovel over a fire till it was reduced to black dust. The residue weighed half an ounce, whereas the greatest residue he ever obtained from a pound of dried peat burnt, was not more than five drams. If such a quantity of mould could thus be accumulated by the grasses growing on a naked rock, may it not accumulate at least in as great a proportion on the soil where the succession of growth is incomparably greater?

"It is true, he observes, that some soils by long lying at rest, condense so much as to incommode the roots of the grasses, and on others the mosses prevail so much as to overcome the esculent herbage, but the fertility of the soil is not thereby diminished. Its present energy is only suspended, while it is acquiring additional vigour for future exertion. When such land is again employed in tillage, the spoils of the turf, together with a great part of what has been consumed by pasturing animals restored in excrements, are turned down and mixed with the soil, by which its conformation is improved, and its thickness and principle of fertility augmented. Hence the tillage crops are plentiful—the ears large and plump—and the produce of one year equal to two or more on land wearied out by perpetual turing.

"It must not be understood, by what is here or formerly said, that he means to undervalue the operation of the plough. But, as we are studying in what manner the fertility of the country may be preserved and improved, and the greatest quantity of disposable produce obtained at the least possible expence, it is necessary to examine how all those aids which nature offers may be made to co-operate with the artificial means of agricultural improvement, and not blindly expect from mechanical labour, more than it can possibly produce. When barren soils are to be brought from a wild state, it

is by mechanical labours only that their obstinacy can be subdued, and the different ingredients properly blended. The turf of old grass ground will frequently require a good deal of mechanical operation to mix it with the earths, and facilitate its putrefaction. But when these, and such other aids as mechanical labour is adapted to accomplish, are obtained, that medium of confidence on which fertility depends will be best preserved by alternate successions of labour and rest. The proportion and order of those successions must no doubt vary greatly according to circumstances. While those where the soil is deep and of the most favourable construction, and where adventitious manure is attainable, may be much occupied in tillage crops, without suffering great deterioration; in the more elevated grounds, where the soil is generally less happily constructed, exposed to severer washings and manure less abundant, a greater proportion of the farm ought always to be in pasture. But in all situations and circumstances, the soil will be benefited by being occasionally at rest, provided care has been taken to lay it down unexhausted, free of weeds, and well stocked with proper grasses. By this system of alternations of tillage and grass crops, the attention of the husbandman is less dissipated, and his labours more regularly distributed. The live stock fed on his pasture, furnish him with manure to enrich his tillage fields, and the more they are enriched, they are the better fitted to yield an abundant return of grass, when they come in course to be laid to rest. When ground is brought to yield abundance of sweet grass it is profitable in pasture, and while it continues so is still improving in fertility, and becomes more and more adapted to yield plentiful tillage crops. Thus under good management, the fertility of the country may progressively advance, and the disposable quantity of provisions for the use of the consumer, and the net return to the husbandman, perhaps, exceed what the operose and expensive system of perpetual fallowing, and crops without rest, could produce.

"Convertible husbandry is not less superior to perpetual grass. Land which lies perpetually in grass, is deprived of the advantage of having the vegetable substance accumulating on the surface from time to time mixed into the soil. By the working of moles, ants, and other vermin, by the condensation of the soil, by the prevalence of mosses and useless weeds, the turf is deformed and the reproduction of sweet pasture diminished. Water is frequently detained on the surface, and chills the growth of esculent herbage, and thus the growth becomes more feeble and slow. In proportion to the decay of esculent herbage, plants which are noxious or unprofitable prevail; the pasture becomes gradually less, and the fertility of the soil is almost useless to the owner and to society, while it remains in that state."

The practice of this husbandry must of course in many instances be highly profitable to the cultivator. See TILLAGE and GRASS.

CONVEX, bending down on every side, as the outside of a globular body.

CONVEX freeze, leaf, lens, mirror, superficies. See the several substantives.

CONVEXITY, the exterior surface of a convex, i. e. gibbous and globular thing; in opposition to concavity, or the inner surface, when hollow or depressed.

The word is of particular import in catoptrics, and dioptrics; where it is applied to mirrors and lenses; which see. See also REFRACTION.

CONVEYANCE, in Law, a deed, or instrument, by which lands, &c. are conveyed, or transferred, by the proprietor, to some other person. In the discussion of this subject, it is proper to inquire *quo* may thus aliene and *quomodo*; and then *how* a man may aliene, or the several modes of

of conveyance. With regard to the first inquiry, who is capable of conveying and who of purchasing, the subject of consideration is rather the incapacity, than the capacity, of the several parties: for all persons in possession are *prima facie* capable both of conveying and purchasing, unless the law hath laid them under any particular disabilities. But if a man has only in him the right of either possession or property, he cannot convey it to any other, lest pretended titles might be granted to great men, by which justice might be trodden down, and the weak oppressed. (Co. Litt. 214.) Yet reversions and vested remainders may be granted, because the possession of the particular tenant is the possession of him in reversion or remainder; but contingencies, and mere possibilities, though they may be released, or devised by will, or may pass to the heir or executor, cannot be assigned to a stranger, unless coupled with some present interest. (Sheppard's Touchstone, 238, 239, 322. 11 Mod. 152. 1 P. Wms. 574. Stra. 132.)

Persons attainted of treason, felony, and præmunire, are incapable of conveying, from the time of the offence committed, provided attainder follows, for such conveyance by them may tend to defeat the king of his forfeiture, or the lord of his escheat. But they may purchase for the benefit of the crown, or the lord of the fee, though they are disabled to hold the lands so purchased, if after attainder, being subject to immediate forfeiture; if before, to escheat as well as forfeiture, according to the nature of the crime. (Co. Litt. 42. 2.) Thus also corporations, religious or others, may purchase lands; yet, unless they have a licence to hold in mortmain, they cannot retain such purchase; but it shall be forfeited to the lord of the fee. Idiots and persons of non-sane memory, infants, and persons under duress, are not totally disabled either to convey or purchase, but *sub modo* only. For their conveyances and purchases are voidable, but not actually void. The king indeed, on behalf of an idiot, may avoid his grants or other acts. (Co. Litt. 247.) See IDIOT. A feme-covert may purchase an estate without the consent of her husband, and the conveyance is good during the coverture, till he avoids it by some act declaring his dissent. And though he does nothing to avoid it, or even if he actually consents, the feme-covert herself may, after the death of her husband, waive or disagree to the same; nay, even her heirs may waive it after her, if she dies before her husband, or if in her widowhood she does nothing to express her consent or agreement. (Co. Litt. 3.) But the conveyance or other contract of a feme-covert (except by some matter of record) is absolutely void, and not merely voidable (Perkins, § 154. 1 Sid. 120.) and therefore cannot be affirmed or made good by any subsequent agreement. The case of an alien born is also peculiar.—For he may purchase any thing; but after purchase he can hold nothing, except a lease for years of a house for convenience of merchandize, if he be an alien-friend: all other purchases (when found by an inquest of office) being immediately forfeited to the king (Co. Litt. 2.) Papists, and persons professing the popish religion, and neglecting to take the oath prescribed by statute 18 Geo. III. c. 60. within the time limited for that purpose, are by stat. 11 and 12 W. III. c. 4. disabled from purchasing any lands, rents, or hereditaments; and all estates made to their use, or in trust for them, are void. (1 P. Wms. 354.)

In answer to the second inquiry, or how a man may alien or convey, we are led to state the several modes of conveyance. A translation, or transfer, of property being admitted by law, it became necessary that this transfer should be properly evidenced, in order to prevent disputes as to the

fact, or in relation to the persons concerned, or with regard to the subject-matter, or with respect to the mode and quality of the transfer. The legal evidences of this translation of property are called the common assurances of the kingdom. See COMMON ASSURANCES.

Deeds (see DEED) which serve to convey the property of lands and tenements from man to man, are commonly denominated conveyances; and these are either conveyances at common law, or such as receive their force and efficacy by virtue of the statute of uses. Of conveyances by the common law, some may be called original or primary conveyances; which are those by means of which the benefit or estate is created or first arises; and others are derivative or secondary, by which the benefit or estate, originally created, is enlarged, restrained, transferred, or extinguished. Original conveyances are the following, viz. Feoffment, Gift, Grant, Lease, Exchange, and Partition; which see respectively. Derivative conveyances are Release, Confirmation, Surrender, Assignment, and Disseizance; which see under their proper titles. For other conveyances, which have their force and operation by virtue of the statute of uses, which have been derived from it or introduced in consequence of it; see USES. See also COVENANT TO STAND SEISED TO USES, BARGAIN AND SALE, LEASE AND RELEASE, and REVOCATION OF USES.

A conveyance cannot be fraudulent in part, and good as to the rest: for if it be fraudulent and void in part, it is void in all; and it cannot be divided. 1 Lill. Abr. 311. Fraudulent conveyances to deceive creditors, defraud purchasers, &c. are void, by statutes 13 Eliz. c. 5. 27 Eliz. c. 4. See FRAUD.

CONVICT, in Common Law, one who is found guilty of an offence, by the verdict of a jury. This conviction may accrue two ways; either by his confessing the offence and pleading guilty; or by his being found so by the verdict of his country. Judge Blackstone says, that in the Roman republic, when the prisoner was convicted of any capital offence by his judges, the form of pronouncing that conviction was peculiarly delicate, not that he was guilty, but that he had not been sufficiently on his guard, "parum cavisse videtur."

According to Crompton, a person is also a convict, or said to be convicted, when, after having been outlawed, he appears and confesses, or is found guilty by the inquest; and he says, moreover, that when a statute excludes from clergy persons found guilty of felony, &c. it extends to those who are convicted by confession. (Crompt. Init. 9.)

The law implies that there must be a conviction before punishment, though it is not so mentioned in a statute; and where any statute makes a second offence felony, or subject to a heavier punishment than the first, it is always implied that such second offence ought to be committed after a conviction for the first. (1 Hawk. P. C. c. 10. § 9. c. 41. § 3.) Judgment amounts to conviction; though it doth not follow that every one who is convicted is adjudged. A conviction at the king's suit may be pleaded to a suit by an informer, on a penal statute; because while in force it makes the party liable to the forfeiture, and no one ought to be punished twice for the same offence; but conviction may be pleaded to a new suit by the king. (1 Hawk. P. C. c. 10.) A person convicted or attainted of one felony may be prosecuted for another, to bring accessories to punishment, &c. (Fitz. Coron. 379.)

Persons convicted of felony by verdict, &c. are not to be admitted to bail, unless there be some special motive for granting it; as where a man is not the same person, &c. for bail ought to be before trial, when it stands indifferent

whether

whether the party be guilty or not. (2 Hawk. P. C. c. 15. § 45, 80.) See BAIL. Conviction of felony, and other crimes, disables a man to be a juror, witness, &c. Conviction and attainder, &c. are, in our law-books, frequently confounded. On conviction, (or even upon an acquittal upon some reasonable ground to prosecute, and, in fact, a *bona fide* prosecution,) for any grand or petit larceny, or other felony, the reasonable expences of prosecution, and also, if the prosecutor be poor, a compensation for his trouble and loss of time, are by statutes 25 Geo. II. c. 36., and 18 Geo. III. c. 19. to be allowed him out of the county stock, if he petitions the judge for that purpose; and by statutes 27 Geo. II. c. 3. explained by the same statute 18 Geo. III. c. 19; all persons, appearing upon recognizance or *subpoena* to give evidence, whether any indictment be preferred or not, and as well without conviction as with it, are entitled to be paid their charges, with a farther allowance (if poor) for their trouble and loss of time. Moreover, on a conviction of larceny in particular, the prosecutor shall have restitution of his goods, by virtue of the statute 21 Hen. VIII. c. 11. And the construction of this act having been in great measure conformable to the law of appeals, it has therefore in practice superseded the use of appeals of larceny. It is now usual for the court, upon the conviction of a felon, to order (without any writ of restitution) immediate restitution of such goods as are brought into court to be made to the several prosecutors, or else, without such writ, the party may peaceably retake his goods, wherever he happens to find them, unless a new property be fairly acquired in them. Or, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover against him for his goods, and recover a satisfaction in damages. But such action does not lie before prosecution; for then felonies would be made up and healed (1 Hal. P. C. § 46.) and also recaption is unlawful, if it be done with intention to smother or compound the larceny; it then becoming the heinous offence of *theft-bote*; which see.

When a person is convicted of a misdemeanor which principally and more immediately affects some individual, as a battery, imprisonment, or the like, it is not uncommon for the court to permit the defendant to *speak with the prosecutor*, before any judgment is pronounced; and if the prosecutor declares himself satisfied, to inflict but a trivial punishment. This is done, to reimburse the prosecutor his expences, and make him some private amends, without the trouble and circuity of a civil action. This, says judge Blackstone, is a dangerous practice, which, though intrusted to the discretion of the judges in the superior courts of record, ought never to be allowed in local or inferior jurisdictions, such as the quarter-sessions; where prosecutions for assaults are by such means too frequently commenced, rather for private lucre than for the great ends of public justice. Above all, he says, it should never be suffered, where the testimony of the prosecutor himself is necessary to convict the defendant; for there the rules of evidence are entirely subverted; the prosecutor becomes in effect a plaintiff, and yet is suffered to bear witness for himself. Nay, even a voluntary forgiveness, by the party injured, ought not, in true policy, to intercept the stroke of justice. "This," says an elegant writer (Beccaria, ch. 46.) who pleads with equal strength for the certainty as for the lenity of punishment, "may be an act of good nature and humanity, but it is contrary to the good of the public. For, although a private citizen may dispense with satisfaction for his private injury, he cannot remove the necessity of public example. The right of punishing belongs not to any

one individual in particular, but to the society in general, or the sovereign who represents that society; and a man may renounce his own portion of this right, but he cannot give up that of others." Blackst. Comm. Book iv.

CONVIC^T *recusant*, he who has been legally presented, indicted, and convicted, for refusing to come to church to hear the common prayer, according to the statutes 35 Eliz. and 3 Jac. I.

This is commonly understood to be a popish recusant; though any others who refuse coming to church on the same account are as properly denominated recusants.

CONVICTION, in *Law*. See CONVIC^T.

CONVICTION, in *Theology*, expresses the first degree of repentance; wherein the sinner becomes sensible of his guilt, of the evil nature of sin, and of the danger of his own ways.

CONVICTION, *summary*, in *Law*, is such as is directed by several acts of parliament, for inflicting certain penalties created by those acts, without the intervention of a jury: the party accused being acquitted or condemned by the suffrage of such person only, as the statute has appointed to be his judge. Of this kind are all trials of offences contrary to the laws of EXCISE, and other branches of the REVENUE, proceedings before JUSTICES of the peace, and the method used by superior courts of justice for punishing contempt by attachment. See CONTEMPT.

CONVIVIVM, *banquet*, in our *Ancient Customs*, and *Law-Books*, signifies the same thing among the laity as prosecution among the clergy; *viz.* when the tenant was obliged, in virtue of his tenure, to provide meat and drink for his lord once, or oftener, in the year.

CONVIVIVM *militare*, a military banquet or repast. The repast of Roman soldiers was a particular object of military discipline, which the commanders themselves paid attention to. The soldiers were not suffered to eat alone but by troops, in order to preserve union and good fellowship amongst them.

CONULI, in *Natural History*, *Conuli Kleinii*, a class of the *Echinus*, in the Mollusca order of Vermes. See ECHINUS.

CONULUS, a genus of the *Trochus*, in the Testacea order of Vermes. See TROCHUS.

CONVOCA^TION, a general assembly of the representatives of the clergy of a province, summoned by the king's writ to consult of the more weighty affairs of the church, as oft as a parliament is convoked to consult of those of the state.

The king's writ is directed to the archbishop of each province, requiring him to summon all bishops, deans, archdeacons, cathedral and collegiate churches, &c.

Upon which, the archbishop directs his mandate to his dean provincial, first citing him preceptorily; then willing him, in like manner, to cite all the bishops, deans, &c. and all the clergy of his province: but directing, withal, that one prætor sent for each cathedral and collegiate church, and two for the body of the inferior clergy of each diocese, may suffice: which the dean accordingly does.

The place where the convocation of the province of Canterbury has been usually held, is St. Paul's church; whence they have been prorogued to St. Peter's in Westminster, in the chapel of Henry VII. or the Jerusalem Chamber, where there is an upper and lower house.

The upper house, in the province of Canterbury, consists of twenty-two bishops, whereof the archbishop is always president, who prorogues and dissolves the convocation by mandate from the king: and before the reformation abbots, priors, and other mitred prelates sat with the bishops. All

at the opening of a convocation, are in their scarlet robes and hoods.

The lower house consists of twenty-two deans, fifty-four archdeacons, twenty-four proctors for the chapters, and forty-four proctors, representing the parochial clergy; in all 144.

Each house hath a prolocutor chosen from among themselves; and that of the lower house is presented to the bishops. Things are first usually proposed in the upper house; then communicated to the lower. All the members of both houses have the same privilege in freedom from arrest, as the members of parliament have, stat 8 Hen. VI. c. 1. and the proctors of the clergy received wages from their constituents.

The convocation exercises jurisdiction in making canons with the king's assent, (stat. 25 Hen. VIII. c. 19.) This statute which restrains the convocation from making or executing any canons repugnant to the king's prerogative, or the laws, customs, and statutes of the realm, was merely declaratory of the old common law (12 Rep. 72.); that part of it only being new, which makes the king's royal assent actually necessary to the validity of every canon. To the convocation also belong the examination and censure of heretical and schismatical books and persons. But appeal lies from their proceedings to the king in chancery, or to his delegates. In case the king himself be a party, the appeal lies by stat. 24 Hen. VIII. c. 12. to all the bishops assembled in the upper house of convocation. See *COURT of delegates*.

The archbishop of York, at the same time, holds a convocation of the clergy of his province, after the like manner at York; and, by constant correspondence, debates and concludes of the same matters as are debated by that of Canterbury; but they are distinct and independent of each other; and when they used to tax the clergy, they granted different subsidies. In the province of York, the convocation consists only of one house; and on account of the small number of dioceses in this province, each archdeacon elects two proctors. It has been customary with the convocation, for many years back, regularly to assemble, and to adjourn without proceeding to any business; so that the convocation now exists more in form than for any effective purpose. See *CHURCH of England*.

In the year 1711, the convocation was assembled with the new parliament; the lower house chose Aterbury for its prolocutor; and both houses concurred in censuring some tenets that favoured Arianism, broached and supported by Mr. Whilston, mathematical professor in Cambridge. The archbishop doubted whether this assembly could proceed against a man for heresy; the judges were consulted, and the majority gave their opinion that the convocation had a jurisdiction. Five of them professed the contrary sentiment, which they maintained from the statutes made at the reformation; the queen, not doubting their jurisdiction, expected them to proceed, but fresh scruples arising, they determined to examine the book, without proceeding against the author, and this was censured accordingly. An extract of the sentence was sent to the queen, but she did not signify her pleasure on this subject, and the affair remained in suspense. Before the queen's death, in 1714, the lower house of convocation had declared, that a book published by Dr. Samuel Clarke, under the title of "The Scripture Doctrine of the Trinity," contained assertions contrary to the Catholic faith. They sent up extracts from this performance to the bishops; and the doctor wrote an answer to their objections. He was prevailed upon to write an apology, which he presented to the upper house; but apprehending that it might be published separately, and misunderstood, he afterwards delivered an explanation to the bishop of London. This was satisfactory to the bishops;

but the lower house resolved, that it was no recantation of his heretical assertions. (See the article *CLARKE*.) In the year 1717, the proceedings in the convocation turned chiefly upon two performances of Dr. Hoadly, bishop of Bangor. One was entitled "A Preservative against the principles and practices of the Non-jurors;" the other was a sermon preached before the king, under the title of "The nature of the kingdom of Christ;" the convocation appointed a committee to examine the bishop's two performances; and thus commenced the famous controversy, called "Bangorian;" in consequence of a letter written on the subject of the bishop's discourse by Dr. Snape, master of Eton college. The convocation drew up a representation, in which the preservative and the sermon were censured, as tending to subvert all government and discipline in the church of Christ; to reduce his kingdom to a state of anarchy and confusion; to impugn and impeach the royal supremacy in causes ecclesiastical, and the authority of the legislature to enforce obedience in matters of religion by civil sanctions. Before this representation could be brought into the upper house, that whole assembly was prorogued by a special order from the king. This measure, however, inflamed the controversy. A great number of pens were drawn against the bishop; but his chief antagonists were Dr. Snape, and Dr. Sherlock, whom the king removed from the office of his chaplains. The convocation has not been permitted by government to do any business of consequence since this time, but merely to confine itself to matters of form. See *CHURCH of England*.

The English clergy, anciently, had their representatives in the lower house of parliament; as appears by the record, much prized by lord Coke. Among the freeholders who were present in parliamentary meetings, we find many of the inferior, secular, clergy; an order of men who were, certainly, of too great estimation and account in the state not to have had a share in the legislature, either personally or by representatives. There are not, indeed, any writs of summons now remaining, which require proctors to be sent for them to the parliaments of this kingdom, before the 23d year of Edward I.; but from the annals of Burton (p. 355, sub anno 1255.) it appears, that the whole body of the clergy were so represented in the 29th of Henry III. Nor is this remarked as a novelty by any of the historians who wrote in that age; though, being all ecclesiastics, they would probably have thought it more worthy of observation than any event in which the laity alone were concerned. It may be therefore presumed, that, not only the attendance of the inferior clergy in parliament, which is evidently proved by many passages in more ancient historians, but this kind of representation of them had been customary long before. (See *BOROUGH*.) In later times, from a desire of independence on the state, to which they were incited more and more by the pope, they gradually withdrew themselves from any attendance in parliament, either personally, or by representatives; so that, after the reign of Henry VI., they are hardly ever mentioned as present there; although in the 21st year of Richard II. the commons had shewn in a petition to the king, "how that before those times many judgments and ordinances, made in the times of the progenitors of our lord the king in parliament, had been repealed and disannulled, because the state of the clergy were not present in parliament at the making of the said judgments and ordinances." After the reformation of religion, in the reign of Edward VI., an attempt was made in convocation to have the lower house united to the house of commons, "according to ancient custom, *sicut ab antiqua fieri consuevit*." It was also proposed to queen Elizabeth, but rejected. The clergy continued to tax themselves in a separate body, till the restoration of Charles II.; soon after which

which they were taxed in the same manner and conjointly with the rest of the commons; and have ever since been represented in parliament by the same persons, which has more embodied them with the laity, and prevents the setting up of a church interest distinct from that of the people. It is remarkable, that this very important alteration in the state of the kingdom was made *without any law*, by agreement with the clergy. (Littleton's Hist. Hen. II. vol. iii.)

In the parliament of Ireland, originally formed on the model of that of England, the clergy continued to be members of the house of commons, till they were excluded by an act of parliament, 28 Hen. VIII. A. D. 1536, because they supported the authority of the pope, and obstructed the reformation of the church. Whilst the clergy continued to grant their own money in their convocations, their grants were not effectual till they were confirmed in parliament. In the 15th century the clergy of England had great influence in all the public councils of the kingdom, and particularly in parliament: they constantly resided in the kingdom, and were present in these councils; while the nobles and great men were engaged in warlike expeditions into France or Scotland. Besides all the archbishops and bishops, twenty-five abbots and two priors were summoned to every parliament, and sometimes many more; so that the spiritual lords were generally double the number of the temporal lords in the house of peers (Prynne's register of writs, vol. i. & iv.). This enabled the prelates to procure sanguinary laws against heretics, and to secure the immense possessions of the church, together with all her absurd errors and wretched superstitions, from all attacks. 1 Hen. IV. c. 15. 2 Hen. V. c. 7.

CONVOLVULI, in *Botany*, the tenth natural order of dicotyledonous hypogynous plants, in the system of Jussieu, with the following character. *Calyx* five-cleft, most frequently permanent. *Corolla* regular, commonly with a five-cleft border. *Stamens* generally five, inserted at the base of the corolla, and alternating with its segments. *Style* one, or definitely divided; when one, with a stigma either simple or divided; when more than one, with as many simple stigmas as there are divisions. *Fruit* capsular, often three-celled, more rarely two or four-celled; cells with one or more seeds. *Seeds* marked with an umbilical eye at the base, somewhat obscure, and affixed below to the central partition; valves free, with their edges adjoining to the angles of the partition; radicle of the arched coraculum inferior. (Coraculum shut up by the perisperm?) *Stems* shrubby, or more frequently herbaceous; many twining; many lactescent. *Leaves* alternate, very rarely almost opposite, (always simple, Vent.). This order is nearly allied to the Borraginæ and Polemoniæ, in its regular five-cleft pentandrous corolla, and alternate leaves; but differs from the latter, in having the partition adjoining to the edges, not to the middle of the valves; and from the former, in the fruit not being gymnospermous. Jussieu assigns to it the following genera: 1. With a single style. *Maripa*, Aubl.; *monoucoa*, Aubl.; *retzia*, Thunb.; *endrachium*, (humbertia, Commers.); *convolvulus*, Linn.; *ipomea*, Linn. 2. With several styles. *Evolvulus*, Linn.; *nama*, Brown and Linn.; *hydrolea*, Linn.; *fagonca*, Aubl.; *creffa*, Linn. 3. Allied to the convolvuli. *Cuscuta*, Linn.; *diapensia*, Linn.; *loefelia*, Linn.

Ventenat has changed the name of the order to convolvulacæ, and has included in it only convolvulus, ipomea, evolvulus, and creffa; entirely omitting maripa, monoucoa, retzia, endrachium, nama, hydrolea, and fagonca; and removing cuscuta to his undetermined plants, and diapensia and loefelia to the polemonia, his polemonacæ. La

Marc's natural family of liferons corresponds exactly with the first two sections of Jussieu.

CONVOLVULUS, (so called, *a convolvendo*, because many of the species are twining). Linn. Gen. 215. Schreb. 287. Willd. 323. Lam. Illust. 296. Gært. 780. Juss. 133. Vent. ii. 396. Class and order, *pentandria monogynia*. Nat. Ord. *Campanaceæ*, Linn. *Convolvuli*, Juss. *Convolvulacæ*, Vent.

Gen. Ch. *Cal.* perianth five-cleft. *Cor.* monopetalous, bell-shaped or funnel-shaped, plaited; border generally spreading, more or less five-lobed. *Stam.* filaments five, awl-shaped, shorter than the corolla, approximating at the base. *Pist.* germ superior, roundish; style filiform; stigma simple or biind. *Peric.* capsule surrounded by the calyx, roundish; one, two, three, or four-celled; one, two, three, four, or many-valved. *Seeds* one or two in each cell.

Eff. Ch. Five-cleft. Corolla bell or funnel-shaped. Stigmas one or two. Pericarp a capsule, or dry berry. Seeds one or two in each cell.

Obf. Authors often call the calyx five-leaved, when it is very deeply five-cleft.

* *Stems twining.*

Sp. 1. *C. arvensis*. Linn. 1. Mart. 1. Desfrouseaux, Encyc. 2. Lam. Ill. 2001. Willd. 1. Bauh. Pin. 294. Flor. Dan. tab. 459. Curt. Flor. Lond. 2. 13. Eng. Bot. 312. (*C.* minor; Bauh. Hist. 2. 157. *C.* purpureus; Lob. Obs. 340. fig. 2. *C.* minor arvensis, flore roseo; Tourn. Inf. 83. *Smilax levis* minor; Ger. Emen. 861. *Helxine foliis sagittatis*, cissampelis; Mat. 1011. Camer. Epit. 753.) "Leaves arrow-shaped; lobes acute; flowers generally solitary; bractes minute, awl-shaped, remote from the flower." *Root* perennial, creeping, striking deeply into the ground, not easily extirpated. *Stems* numerous, angular. *Leaves* alternate, petioled, smoothish. *Flowers* flesh-coloured, sometimes white, sweet-scented, opening only in clear weather; peduncles axillary, generally one-flowered, thickened above. A troublesome weed in cultivated ground, twining closely about the culms of wheat, and other kinds of corn, and thence in many parts of England called bind-weed. Its juice is slightly purgative. The blossoms give a deep yellow or orange tincture to water, which is heightened by alum and alkalis. A native of Great Britain, and most parts of Europe. 2. *C. auriculatus*. Desf. 3. Lam. 2002. (*C. arvensis* β ; Linn. *C. minimus*, angusto auriculato folio; Bocc. Mus. tab. 33. Pluk. Alm. 116. tab. 24. fig. 3. *C. arvensis minimus*; Rai. Syn. 276.) "Leaves linear, hastate-acuminate; lobes entire." Distinguished from the preceding by its narrow elongated leaves, longer petals, and bractes placed nearer the flower. A native of Great Britain, and other parts of Europe: found by Commerfon in the Isle of France, where it is supposed to have been brought with wheat from Persia. 3. *C. sepium*. Linn. 2. Mart. 2. Desf. 1. Lam. 1. Willd. 2. Flor. Dan. tab. 458. Curt. Flor. Lond. 1. tab. 13. Eng. Bot. 313. (*C.* major, albus; Bauh. Pin. 294. Tourn. Inf. 82. *Smilax levis* major; Ger. Emen. 861.) "Leaves arrow-shaped; lobes truncate; peduncles square, one-flowered; bractes larger than the calyx, and close to it." β americanus; with a flesh-coloured flower. Bot. Mag. 732. *Root* perennial, about the thickness of a goose-quill, white, creeping, not easily eradicated. *Stems* numerous, from six to ten inches high, or more, angular, smooth, not much branched. *Leaves* alternate, petioled, dependent. *Flowers* large, generally white, sometimes flesh-coloured; nectary a yellow gland, surrounding the base of the germ. A native of Great Britain,

Britain, and most parts of Europe, climbing up hedges in moist ground. Its inspissated juice, taken in doses of twenty or thirty grains, is a powerful purgative. 4. *C. Wheeleri*. Mart. 84. Willd. 3. Vahl. Symb. 2. 366. (C. fasciataria foliis, Wheeleri; Pluk. Phyt. tab. 85. fig. 3. Ipomea sagittata; Poir. It. 2. 160. tab. 3.) "Leaves arrow-shaped, roundish behind, entire; peduncles cylindrical, one-flowered." Wholly smooth. Leaves acute; petiole the length of the leaf. Peduncles shorter than the petiole, thicker, bractate towards the middle, thicker under the flower. Allied to *C. sepium*. A native of Spain and Barbary. 5. *C. scammonia*. Linn. 3. Mart. 3. Defr. 81. Lam. 2079. Woodv. Med. Bot. 13. tab. 5. (*C. fyiaca*, fusc scammonia; Morif. Hist. 2. 12. tab. 3. fig. 5. Bauh. Pin. 294.) "Leaves triangular-arrow-shaped; peduncles cylindrical, nearly double the length of the leaves, about three-flowered." Root perennial, long, thick, fleshy, full of a milky juice. Stems cylindrical, slender, somewhat villous. Leaves alternate smooth, acute; posterior lobes diverging, with a tooth on the inner side of each. Flowers large, purplish white or pale yellow; peduncles solitary; segments of the calyx emarginate; bractes small, awl-shaped, spreading, remote from the flower. Capsule three or four-celled. A native of Syria and Asia Minor. For its medical uses, see SCAMMONY. 6. *C. involuacratu*. Willd. 5. "Leaves cordate-hastate, pubescent; peduncles about three-flowered; calyxes bracteatate." Stem cylindrical, pubescent-villous. Leaves oblong, obtuse, mucronate, quite entire, pubescent on both sides; truncate at the base, undivided, rather obtuse; petioles villous. Peduncles about the length of the leaves, pubescent. Bractes two at the division of the peduncle, pubescent, oblong, acute; two others at the base of each flower, villous-pubescent, elliptical, rather acute, longer than the calyx, and involving it. A native of Guinea. 7. *C. sagittifolius*. Smith Prod. Fl. Gr. p. 133. Flor. Græc. tab. 103. "Leaves cordate-hastate, covered with long distinct hairs, angular at the base; peduncles generally one-flowered; capsules hirsute." A native of the islands in the Archipelago, in vineyards and cultivated ground. 8. *C. fibrivus*. Linn. Mantis. 203. Mart. 4. Defr. 80. Lam. 2078. Willd. 6. (*C. rufestris*; Pallas It. 3. n. 80. tab. R.) "Leaves cordate-acuminate, even-surfaced; peduncles two-flowered; stipules retuse, decurrent." Root annual. Stems from four to six feet long, slender, slightly winged from the decurrence of the stipules, but not two-edged. Leaves ending in a point, which extends to half their whole length, soft, thin, smooth, veined, entire, paler underneath; stipules vertical, small, obtuse. Flowers small, scarcely twice the length of the calyx, whitish or flesh-coloured, fugacious; bractes often wanting; when present, brittle-shaped, sometimes at the division of the peduncle, sometimes on the pedicels; calyx smooth, deeply divided; stigma capitate, two-lobed. A native of Siberia, flowering in July and Aug. Introduced into England in 1779. 9. *C. rufestris*. Willd. 7. "Leaves obtusely heart-shaped, oblong, lanceolate, acute; peduncles one-flowered." Stem smooth, but little twining, somewhat shrubby. Leaves two inches long, smooth, slightly hairy underneath, and at the edges, when viewed through a lens. Flowers violet; peduncles almost the length of the leaves; bractes two, awl-shaped, about the middle of the peduncle; calyx-leaflets, egg-shaped, acute, a little hairy, corolla flat, five-plaited; plaits a little hairy on the outside. Supposed to be a native of Siberia. 10. *C. farinosus*. Linn. Mant. 203. Mart. 5. Defr. 79. Lam. 2077. Wild. 8. Jacq. Hort. Vind. 1. 13. tab. 35. Salisb. Par. Lond. 45. "Leaves heart-shaped, acuminate, repand; peduncles three-flowered; stem mea-

ly." Linn. "Stem with a silky pubescence, which appears at a little distance like dust; leaves cordate, arrow-shaped, with the base of the sinus prominent, repand-toothed, smooth above; panicles from three to five-flowered; border of the corolla sharply five-cleft; stigmas smooth." Salisb. Root annual. Stem six feet high, about the thickness of a goose-quill. Leaves remote, but from the number of branches appearing crowded. Flowers pale rose-coloured; peduncles longer than the leaves, slender, cylindrical; pedicels turned upward after flowering; bractes small, tinged with dull purple towards the top; segments of the calyx purplish, mucronate; tube of the corolla pale green, funnel-shaped, pentangular, shining; filaments whitish, attached to the tube nearly its whole length, slightly pubescent; anthers pale blue. Nectary deep yellow. Capsule two-celled, two seeds in each cell. Salisb. Four-celled, one seed in each cell. Jaq. A native of fields and hedges in Mytha, Livadia, and Peloponnesus; Sibth. Madeira; Masson. 11. *C. lanuginosus*. Mart. 85. Willd. 9. Vahl. Symb. 3. 23. "Leaves heart-shaped, oblong, somewhat hastate, tomentous-silky, auricled, toothed; peduncles three-flowered; stem hairy." Stem herbaceous, beset with numerous ferruginous hairs. Leaves on short peduncles, acute; auricles with two teeth. Flowers resembling those of scammony, yellowish, having a purplish lanceolate line, with a pile of yellow hairs on each segment of the border; bractes two at the division of the peduncle, lanceolate; two others on each lateral pedicel near the flower; middle pedicel shorter, without bractes; peduncles axillary, solitary, hairy; three outer leaflets of the calyx egg-shaped, acuminate, rough with hairs; style bifid. Supposed to be a native of the Levant. 12. *C. incanus*. Mart. 86. Willd. 10. Vahl. Symb. 3. 23. "Tomentous-silky; leaves lanceolate-arrow-shaped, obtuse, often with two teeth at the base; peduncles two-flowered." Stem herbaceous, cylindrical. Leaves an inch and half long, rounded at the end, mucronate, gradually wider towards the base; auricles rounded behind; petioles one fourth of the length of the leaf. Peduncles the length of the leaves; pedicels one shorter and thicker, with two bractes at the base; one longer, with two brittle-shaped bractes in the middle; segments of the calyx egg-shaped, acute; outer ones more villous; corolla villous on the outside; style bifid. Capsule smooth, globular. A native of America. 13. *C. salicifolius*. Defr. 17. Lam. 2016. "Leaves lanceolate, serrated, on short petioles; calyx angular." Stems cylindrical, slender. Leaves three or four inches long, narrowed to a point at both extremities. Peduncles shorter than the leaves, axillary, solitary, one-flowered; bractes two, very small, awl-shaped, at a distance from the flower; calyxes five-leaved. A native of St. Domingo; specimen in the herbarium of La Marck. 14. *C. emarginatus*. Mart. 87. Willd. 11. Vahl. Symb. 3. 23. (*C. uniflorus*; Defr. 18. Lam. 2017. Burm. Ind. 47. tab. 21. fig. 2.) "Leaves lanceolate; lower ones emarginate, mucronate; peduncles one-flowered; outer calyx-leaves femioveate, large." Stem rooting at the bottom, mucronate upwards, with small spines, and having minute hairs scattered over it at the top. Leaves thickish, veiculis, smooth; lower ones acute at the base; upper ones rounded at the base, mucronate. Peduncles solitary, with two minute bractes above the middle; calyx-leaves smooth, the length of the corolla; three outer ones acute, mucronate; two inner ones linear-lanceolate, attenuated; corolla with five lines on the outside, which are closely beset with fulvous shining hairs; stigma capitate. Capsule smooth, shorter than the calyx. A native of the East Indies. 15. *C. nitidus*. Defr. 19. Lam. 2018. "Leaves oval, shining, silky-white underneath; peduncles one-flow-

ered, shorter than the petiole." *Root* perennial. The young branches, petioles, leaves, peduncles, and calyxes, clothed with a silky shining down. *Stem* cylindrical, woody, almost smooth. *Leaves* broad-oval, alternate, acute, entire, nerved, about twice the length of the petioles. *Peduncles* axillary, solitary, with two awl-shaped bractes about the middle; calyxes short; two inner leaves smaller; corollas at least two inches long, funnel-shaped. A native of the Philippine islands. Specimen in the herbarium of Jussieu. 16. *C. che-nopodioides*. Defr. 21. Lam. 2020. "Villous; leaves egg-shaped, ferrate-venated; flowers solitary, nearly sessile." *Stems* slender, weak, cylindrical. *Leaves* an inch long; petioles about half their length, channelled. *Peduncles* axillary, solitary; bractes two, small, filiform, rather long; leaves of the calyx egg-shaped, acute, corollas narrow, tubular. In the herbarium of La Marek. 17. *C. medium*. Linn. Sp. Pl. 4. Mart. 6. Defr. 10. Lam. 2009. Willd. 12. "Leaves linear, hastate-acuminate; auricles toothed; peduncles one-flowered; calyxes arrow-shaped." Plant smooth in all its parts. *Root* annual. *Stems* very slender. *Peduncles* axillary, solitary, often bent in the middle at the origin of the two bractes; upper half angular, thicker; three outer leaves of the calyx large, nearly as long as the peduncles, acute, arrow-shaped at the base, like those of campanula medium; auricles terminated by two or three small teeth; two inner ones entire, acute, a little shorter; corolla not longer than the calyx. A native of Madagascar and the East Indies. 18. *C. filicaulis*. Mart. 88. Willd. 13. Vahl. Sym. 3. 24. "Leaves linear-lanceolate, obtuse, mucronate, dilated and toothed at the base; calyx leaves oblong." *Root* annual. *Stem* herbaceous, filiform, branched. *Leaves* on very short petioles, distant, two inches long or more, tender, veined, quite smooth. *Peduncles* axillary, filiform, thicker at the top; bractes two, opposite, awl-shaped, above the middle of the peduncle; calyx-leaves mucronate, smooth; stigma simple, bluntish. A native of Guinea. 19. *C. tridentatus*. Linn. Sp. Pl. Ed. 1. Mart. 76. Defr. 12. Lam. 2011. Willd. 14. Pluk. Alm. 117. tab. 276. fig. 6. & Mart. 117. tab. 167. fig. 5. (Evolvulus tridentatus; Linn. Sp. Pl. Ed. 2. Fendera-claudi; Rheed. Mal. 11. 133. tab. 65.) "Leaves spatulate-linear, three-toothed at the tip, dilated and toothed at the base; calyx leaves elliptical, cuspidate." *Root* annual. *Stems* filiform, smooth, slightly striated, almost simple. *Leaves* alternate, about half an inch long, smooth; petioles about a line long. *Flowers* purplish at the base, with a yellowish white border; peduncles axillary, solitary, one-flowered, longer than the leaves, with two small bractes near their summit. A native of the East Indies. Introduced into England in 1778, by Sir Joseph Banks. 20. *C. angustifolius*. Mart. 89. Defr. 32. Lam. 2030. Willd. 15. (Ipomœa angustifolius; Jacq. ic. 2. tab. 37.) "Leaves linear, hastate, obtuse, mucronate, smooth; auricles generally entire; peduncle one-flowered." *Root* spindle-shaped, rising about an inch above the surface of the ground, with the appearance of a slender, simple, erect, leafless stem. *Stems* several, scarcely a foot high, a little twining, almost simple, filiform, weak. *Leaves* an inch long, about a line broad, numerous, on very short petioles. *Flowers* yellow, longer than the calyx; peduncles axillary, solitary, shorter than the leaves, with two awl-shaped bractes, about the middle, upper half thicker; calyx-leaves connivent, lanceolate, mucronate; corolla funnel-shaped; border very open; divisions egg-shaped, obtuse; stigma globular, didymous. *Capsule* two-celled. A native of Guinea and the East Indies. 21. *C. aristolochifolius*. Mill. Houlton MSS. "Leaves hastate-lanceolate; auricles rounded; peduncles many-flowered." *Root* annual.

Stem ten feet high, slender. *Flowers* yellow, in small clusters, on long peduncles. *Capsules* trizonous, three-celled. *Seeds* two in each cell. *Seeds* sent to Mr. Miller from Carthage in New Spain. 22. *C. Adansoni*. Defr. 82. Lam. 2080. "Leaves hastate, linear; stipules in pairs, somewhat filiform; calyx mucronate." *Stems* herbaceous, weak, a little villous. *Leaves* alternate, dilated, petioled, entire, smooth, from three to four inches long; stipules about an inch long. *Flowers* near two inches long, axillary; peduncles nearly the length of the petioles, smooth, with two small bractes about the middle; calyx-leaves egg-shaped, rough, with sharp tubercles. A native of Senegal. 23. *C. japonicus*. Mart. 7. Defr. 6. Lam. 2005. Willd. 16. Thunb. jap. 85. (Kos and Kudr vulgo Firaga wo; Kempf. Amœn. 5. 856.) "Leaves hastate, lanceolate, acute; lateral lobes one-toothed; peduncles one-flowered; stem simple." *Stems* filiform, smooth. *Leaves* alternate, almost unilateral, petioled, smooth; middle lobe an inch long, lanceolate, entire, acute; side ones a little reflexed, shorter. *Flowers* axillary, solitary; peduncles as long as the leaves, filiform, smooth; calyx-leaves egg-shaped, acute, entire, smooth. A native of Japan. 24. *C. ebraheutus*. Defr. 7. Lam. 2006. "Leaves cordate-arrow-shaped, obtuse behind; peduncles shorter than the petiole, without bractes." Whole plant, except the corolla, clothed with short white hairs. *Stems* scarcely a foot and a half long, slender. *Leaves* alternate, acute. *Flowers* white, small; peduncles one or two-flowered; segments of the calyx five; two outer ones broader; stigmas two, globular, purplish. Native country unknown. Cultivated in the botanic garden at Paris. 25. *C. leucanthus*. Defr. 8. Lam. 2007. (Ipomœa leucantha; Jacq. Coll. 2. 280. ic. 2.) "Leaves heart-shaped, acuminate; peduncles shorter than the petiole." *Root* annual. *Stems* about four feet high, slender, cylindrical, branched, reddish, and somewhat rough towards the bottom. *Leaves* alternate, entire, or slightly felloped, smooth. *Flowers* white; peduncles axillary, solitary, an inch long, erect, cylindrical, smooth, one-flowered; calyx leaves mucronate, a little open at the summit, ciliated at the base; corolla funnel-shaped; anthers purplish; stigma two-lobed. A native of America in the torrid zone. 26. *C. fruticosus*. Defr. 9. Lam. 2008. "Shrubby; leaves somewhat heart-shaped at the base, linear, lanceolate, petioles short; flowering branches, thick set with leaves." *Root* perennial. *Stems* three or four feet high, cylindrical, slender. *Leaves* not more than two lines broad, sloped at the base, on very short petioles. *Flowers* with five purple rays; peduncles larger than the petioles, scarcely the length of the flowers; bractes two, small, awl-shaped, unequal, situated nearer to the stem than to the calyx; calyx smooth; corolla shallowly five-lobed. A native of the Canary islands, flowering in April and May. 27. *C. dentatus*. Mart. 90. Willd. 17. Vahl. Symb. 3. 25. "Leaves hastate, smooth; auricles toothed; peduncles many-flowered, mucronate." *Stem* cylindrical, smooth. *Leaves* scarcely an inch long, somewhat heart-shaped at the base; middle lobe lanceolate, quite entire; side ones roundish, unequally four or five-toothed; petioles filiform, often somewhat mucronate towards the base. *General peduncles* spreading, thicker, and a little longer than the petioles; partial peduncles in threes; that in the middle one-flowered; side ones with two or three pedicelled flowers; both mucronate; rigid; calyx-leaves oblong, obtuse, mucronate, equal. A native of the East Indies, found by Schumacher. 28. *C. hastatus*. Mart. 79. Willd. 18. Vahl. Symb. 1. 15. Forst. defr. 203. "Leaves lanceolate, hastate; peduncles axillary, in pairs, two-flowered." *Stem* hairy. *Leaves* remote, quite entire, smooth on the upper surface, villous on the lower; au-

ricles rounded, sometimes with one tooth behind; petiole half the length of the leaf. *Peduncles* shorter than the petiole, villous; calyx-leaves hairy, acuminate, patulous at the tip. A native of Egypt and Arabia. 29. *C. Souneratii*. (C. haitatus; Desf. 11. Lam. 2010. Tala-neli; Rheed. Mal. 11. 113. tab. 55.) "Leaves linear, hastate-acuminate; auricles toothed; calyx-leaves simple." Whole plant smooth. *Stems* very slender, slightly angular. *Leaves* about two lines broad, alternate, nearly sessile. *Peduncles* longer than the flower, slender, one or two-flowered, often bent at the insertion of the bractes, thicker upwards; bractes two, small, awl-shaped, situated a little above the middle of the peduncle. *Flowers* yellowish-white, twice the length of the calyx; calyx leaves egg-shaped, acute. A native of the East Indies, communicated to La Marck by Sounerat. 30. *C. asarifolius*. Desf. 89. Lam. 2087. "Leaves kidney-shaped, broad, veined; peduncles one or two-flowered." *Stems* cylindrical, smooth, not much branched. *Leaves* alternate, large, entire, smooth, firm; petioles about two inches long, channelled. *Peduncles* longer than the petioles; bractes from two to four, small, awl-shaped, situated almost close to the flowers; calyx-leaves short, egg-shaped, obtuse, two outer ones smaller; corollas at least two inches long, tubular; tube about half an inch diameter; border but little open, with five pointed divisions; stigma capitate, didymous. A native of Senegal. 31. *C. tiliaefolius*. "Shrubby; leaves heart-shaped, rounded; younger ones somewhat tomentous; flower and fruit very large." *Stems* cylindrical, almost smooth. *Leaves* alternate, a little orbicular, entire; petioles about half the length of the leaves, channelled. *Flowers* large; peduncles not more than eight or ten lines long, axillary, solitary, one-flowered; calyx-leaves short, obtuse, almost round; corolla at least three inches long, almost cylindrical; tube narrow as far as the length of the calyx, afterwards eight or ten lines in diameter; stigma capitate, two lobed. *Capsule* about the size of a walnut, apparently two-celled. A native of the Isle of France, and the Cape of Good Hope. Found by Commerlon. 32. *C. panduratus*. Linn. Sp. Pl. 5. Mart. 8. Desf. 91. Lam. 2089. Willd. 19. (C. megalorrhizos; Dill. Elth. 101. tab. 85. fig. 99.) "Leaves, some heart-shaped, entire, others panduriform or three-lobed; peduncles longer than the petiole, about two-flowered." *Root* perennial, thick, spindle-shaped. *Stems* long, slender. *Leaves* distant, petioled. *Flowers* large, white, with the bottom of fine purple; peduncles axillary, solitary, from one to three-flowered; calyx-leaves short, two outer ones shorter and narrower. *Capsule* two-celled. *Seeds* hirsute, one in each cell. A native of Carolina and Virginia, flowering from June to September. 33. *C. betoniifolius*. Mart. 72. "Leaves cordate-arrow-shaped, acute; peduncles one-flowered." *Stem* five or six feet high, slender. *Flowers* white, with purple bottoms; peduncles long, slender. A native of Africa, cultivated by Miller in 1730. 34. *C. bracteatus*. Mart. 91. Vahl. Sym. 3. 25. "Leaves heart-shaped, almost entire, and three-lobed, hastate, attenuated; peduncles one-flowered; outer calyx-leaves bractee-shaped." *Stem* thinly beset with short hairs. *Leaves* two inches long; petioles shorter than the leaf, pubescent. *Peduncles* the length of the leaf, solitary; bractes two, lanceolate, acute, situated a little below the calyx; calyx pubescent; inner calyx-leaves oblong, bluntish, nerved; outer ones much broader, enclosing the others as between two bractes; corolla villous on the outside, tender, silky; border five-cleft; stigma capitate, two lobed, found in the East Indies by Koenig. 35. *C. bicolor*. Mart. 92. Willd. 21. Vahl. Symb. 3. 25. "Leaves heart-shaped, villous, somewhat angular-lobed at the base; peduncles one-flowered; outer leaves of the calyx resembling

bractes." *Stem* villous. *Leaves* acute, mucronate, not attenuated, nearly equal in length and breadth, one, two, or three-lobed at the bottom, villous on both sides; very softly villous, hoary, and obscurely veined underneath; the younger ones silky. *Flowers* white, with a violet purple base; bractes, calyx, and corolla, as in the preceding species. Found in the East Indies by Schumacher. 36. *C. Giffroyensis*. (C. bicolor; Desf. 96. Lam. 2094.) Hairy; leaves somewhat heart-shaped, three-lobed, hoary underneath; peduncles many-flowered." On a superficial view having the appearance of a bramble. *Stems* slender, cylindrical; beset, as well as the petioles, peduncles, and calyxes, with blackish points, and hispid with rather long stiffish hairs. *Leaves* alternate, longer than their petioles, clothed with fine recumbent hairs, green on the upper surface, hoary underneath; lobes oval, acute, entire. *Flowers* small; peduncles axillary, solitary, thicker and longer than the petioles, dichotomous; bractes two, linear, awl-shaped, situated at each division of the peduncles; calyx-leaves narrow, acute, rather long. Brought from Senegal by M. Geoffroy. 37. *C. trilobus*. Willd. 22. Thunb. prod. 35. "Leaves heart-shaped, villous, three-lobed; lobes egg-shaped, acute; peduncles one-flowered." A native of the Cape of Good Hope. 38. *C. subquinquelobus*. (C. trilobus; Desf. 94. Lam. 2093. *Ipomoea triloba*; Linn.) "Lower leaves heart-shaped, three-lobed; upper ones somewhat five-lobed; peduncles three-flowered." *Root* annual. *Stems* two or three feet long, slender, slightly angular, smooth. *Leaves* alternate, generally shorter than their petioles; middle lobes of the lower leaves egg-shaped, obtuse, mucronate, smooth; lateral lobes of the upper leaves with a deep sinus, which makes them appear five-lobed. *Flowers* purple or violet; peduncles angular, nearly the length of the petioles; pedicels very short, bractes small, egg-shaped; calyx-leaves half the length of the corolla, smooth, egg-shaped, acute, connivent; corolla small, cylindrical; border with five sharp teeth. A native of South America, cultivated in the botanic garden at Paris. 39. *C. platanifolius*. Mart. 93. Willd. 23. Vahl. Symb. 3. 26. Pluk. phyt. tab. 167. fig. 3. Feuill. peruv. 3. 16. tab. 11. "Leaves heart-shaped, three-lobed; lateral lobes toothed-angular; peduncles, somewhat three-flowered; calyxes almost as long as the peduncles, smooth." Whole plant quite smooth, except the petioles. *Stem* cylindrical. *Leaves* two inches long or more, glaucous, green underneath, with purplish veins; lobes lanceolate; middle one longer, broader, quite entire, acuminate; lateral ones narrower, attenuated, with a smaller broader lobe at the bottom on each side, rounded behind, and furnished with an angular tooth; petioles shorter than the leaf, beset with a few scattered hairs. *Peduncles* solitary, shorter than the leaf, thickened at the top; lower ones three-flowered; middle ones two-flowered, uppermost one-flowered; calyx-leaves oblong, somewhat membranous, ending in a bristle; stigma capitate. It differs altogether from *C. batatas* in the smoothness of the stem, and the form of the leaves. A native of America. 40. *C. acuminatus*. Mart. 94. Willd. 24. Vahl. Symb. 3. 26. "Leaves heart-shaped and three-lobed, attenuated; peduncles elongated, many-flowered; calyxes smooth." *Stem* with a few minute scattered hairs, pressed close, and visible only with a magnifier. *Leaves* four inches long, three or more broad at the base, three-lobed or entire, quite smooth, nerved, acute; lateral lobes lanceolate; middle one egg-shaped, attenuated; petioles longer than the leaf. *Flower* large, bell-shaped, purple with a pale base and five paler rays running to the margin; peduncles axillary, the length of the petioles alternate; pedicels about five, an inch and half long; bractes at the base of each pedicel two, lanceolate, attenuated, finely

nerved, smooth; calyx-leaves lanceolate, attenuated, tender, finely nerved, quite smooth; two inner ones a little shorter, stigma capitate. A native of the island of Santa Cruz in the West Indies. 41. *C. carolinus*. Linn. Sp. Pl. 6. Mart. 9. Defr. 90. Lam. 2088. Willd. 25. Dill. elth. 100. tab. 84. fig. 98. "Leaves heart-shaped, entire, and three-lobed, villous; calyxes even-surfaced; capsules hirsute; peduncles one or two-flowered." *Root* perennial. *Stems* slender, reddish towards the root, hairy at the joints. *Leaves* alternate, scarcely two inches long, some entire, others like those of ivy; petioles about the length of the leaves, slender, channelled. *Flowers* pale purple, resembling those of *C. arvensis*; peduncles the length of the petioles, thicker, axillary, solitary, angular, with a few narrow bractes; calyx-leaves egg-shaped, acute, scarcely half the length of the corolla, a little ciliated at the edges with whitish hairs. *Capsules* round, hairy towards the summit, two-celled, four-valved. *Seeds* two in each cell. A native of Carolina. 42. *C. hederaceus*. Linn. Sp. Pl. 7. Mart. 10. Defr. 92. Lam. 2090. Dill. elth. 99. tab. 83. fig. 96. Gart. tab. 134. fig. 2. "Leaves heart-shaped, entire and three-lobed; corollas undivided; fruit erect." Linn. "Peduncles about three-flowered; calyxes tubercled." Lam. *Root* annual. *Stems* farmentous, cylindrical, dull red, two or three feet high. *Leaves* alternate, petioled, clothed with fine short hairs. *Flowers* fine blue, with a pale base; peduncles nearly the length of the petioles, axillary, solitary, hairy; bractes small; pedicels very short; calyx-leaves rough with numerous long hairs, and small black tubercles; two of them narrower. *Capsules* spherical, smooth, thin, three-celled, three-valved. *Seeds* two in each cell, black, smooth. A native of Asia, Africa, and America. 43. *C. Dillenii*. Defr. 22. Lam. 2021. Dill. elth. 97. tab. 81. fig. 93. "Leaves heart-shaped, entire, and three-lobed; flowers solitary, almost sessile." Distinct from the preceding, with which it has been confounded. *Root* annual. *Stems* long, slender, hairy. *Leaves* alternate, slightly villous, paler underneath; lobes angular; petioles shorter than the leaves, hairy. *Flowers* fine blue, with a whitish base; peduncles axillary, solitary; calyxes oblong, five-cleft, hairy; corollas large, very open, almost entire, supposed to be a native of Africa. 44. *C. nil*. Linn. Sp. Pl. 8. Mart. 11. Willd. 27. Bot. Mag. 188. *C. cœruleus*; Ger. em. 864, fig. 1. *C. hederaceo anguloso folio*; Bauh. p. 295; Dill. elth. 96. tab. 8. fig. 91, 92. *Ipomœa hederacea*; Lam. ? *J. trilobata*; Thunb. Flor. jap. 86. Linn. Transf. 2. 330. "Leaves heart-shaped, three-lobed; corollas femiquinquefid; peduncles shorter than the petiole." *Root* annual. *Stem* eight or ten feet high. *Leaves* woolly, acuminate, on long petioles. *Flowers* deep blue, with purple rays; peduncles two-flowered. *Fruit* erect. Nil is an abbreviation of Anil, one of the names of indigo. A native of America. 45. *C. purpureus*. Linn. Sp. Pl. 9. Mart. 12. Willd. 28. Bot. Mag. 113. (*C. purpureus folio subrotundo*; Bauh. p. 295. *Ipomœa purpurea*; Lam.) "Leaves heart-shaped, undivided; fruit nodding; pedicels thickened." *β. cœruleus minor, folio subrotundo*. Dill. elth. 98. tab. 83. fig. 95. smaller, blue-flowered, with a roundish leaf. *γ. C. folio cordato glabro*. Dill. elth. 98. tab. 84. fig. 97. with a heart-shaped smooth leaf. *δ. elatior*; Bot. Mag. 1005. *Stems* very high; leaves orbicular-heart-shaped; flowers white, with five spots, elegantly shaded with blue and carmine. All the varieties are natives of America. The first is a hardy annual, common in the English gardens, under the name of *Convolvulus major*. 46. *C. obfcurus*. Linn. Sp. Pl. 10. Mart. 14. Defr. 15. Lam. 2014. Willd. 29. Dill. elth. 98. tab. 83. fig. 95.

"Leaves heart-shaped, undivided; stem somewhat pubescent; peduncles thickened, one-flowered; calyxes smooth." *Root* annual. *Stems* cylindrical, villous towards the top, three or four feet high. *Leaves* alternate, acute, green, and smooth above, paler and a little villous underneath; petioles one or two inches long. *Flowers* white, with a purple base and yellowish rays; peduncles longer than the petioles, slender, slightly pubescent towards the bottom, with two small bractes. A native of Java, and other parts of the East Indies. 47. *C. flavus*. Willd. 30. (*Evolvulus hederaceus*; Burm. Ind. 77. tab. 30. fig. 2.) "Leaves heart-shaped, repand, somewhat lobed, with small mucronate teeth; peduncles bifid, many-flowered." *Stem* rather smooth. *Leaves* acuminate, somewhat scabrous. *Peduncles* much longer than the leaves; upper ones three-flowered; lower ones bifid; branches three-flowered, with a single flower at the division. A native of the East Indies. 48. *C. angularis*. Linn. Mant. 203. Mart. 13. Defr. 98. Lam. 2098. Willd. 31. Burm. Ind. 46. tab. 19. fig. 2. "Leaves heart-shaped, pentangular, quite entire, villous; peduncles many-flowered." *Stems* pubescent. *Leaves* on short petioles, quite entire, rough with reddish shining hairs. *Flowers* orange; peduncles the length of the leaves, axillary, solitary, most commonly three-flowered; calyx hairy; segments acute; corollas bell-shaped, three times longer than the calyx. A native of the East Indies. 49. *C. Batatas*. Linn. Sp. Pl. 11. Mart. 15. Willd. 32. (*Batatas*; Bauh. Pin. 91. Rumph. Amb. 5. 367. tab. 130. *C. radice tuberosa esculenta*; Catseb. Car. tab. 60. *Ipomœa Batatas*; Lam.) Spanish or sweet potatoe. "Leaves heart-shaped, hastate, five-nerved; stem hispid, creeping, bearing tubers." *Root* perennial. *Stem* cylindrical, perennial, hispid, prostrate, creeping; sending out scattered, oblong, acuminate tubers, purple or pale on the outside. *Leaves* angular, on long petioles. *Flowers* purple, large, about three together, on upright peduncles. A native of the West Indies, whence it is said to have been introduced by the Spaniards into the Philippine islands. It is now extensively cultivated in the tropical climates of both hemispheres, for the sake of its tubers. They are sweet, sapid, and esteemed nourishing, and are the common potatoe of our old English botanists. There are several varieties, and probably more than one distinct species. 50. *C. mexicanus*. Linn. jun. Sup. 137. Mart. 25. Willd. 33. Vahl. Symb. 3. 268. (*C. marginatus*; Defr. 72. Lam. 2071. Tiru-tali; Rheed. Mal. 11. 109. tab. 53.) "Leaves heart-shaped, acute, smooth; peduncles many-flowered, smooth; stem somewhat hairy." *Root* perennial, fibrous. *Stems* cylindrical, slender, reddish. *Leaves* alternate, thin, soft, even-surfaced, bordered with red; petioles rather long, thick, channelled, reddish. *Flowers* pale red, with a purple base, funnel-shaped; peduncles axillary, solitary, thicker than the branches from which they spring, seven or eight-flowered; calyx-leaves short, somewhat acute; stigma capitate, two-lobed. A native of the East Indies. 51. *C. biflorus*. Linn. Sp. Pl. Append. p. 1668. Mart. 16. Willd. 34. "Leaves heart-shaped, pubescent; peduncles in pairs; corollas with trifid lobes. *Root* annual. *Stem* cylindrical, hairy, branched at the base, about the size of *C. arvensis*. *Leaves* oblong; petioles cylindrical, hairy, shorter than the leaf. *Flowers* white; peduncles hairy, approximating at the base, shorter than the petioles; calyx five-leaved; two outer leaves cordate-oblong; two inner ones linear-lanceolate; the fifth semi-heart-shaped; corolla small, campanulate, quinquefid, plaited; lobes trifid at the tip; middle lobe smaller; tube shorter than the calyx; stigmas two, capitate, purple. A native of China. 52. *C. gemellus*. Mart.

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Mart. 95. Defr. 71. Lam. 2070. Vahl. Symb. 3. 27. Burm. ind. 46. tab. 41. fig. 1. "Leaves heart-shaped, somewhat villous underneath, peduncles two-flowered." *Stem* tender, pubescent at the top. *Leaves* an inch long, obscurely seven-nerved, a little acuminate; petioles the length of the leaves. *Flowers* white; peduncles the length of the petioles; pedicels almost as long as the peduncles; one shorter, without bractes; the other with two bractes in the middle; both turned back when the fruit ripens; calyx-leaves oblong, obtuse: corolla campanulate, six times as large as the calyx, smooth; stigma capitate. A native of Java and Tranquebar. 53. *C. triflorus*. Mart. 102. Willd. 42. Vahl. Symb. 5. 30. "Leaves cordate-lanceolate, attenuated, obtuse, smooth; peduncles three-flowered." *Stem* herbaceous, smooth. *Leaves* two inches long, quite entire, simply veined, rounded at the end and mucronate; lobes rounded at the end, sometimes but rarely obscurely angular; petiole short. *Peduncles* shorter than the leaf; pedicels angular, without bractes, equal, almost the length of the peduncle. *Calyx-leaves* obtuse. *Corolla* three times the length of the calyx; lobes hairy at the tip. *Stigma* capitate. A native of the East Indies, observed by Koenig. 54. *C. latifolius*. Defr. 58. Lam. 2033. Plum. Cat. 1. and MSS. "Leaves heart-shaped, smooth; peduncles about three-flowered; corolla valver-shaped, very large." *Stems* very long. *Leaves* alternate, large, thin, acuminate, bright green; petioles channelled. *Flowers* white; peduncles axillary, solitary, thicker than the petioles, a little angular under the pedicels: calyx-leaves small; three outer ones long, acute; two inner ones egg-shaped, obtuse; tube of the corolla long, narrow, greenish; border near five inches in diameter, expanded, almost flat, slightly sinuated at the edges, marked with a greenish-white star. *Fruit* membranous, top-shaped, about the size of a walnut. *Seeds* three or four. A native of St. Domingo and Martinico. 55. *C. hypocrateriformis*. Defr. 81. Lam. 2082. "Leaves heart-shaped; corolla valver-shaped; border five-cleft; segments emarginate." *Branches* woody, cylindrical. *Leaves* alternate, near together, about an inch long, coriaceous, smooth, scarcely pointed; petioles rather shorter than the leaves, angular. *Peduncles* axillary, solitary, or in pairs, one-flowered, nearly as long as the petioles, thickened upwards; bractes situated above the middle of the peduncle, linear-lanceolate, reaching almost to the top of the calyx; calyx-leaves short, egg-shaped, obtuse; tube of the corolla near two inches long; border at least an inch and half in diameter, very flat. A native of the East Indies; described from an imperfect specimen gathered by Sonnerat. 56. *C. striatus*. Mart. 96. Willd. 36. Vah. Symb. 3. 28. "Leaves heart-shaped, attenuated, smooth; peduncles longer than the leaf, about four-flowered; corollas smooth, striated on the outside." *Stem* herbaceous, cylindrical, slender, pubescent. *Leaves* two inches long, remote, quite entire, with a rounded mucronate point, smooth on both sides except the rib, simply veined; petioles the length of the leaves, pubescent. *Peduncles* longer than the leaves, solitary, pubescent; pedicels in threes; lateral ones jointed, one of them often two-flowered; intermediate one shorter, thicker, without bractes. *Bractes* two, situated at the joints about the middle of the lateral pedicels, oblong, concave, small, villous, deciduous. *Calyx-leaves* oblong, obtuse, concave, equal; two outer ones villous, somewhat hoary. *Corolla* campanulate, twice the length of the calyx, white, with a purplish base and five paler lanceolate-striated rays extending to the margin; stigma capitate, two-lobed. 57. *C. dominicensis*. Defr. 59. Lam. 2058. "Leaves heart-shaped; racemes numerous, unilateral; calyx acute, smooth." *Stems*

slender, cylindrical, smooth, frutescent. *Leaves* alternate, acute, smooth, except the middle nerve underneath; petioles of a moderate length, channelled. *Flowers* in small peduncled racemes, numerous, situated near the extremities of the branches, often pendant; bractes very small, awl-shaped, at the foot of the pedicels; calyx-leaves smooth, egg-shaped, elongated, unequal in size; corollas bell-shaped, expanding; stigmas capitate, two-lobed. A native of St. Domingo. 58. *C. finensis*. Defr. 69. Lam. 2068. "Hairy; leaves heart-shaped, acute; peduncles two or three flowered; calyx-leaves heart-shaped." Whole plant, especially near the summit, clothed with separate, fine, whitish hairs. *Stems* slender, cylindrical. *Leaves* alternate, entire, on length somewhat villous petioles. *Peduncles* shorter than the petioles, axillary, solitary; bractes small, awl-shaped; three exterior calyx-leaves broader than the others, heart-shaped at the base, very rough with hairs; corollas campanulate, a little longer than the calyx. Supposed to be a native of China. 59. *C. pentanctus*. Willd. 37. Jacq. ic. rar. 2. 316. Collect. 42. 210. "Leaves heart-shaped, acuminate, smooth, somewhat repand; umbels peduncled, capitate, five-flowered; calyxes ciliated." *Root* perennial. *Stem* shrubby. *Flowers* nearly sessile. Native country unknown. 60. *C. guianensis*. Mart. 97. Defr. 58. Lam. 2057. Aubl. guian. 1. 136. tab. 52. "Leaves somewhat heart shaped, mucronate, tomentous; flowers collected into a kind of corymbose head, on very long peduncles." *Root* perennial. *Stems* a little woody at the base, cylindrical, villous. *Leaves* alternate, two inches long, quite entire, veined, nerveless; petiole only half the length of the leaf, a little channelled, tomentous. *Flowers* pale blue, or whitish; peduncles seven inches long, axillary, villous; pedicels very short, intermingled with filiform bractes; calyxes villous, deeply divided into five lanceolate segments; corollas small; lobes of the border acuminate; stigmas two, reflexed. A native of Guiana. 61. *C. capitatus*. Mart. 98. Defr. 57. Lam. 2056. Willd. 39. Vahl. Symb. 3. 28. "Hispid; leaves heart-shaped; flowers capitate, involucred; peduncles scarcely longer than the petiole." Whole plant hispid, with long distinct hairs of a dirty white colour, placed on minute tubercles. *Stem* slender, cylindrical. *Leaves* from two to three inches long, alternate, acute, entire; petioles nearly the length of the leaf. *Peduncles* axillary, solitary, with about five sessile flowers collected into a close head. *Involucre* consisting of six or seven egg-shaped acute bractes, of unequal size, generally as long as the calyx; calyx-leaves one third of the length of the corolla, ovate-lanceolate, acuminate, smooth within; corolla hispid on the outside with long hairs arranged in five lines. *Capitate* globular, shorter than the calyx, even-surfaced, smooth. Found in the East Indies by Koenig and in Senegal by Geoffroy. 62. *C. crinitus*. Defr. 112. Lam. 2114. "Leaves heart-shaped, almost smooth; heads of flowers very hispid, on long peduncles, involucred; capsule even-surfaced." *Stem* herbaceous. Specimen in the herbarium of Justieu. 63. *C. hispidus*. Mart. 99. Willd. 40. Vahl. Symb. 3. 29. "Extremely hispid; leaves cordate-egg-shaped; flowers unbelled; peduncles very short." *Leaves* from two to three inches long, attenuated, quite entire; petiole half the length of the leaf. *Pedicels* the length of the peduncle. *Calyx-leaves* lanceolate, attenuated, smooth within, lax. *Corolla* smooth. *Stigma* capitate. A native of the East Indies. 64. *C. parviflorus*. Mart. 100. Willd. 42. Vahl. Symb. 3. 29. (*Ipomæa paniculata*; Burm. Ind. 50. tab. 21. fig. 3.) "Leaves heart-shaped, acuminate, smooth; peduncles many-flowered; calyxes acuminate, villous." *Stem* weak, slightly villous at the top.

Leaves

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Leaves an inch long; petiole the length of the leaf, filiform, villous. *Flowers* blue; peduncles the length of the petioles; pedicels umbelled; lateral ones sometimes branched; calyx-leaves egg-shaped, acuminate, small; corolla smooth, twice the length of the calyx, five-cleft; stigma bifid; segments revolute. A native of Java. 65. *C. verticillatus*. Linn. 12. Mart. 17. Willd. 43. Brown. Jam. 153. (*C. nodiflorus*, Lam?) "Leaves oblong, heart-shaped, oblong, naked; peduncles umbelled, bifid, many-flowered." *Leaves* roughish, somewhat repand. *Flowers* bluish, small, campanulate, not cut; peduncles shorter than the leaf; pedicels often somewhat divided. A native of North America. 66. *C. solanifolius*. (*C. parviflorus*; Deffr. 66. Lam. 2065. Quamoclit purpurea solanifolia minor; Plum. MSS. 2. tab. 62. Burm. Amer. 83. tab. 94. fig. 2.) "Leaves cordate-oblong, mucronate; peduncles branched, many-flowered, short, appearing verticillate." Distinct from the preceding. *Roots* the thickness of the human little finger, much branched. *Stems* very slender, long, branched. *Leaves* sinuate, slightly tomentous; petioles rather short. *Flowers* purplish, small, campanulate, deeply five-cleft, as represented in Plumier's figure; peduncles axillary, shorter than the leaves; pedicels forming a corymb. *Capsules* four-celled. *Seeds* yellow, angular. A native of St. Domingo, on stony hills, communicated to La Marck by Joseph Martyn. 67. *C. violaceus*. Mart. 101. Willd. 44. Vahl. Symb. 3. 29. "Leaves cordate-egg-shaped, acute; peduncles elongated, bifid, many-flowered; two outer calyx-leaves cordate-egg-shaped, acute." *Stem*, *petioles*, *peduncles*, and *calyxes* villous. *Leaves* an inch long. *Flowers* violet, with five lanceolate paler rays; peduncles four or five times longer than the leaf; pedicels three or five-flowered, with a pair of linear-lanceolate bractes at the base; calyx-leaves tender; two innermost ones only half the size of the others, somewhat membranous, smooth, mucronate; corolla campanulate; stigmas two, reflexed. It varies with respect to the hairiness of the leaves. A native of the island of Santa Cruz. 68. *C. azureus*. Deffr. 56. Lam. 2055. "Leaves somewhat heart-shaped, acute, naked; flowers collected into a head on a very long petiole." *Stem* woody, finely striated, firm and greyish near the bottom, twining and somewhat villous towards the top. *Leaves* near an inch and half long, a little longer than the petioles, repand, smooth, rather glaucous underneath. *Flowers* fine azure blue, small; peduncles axillary, solitary, divided at the summit into short ramifications intermingled with small bractes; calyxes deeply divided; segments acute. A native of South America. 69. *C. cymosus*. Deffr. 64. Lam. 2063. (*C. laevis* minor; Rumph. Amb. 5. 451. tab. 158.) "Leaves heart-shaped, oblong, acuminate; peduncles cymous; fruit nodding." *Stems* long, slender, cylindrical, almost smooth. *Leaves* four or five inches long, alternate, petioled, nerved, even-surfaced, slightly sinuate. *Peduncles* axillary, about the length of the petioles, branched about the middle into a cyme. *Calyx-leaves* egg-shaped, obtuse. *Corollas* long, not very open. *Stigma* capitate, two lobed. A native of the East Indies. 70. *C. umbellatus*. Linn. Sp. Pl. 13. Mart. 18. Deffr. 63. Lam. 2062. Willd. 45. (*C. luteus* polyanthus; Plum. Am. 88. tab. 103. Sloan. Jam. 53.) "Leaves heart-shaped; petioles stipuleous at the base; peduncles umbelled." *Root* perennial. *Stem* herbaceous, cylindrical, filiform, stiff, subdivided, pubescent. *Leaves* above two inches long, and as broad at the base, deeply heart-shaped, lanceolate, somewhat sinuate, entire, dark green, hoary underneath; petioles three inches long, with two stipules at the base a little decurrent on the stem. *Flowers* yellow; peduncles three

inches long or more; partial peduncles three quarters of an inch long, three-flowered; each flower on a pedicel longer than the partial peduncles; two of the calyx-leaves a little shorter than the rest; stigma bifid, globular. *Capsule* two-celled. *Seeds* one or two in each cell, covered with a velvety down. A native of the West Indies. 71. *C. multiflorus*. Mart. 69. "Leaves heart-shaped, smooth; peduncles many-flowered. *Seeds* villous, ferruginous. *Root* annual. *Stems* eight or ten feet high, slender. *Leaves* shaped like those of *C. sepium*. *Flowers* purple, on rather long peduncles, growing in bunches. *Capsules* trigonous, three-celled, with one seed in each cell. A native of Jamaica. Linnæus quotes Plukenet's Alm. tab. 167. 1. for the preceding species; Miller for the present. 72. *C. tuguriorum*. Mart. 73. Willd. 46. Forst. Prod. 35. "Leaves cordate-arrow-shaped, acute; stem angular; peduncles tetragonal, one-flowered." A native of New-Zealand. 73. *C. bufalinus*. Mart. 77. Lour. Coch. 109. "Stem shrubby; leaves cordate-arrow-shaped, smooth; peduncles many-flowered; anthers spiral." *Stem* large, shrubby, branched, smooth. *Leaves* alternate, petioled. *Flowers* yellow, large, campanulate; anthers filiform. *Capsule* two-celled, with one seed in each cell. A native of the woods of Cochinchina. 74. *C. cordifolius*. Willd. 47. Thunb. Prod. 35. "Leaves heart-shaped, hastate, toothed; peduncles bifid-umbelled." A native of the Cape of Good Hope. 75. *C. roscus*. Mart. 71. Houff. MSS. "Leaves heart-shaped, acuminate; peduncles two-flowered." *Root* annual. *Stem* seven or eight feet high. *Leaves* on very long petioles. *Flowers* large, of a fine rose colour, on long peduncles. *Seeds* large, covered with a fine down. A native of Jamaica, cultivated by Miller. 76. *C. bifidus*. Mart. 103. Willd. 48. Vahl. Symb. 3. 30. (*C. laevis* mas; Rumph. Amb. 5. 431.) "Leaves heart shaped, oblong, acuminate, very soft underneath; peduncles bifid, many-flowered." β *laevis* minor; Rumph. 5. 431. tab. 158. "Leaves heart-shaped, lanceolate-oblong, smooth." *Stem* villous. *Leaves* from two to three inches long, an inch wide at the base, mucronate; petiole one-third of the length of the leaf, hoary. *Peduncles* axillary, solitary; pedicels numerous, somewhat umbelled, oblong, ferruginous, deciduous, with minute scales at the base instead of bractes. *Calyx-leaves* pubescent at the base, rounded at the tip, equal. *Corolla* almost funnel-shaped, three times the length of the calyx, with five slender villous lines on the outside; lobes acute, bearded at the tip. *Stigma* capitate, two lobed. *Capsule* egg-shaped, striated, smooth. It has the habit of *C. umbellatus*, but has smaller narrower leaves. The variety differs only in the fineness, and its narrow leaves. 77. *C. malabaricus*. Linn. Sp. Pl. 14. Mart. 19. Deffr. 68. Lam. 2067. Willd. 49. (Katta-kelngu; Rheed. Mal. 11. 105. tab. 51.) "Leaves heart shaped, smooth; stem perennial, villous." *Root* perennial. *Stem* somewhat woody, cylindrical, weak, villous. *Leaves* alternate, acute, quite entire; petioles reddish, thicker than the stem. *Flowers* yellowish white, with a deep purple base; peduncles axillary, solitary, cylindrical; bractes narrow, situated near the calyx; calyx five-leaved; leaves acute, three outer ones larger; corolla campanulate, open, villous on the outside; stigma capitate; two-lobed. A native of the coast of Malabar. 78. *C. caelestis*. Mart. 74. Lam. 2112. Willd. 50. Forst. Flor. Aust. 77. "Leaves heart-shaped, very acuminate, pubescent; peduncles elongated, umbellate-trifid." A native of the island of Tanna in the South Seas. 79. *C. canariensis*. Linn. Sp. Pl. 15. Mart. 20. Deffr. 65. Lam. 2064. Willd. 51. Comm. Hort. 2. 101. tab. 51. Pluk. Alm. 114. tab. 325. fig. 1. "Leaves heart-shaped, acute, somewhat tomentous;

soft;

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foft; peduncles axillary, about three-flowered, rather long."

Root perennial. *Stems* woody, twenty feet high or more, cylindrical, a little branched, woolly. *Leaves* alternate, not deciduous, whitish underneath, on short tomentous petioles. *Flowers* purple-violet or pale blue, sometimes white; peduncles axillary, longer than the petioles, tomentous; pedicels three, rarely five or six, short, intermingled with filiform bractes; calyxes very villous, with five deep acute segments; corollas a little villous on the outside; border almost flat; stigmas bihd, filiform. A native of the Canary Islands. 80. *C. pannifolius*. Salisb. Par. Lond. tab. 20. "Stem angular; leaves hastate-wedge-shaped, flaggy, with hairs on both sides; peduncles two or three-flowered; tube of the corolla a line and half long; segments somewhat mucronate; pericarp tender, hairy." *Leaves* pale green, halberd-shaped, very hairy on both sides, like a piece of woollen cloth. *Flowers* pale purple, with a darker base; bractes narrow, attenuated; calyx hairy; margin of the corolla and the wedge-shaped folds of its border pubescent; filaments white, covered with a glandular pubescence towards the bottom; anthers blue; nectary yellow, with a whitish margin; style white, about three lines long; stigmas white, longer than the style, spreading out wide, quite linear, obtuse. *Capsule* two-celled. *Seeds* two in each cell. Raised from seeds received from Lisbon by Messrs. Lee and Kennedy. 81. *C. ferrugineus*. Willd. 52. Vahl. *Ecol.* 1. 17. "Ferruginous-downy; leaves heart-shaped, acute; peduncles axillary, four-flowered." *Root* perennial. A native of South America. 82. *C. muricatus*. Linn. Mant. 44. Mart. 21. Defr. 73. Lam. 2072. Willd. 53. "Leaves heart-shaped; peduncles thickened, and, as well as the calyxes, even-surfaced; stem muricated." Resembling *C. purpureus*, but the stem has a very even surface, with harmle's prickles scattered over it. *Root* annual. *Flowers* purple; peduncles often two-flowered; corolla more funnel-shaped than that of *C. purpureus*. Distinct from *ipomoea bona nox*, a native of Surat; introduced into England by Dr. Solander; flowering in July and August. 83. *C. anceps*. Linn. Mant. 43. Mart. 22. Willd. 54. "Leaves heart-shaped; stem keeled on both sides." *Stem* smooth, winged from leaf to leaf with two decurrent membranes. *Leaves* three inches long, smooth, veined, obtuse, quite entire; petioles nearly the length of the leaf; peduncles axillary, the length of the petioles, thicker, four or five-flowered, villous; pedicels thickened, somewhat umbelled, villous; bractes two, at the base of the calyx, broad, egg-shaped, membranous, mucronate, villous, deciduous; two outer calyx-leaves egg-shaped, villous on the outside, smooth within, mucronate; inner ones only half the size, oblong; corolla twice as long as the calyx, bell-shaped; stigma capitate. A native of Ceylon and Java. 84. *C. triquetra*. Mart. 104. Willd. 54. Vahl. Symb. 3. 30. "Leaves heart-shaped, acute, somewhat villous; peduncles many-flowered; stem three-keeled." *Stem* pubescent. *Leaves* two inches long and more; petiole villous, shorter than the leaf. *Peduncle* the length of the leaves, three or five-flowered; lateral pedicels often two-flowered; middle one one-flowered, shorter, gradually thickened; bractes at the base of the pedicels, egg-shaped, concave, tender, acute, mucronate, coloured, pubescent, deciduous; two outer calycine leaves resembling bractes, egg-shaped, acute, mucronate, silky; inner ones shorter, smooth, rounded at the tip; stigma capitate. Nearly allied to the preceding, but the leaves are not obtuse, and the rings on the stem much narrower. A native of the island of Santa Cruz. 85. *C. Turpethum*. Linn. Sp. Pl. 17. Mart. 23. Defr. 86. Lam. 2084. Willd. 56. (*Turpethum*; Bauh. Pin. 149. *C. zeylanicus alatus*; Herm. Lugdb. 177.

tab. 178, 179.) "Leaves heart-shaped, angular; stem membranous, quadrangular; peduncles many-flowered."

Root perennial, about an inch thick, little branched, striking deep into the ground, throwing out thick fleshy tubers, abounding in a milky juice, which soon hardens into a resinous substance when exposed to the air. *Stems* woody and reddish near the bottom, slender, with four decurrent wings, branched. *Leaves* alternate, crenulate, soft, clothed with a thin whitish down, slightly mucronate; petioles shorter than the leaves, winged, channelled. *Flowers* white, resembling those of *C. sepium*; peduncles longer than the petioles, axillary, solitary, triid; pedicels one or two-flowered; bractes two, egg-shaped, at the base of the calyx; two outer calyx-leaves egg-shaped, villous; three inner ones smooth; anthers spiral; stigma capitate, two-lobed. *Capsule* membranous, globular-depressed, two-celled. *Seeds* one or two in each cell, black, angular on one side. A native of Malabar, Ceylon, the Society and Friendly Isles, and the new Hebrides. For an account of the medicinal qualities of the root, see TURBITH. 86. *C. grandiflorus*. Linn. jun. Sup. 136. Mart. 24. Defr. 14. Lam. 2013. Jacq. Hort. 3. tab. 69. (Munda-valli; Rheed. Mal. 11. 103. tab. 50.) "Leaves cordate-egg-shaped, rather obtuse, quite entire; peduncles generally two-flowered; calyxes coriaceous; stem and petioles pubescent." Linn. jun. "Leaves heart-shaped, acute, on long petioles; peduncles short, one-flowered; corollas very large, funnel-shaped." Lam. *Root* perennial. *Stem* woody at the base, cylindrical, branched, smooth, about twelve feet high. *Leaves* large, with rounded lobes, smooth. *Flowers* very white, sweet-scented. A native of the East and West Indies. 87. *C. speciosus*. Linn. Sup. 137. Mart. 26. Willd. 58. (*C. nervosus*; Defr. 87. Lam. 2085. Burm. Ind. tab. 20. Samudra-ffogam; Rheed. Mal. 11. 125. tab. 61.) "Leaves heart-shaped, tomentous-silky underneath; peduncles longer than the petioles, umbelliferous; calyxes acute." Hort. Kew. *Root* perennial. *Stem* woody at the bottom, pubescent, branched; branches clothed with a thick white cottony down. *Leaves* alternate, large, acute, quite entire, nerved underneath; petioles and peduncles tomentous. *Flowers* purplish, more than two inches long; pedicels five or six, very short; bractes elliptical, longer than the calyx; calyxes small, deeply divided into five egg-shaped segments. A native of the East Indies. 88. *C. trinervius*. Mart. 27. Defr. 16. Lam. 2015. Willd. 59. Thunb. Flor. Jav. 85. "Leaves heart-shaped, oblong, smooth, three nerved; stem cylindrical; peduncles one-flowered." *Stem* filiform, simple, smooth. *Leaves* about an inch long, opposite, acuminate, quite entire, paler underneath; petioles linear, smooth, half an inch long. *Flowers* purplish; peduncles axillary, solitary, or in pairs, very short; segments of the calyx almost bristle-shaped, smooth, half the length of the corolla; stigmas capitate, two-lobed. A native of Japan. Desfontaines observes, that the singularity of the opposite leaves renders the genus dubious. 89. *C. pellatus*. Linn. Sp. Pl. 16. Mart. 28. Defr. 88. Lam. 2086. Willd. 60. Rumph. Am. 5. tab. 157. "Leaves target-shaped; peduncles many-flowered." *Stem*, according to Rumphius, sometimes as thick as the human thigh, and climbing to the top of the highest trees. *Leaves* alternate, large, somewhat acute, smooth; petioles rather long, zig-zag. *Flowers* white or faint purple, bell-shaped, twice the length of the calyx; peduncles axillary, solitary; calyx-leaves egg-shaped, smooth. A native of Amboina. 90. *C. Julapa*. Linn. Mant. 43. Mart. 29. Defr. 13. Lam. 2112. Willd. 61. Woodv. Med. Bot. tab. 21. Lam. III. tab. 104. fig. 2. (*Bryonia mechoacanana nigricans*; Bauh. Pin. 298.) "Leaves

egg-shaped, somewhat heart-shaped, obtuse, obsoletely repand, villos underneath; peduncles one-flowered." Hort. Kew. *Root* perennial, thick, blackish on the outside, whitish within, abounding in a milky juice. *Stems* numerous, herbaceous, ten or twelve feet high. *Leaves* smooth, different in shape, lower ones triangular, almost heart-shaped; upper ones more oblong and acute; petioles long. *Flowers* reddish on the outside, dark purple within (yellow in the Kew Garden); peduncles axillary, solitary. *Seeds* covered with a very white cottony down. A native of South America, about Xalapala, between La Vera Cruz and Mexico. For its medicinal qualities, see JALAP. 91. *C. macropermus*. Willd. 62. (Mouroucoa violacea; Aubl. guian. 1. 142. tab. 54. Juff. 133.) "Leaves elliptical, acute, smooth; corollas flat; capsules two or three-celled, with one seed in each cell." *Root* perennial. *Flowers* silver-shaped. *Seeds* almost an inch and half thick. A native of Guiana. 92. *C. tenellus*. Willd. 63. Defr. 78. Lam. 2076. Pluk. Almag. 114. Phyt. tab. 166. fig. 4. "Leaves oblong-elliptical, obtuse, mucronate, nearly sessile; peduncles longer than the leaf, generally two-flowered." One of the least species of the genus. *Stem* filiform, a little villos. *Leaves* alternate, scarcely an inch long, and about three lines broad, entire. *Peduncles* axillary, solitary; bractes two, awl-shaped, at the base of the pedicels; corollas small, bell-shaped. A native of Carolina and Virginia. 93. *C. Barbudensis*. (C. glaber Mill. Mart. 68.) "Leaves ovate-oblong, smooth; peduncles one-flowered; calyx ten-cleft." *Root* annual. *Stems* eight or ten feet high. *Flowers* purple, large, on long slender peduncles. Sent to Miller from the island of Barbuda. 94. *C. frivexus*. Linn. Mant. 43. Defr. 77. Lam. 2075. (C. mollis; Burm. Ind. 44. tab. 7.) "Leaves lanceolate-elliptical, tomentous-filky underneath; peduncles about three-flowered; calyx short, hairy." *Stems* shrubby, smooth. *Leaves* alternate, petioled. *Peduncles* axillary, solitary, about the length of the petioles. *Calyx*-leaves egg-shaped, whitish, silky. *Tube* of the corolla narrow to the top of the calyx, afterwards widened and terminating in a purple border, covered on the outside with white hairs. *Capsules* downy. A native of the island of Java. 95. *C. tomentosus*. Linn. Sp. Pl. 18. Mart. 31. Defr. 93. Lam. 2091. Willd. 65. Sloan. Jam. 55. hilt. 1. 134. tab. 98. fig. 2. Pluk. alm. 115. tab. 167. fig. 4. "Leaves three-lobed, tomentous; stem lanuginous." *Stem* twenty feet high, cylindrical, whitish. *Leaves* alternate, resembling the older leaves of ivy; petioles three quarters of an inch long. *Flowers* purple; peduncles axillary, solitary, many-flowered, a quarter of an inch long; corollas bell-shaped. *Capsule* spheroidal, acuminate, two-celled. *Seeds* one in each cell, black. A native of Jamaica. 96. *C. quinquelobus*. Mart. 105. Willd. 66. Vahl. Symb. 3. 31. "Leaves sagittate-egg-shaped, attenuated, smooth, crenate, somewhat repand; peduncles about five-flowered." *Stem* slightly pubescent, cylindrical, branched. *Leaves* tender, hoary; petiole shorter than the leaf. *Peduncles* the length of the leaves, pubescent. *Pedicels* in threes, umbelled, lateral ones in the greater number bifid, but on the peduncles near the top all simple, bractes two, linear, at the base of the lateral pedicels; calyx-leaves oblong, obtuse, mucronate, somewhat villos; corolla twice as long as the calyx; lobes bearded at the tip; stigma bifid. Supposed to be a native of the isle of Bourbon. 97. *C. crenatus*. Defr. 74. Lam. 2073. Jacq. ic. rar. 2. tab. 315. (C. Hermannii; Willd. 67. L'Hérit. Rarp. 1. 67. tab. 33.) "Tomentous; leaves cordate oblong obtuse, somewhat repand; peduncles longer than the petiole; border of the corolla acute." β . *erofus*. "Leaves less elongated, appearing bitten here and there at the edge, clothed with a reddish down; flowers larger."

Whole plant whitish, soft to the touch. *Root* perennial, spindle-shaped. *Stems* about three feet long, not much branched. *Leaves* alternate, on short petioles. *Flower* white, small; peduncles long, zig-zag, with two small awl-shaped bractes near the top, often two-flowered; border of the corolla slightly crenulate, with five acute divisions. Found in Peru by Dombey. The variety β found at Monte Video by Commerfon. 98. *C. althæoides*. Linn. Sp. Pl. 19. Mart. 32. Defr. 97. Lam. 2095. Willd. 69. Flor. Gr. tab. 194. Bauh. Pin. 295. Moris. hilt. 2. 13. tab. 3. fig. 10. (C. peregrinus, folio betonica; Tourn. 85.) "Lower leaves heart-shaped, sinuated; upper ones pinnatifid, somewhat palmate; peduncles generally two-flowered." Lam. β . *C. Bryoniaefolius*; Bot. Mag. 943. *Root* perennial. *Stems* a foot and half or two feet high, farinaceous, weak, cylindrical. *Leaves* alternate. *Flowers* reddish, large, very open, almost entire; peduncles longer than the leaves, with two filiform bractes above the middle. The whole plant clothed with numerous hairs, so as to give it a silky aspect. A native of the Levant, Africa, and the South of Europe. The variety β is a much more robust plant; its leaves have no silkiness or silvery whiteness; its flowers are larger and deeper coloured. Raised from seeds procured from China, by Isaac Swainton, eq. in 1802. 99. *C. tenuissimus*. Smith Prod. Flor. Græc. p. 134. Pl. Græc. tab. 195. (C. althæoides β . Linn. γ . Defr. C. althæoides; Bot. Mag. 359? *C. argenteus* elegantissimus foliis tenuiter incisis; Tourn. Iult. 85.) "Leaves pedate, silky, remarkably shining; linear lobes obtuse; root-leaves cordate-ferrated; peduncles one-flowered." Found by Dr. Sibthorp in Candia, about Athens and in the island of Zante. 100. *C. alceifolius*. Lam. 2096. "Hirsute; all the leaves deeply divided, somewhat palmate; peduncles few-flowered, longer than the leaves." A native of the Cape of Good Hope. 101. *C. cairicus*. Linn. Sp. Pl. 21? Mart. 53. Willd. 70. Bot. Mag. 699. (C. foliis lanceolatis vel quinquefoliis; Bauh. Pin. 295. Barrel. icon. 319 and 320. *C. ægyptius*; Velling Ægypt. 73. tab. 74. Ipomæa palmata; Forst. Desc. 43.) "Stem shrubby; leaves palmate-cleft, mucronate, smooth, quite entire, but often minutely crenate; hinder leaflets two-lobed: stipules palmate; calyxes even surfaced; corollas ribbed underneath; divisions acute." *Root* perennial. *Stem* with many slender branches. *Leaves* alternate; segments lanceolate; petioles the length of the leaves, with two leaf-like stipules at the base. *Flowers* violet-purple, large; peduncles the length of the petioles, axillary, from one to three-flowered; pedicels bracteated about the middle, with two small, egg-shaped, acute scales; calyx five-leaved; leaves short, egg-shaped, acute, concave, smooth, very shining either side; tube of the corolla nearly cylindrical, contracted as far as the calyx; border spreading; filaments unequal; anthers somewhat arrow-shaped; stigma divided into furrowed lobes. A common ornamental plant in the gardens of Egypt. 102. *C. quinquelobus*. Mart. 107. Willd. 71. Vahl. Symb. 3. 32. "Leaves palmate-quinquelobed, finely ferrulated, obtuse, smooth; axils tomentous; peduncles one-flowered; stem smooth." *Stem* cylindrical. *Leaves* nerved, finely veined, mucronate; middle lobe scarcely an inch long, lateral ones smaller, and narrower; petioles an inch long, filiform; stipules two, axillary, petioled, similar in structure to the leaves. *Flowers* purple; peduncles the length of the petioles, filiform, without bractes; calyx-leaves oblong, obtuse, smooth; stigma capitate, two lobed. A native of the island of Santa Cruz. 103. *C. egypticus*. Linn. Mant. 559. Mart. 34. Willd. 72. (C. stipulatus; Defr. 26. Lam. 2025. *C. foliis laciniatis*, vel quinquefoliis; Bauh. Pin. 295. Barrel. icon. 319.) "Leaves pedate, ferrated; peduncles eniform,

one or two-flowered; calyxes mucronated." *Root* annual. *Stem* angular, smooth, and even-furfaced. *Leaves* smooth, deeply divided almost to the base; segments five, lanceolate, serrated or unequally toothed, mucronate by the middle nerve; lateral ones feebly shorter; two external ones often bifid. Petioles long, channelled, scabrous underneath; stipules similar to the leaves, but smaller. *Flowers* small, white; peduncles axillary, compressed, longer than the petioles, thickened upwards, with two bractes above the middle. A native of the Levant. 104. *C. laciniatus*. Deffr. 27. Lam. 2026. "Leaves finely laciniated, somewhat bipinnated; peduncles one or two-flowered; calyx of the fruit nearly naked." About a foot and half high, sometimes perfectly smooth, sometimes clothed with fine silky hairs. *Stems* slender, cylindrical. *Leaves* alternate, petioled. *Flowers* white; peduncles slender, longer than the petioles, axillary, solitary, thickened upwards; bractes two, about a line and half long, linear, acute, situated near the top of the peduncles; calyx-leaves egg-shaped, obtuse, mucronate, a little scarious, sometimes rather villous, especially at the time of flowering; corollas campanulate, twice the length of the calyxes. *Seeds* black, naked. A native of South America, about Monte Video. Specimen in the herbarium of Commerfon. There is a variety in the herbarium of Thouin very villous in all its parts, especially the calyxes, with the lower leaves less deeply divided, than the upper. 105. *C. vitifolius*. Linn. Mant. 203. Mart. 35. Deffr. 99. Lam. 2099. Willd. 73. Burm. Ind. 45. tab. 18. fig. 1. Pluk. alm. 135. tab. 25. fig. 3. "Leaves palmate-five-lobed, smooth, toothed; stem hairy; peduncles many-flowered." *Stems* villous. *Leaves* alternate, petioled, divided almost to the middle, hoary underneath. *Peduncles* axillary, solitary, hairy, separating into two principal branches; calyxes villous; corollas campanulate, orange; stigmas two, globular. A native of the East Indies. 106. *C. diffectus*. Linn. Mant. 204. Mart. 36. Deffr. 23. Lam. 2022. Willd. 74. Jacq. ob. 2. 4. tab. 28. Hort. 2. tab. 159. "Leaves palmate, seven-cleft, dentate-sinuated, smooth; stem hairy; peduncles one-flowered." *Root* annual. *Stem* much branched, cylindrical. *Leaves* deeply palmate, almost digitate, segments acute; petioles from one to two inches long, hairy. *Flowers* white, open; peduncles shorter than the leaves, axillary, solitary, hairy at the base; calyx oblong, smooth and even-furfaced; stigma capitate, two-lobed. A native of America. 107. *C. mucronatus*. Mart. 75. Willd. 75. Forst. prod. 79. "Leaves palmate-pedate; lobes ciliate, mucronate; peduncles one-flowered." A native of the Isle of Tanna in the south seas. 108. *C. macrocarpus*. Linn. Sp. 20. Mart. 57. Deffr. 24. Lam. 2023. Willd. 76. (*C. polyphyllus*, flore & fructu purpureis maximis; Plum. Cat. 1. MSS. 2. tab. 56. Burm. Amer. 8. 50. tab. 91. fig. 1.) "Leaves palmate, pedate, five-cleft; peduncles one-flowered." *Root* annual, thick, fleshy, milky. *Stems* long, about the thickness of a goose-quill. *Leaves* deeply palmate, almost digitate, two outer segments less deeply divided, thin, smooth, on rather long petioles. *Flowers* purple; peduncles a little longer than the petioles, axillary, thickened upwards, jointed and bent above the middle, longitudinally winged and curled; calyx-leaves concave, roundish; corollas campanulate, large, slightly sinuated. *Capfule* membranous, orbicular, angular, about the size of a walnut. *Seeds* round, black, villous, about the size of a hazel-nut. A native of Martinico, where its root is esteemed purgative. 109. *C. paniculatus*. Linn. Sp. Pl. 23. Mart. 58. Deffr. 100. Lam. 2100. Willd. 77. (*Pal modeca*; Rheed. mal. 11. 101. tab. 49.) "Leaves palmate; lobes seven, egg-shaped, acute, quite entire; peduncles panicled." *Root* perennial, about a foot and half long,

thick, tuberous. *Stems* slender, even-furfaced. *Leaves* alternate, petioled, rarely three or five-lobed. *Flowers* very open, pale red on the outside, purple within, deeper coloured at the bottom; peduncles axillary, solitary, reddish, a little curved; calyx-leaves rounded, appearing blistered, dull-red, coinivent after the fall of the flower. A native of the coast of Malabar. 110. *C. palmatus*. Mart. 66. (*C. pentaphyllos*, folio glabro dentato, viticulis hirsutis, Plum. Cat. *C. pentaphyllus* *β*. Serpens. Linn. "Leaves palmate; lobes seven, sinuate-pointed; peduncles one-flowered; calyxes very large, spreading." Stem twenty feet high, dividing into several smaller ones. *Flowers* large, purple, on long peduncles. *Capfules* large, roundish, three-celled. *Seeds* one in each cell. A native of La Vera Cruz in New Spain, whence feeds were sent to Miller by Dr. Houffon. 111. *C. aggregatus*. Mart. 78. Lour. Cochinch. 109. "Leaves palmate, seven-lobed, hairy; flowers aggregate." *Stem* perennial, cylindrical, extremely hairy, branched. Lobes of the leaves egg-shaped, rather acute, quite entire. *Flowers* white, large, on a long, solitary, axillary peduncle; common calyx (involucre?) twelve-leaved, bell-shaped; leaves ovate-oblong, unequal, hairy, containing about ten feffile florets; proper calyx-leaves lanceolate, hairy, upright; corolla tubular, five-cleft; segments acute, hairy, closed; anthers bifid at the base; style longer than the corolla; stigma capitate. *Capfule* two-celled, two-seeded. *Seeds* round on one side, angular on the other. A native of Cochinchina. 112. *C. tuberculatus*. Deffr. 25. Lam. 2024. "Leaves digitate, somewhat pedate, seven-cleft, smooth; petioles rough with tubercles; peduncles one-flowered." *Stems* several, two or three feet high, slender, cylindrical, fomentous. *Leaves* alternate; segments egg-shaped, entire, lanceolate, slightly obtuse, mucronate; petioles about two inches long, channelled, tubercled on their convex side, stipules digitate. *Flowers* large, purple; peduncles axillary, thickened upwards; furnished near the bottom with two small glandular points, which rise from a kind of knot; calyxes deeply divided; segments egg-shaped, obtuse, somewhat scarious at the edges; corollas funnel-shaped, almost campanulate, very open; stigma two-lobed. Found in South America, about Monte Video, by Commerfon. Cultivated in the Botanic garden at Paris. 113. *C. macrorhizos*. Linn. Sp. Pl. 22. Mart. 39. Deffr. 106. Lam. 2107. Willd. 78. (*C. coccineus* heptaphyllus, radice crassissima; Plum. Cat. 1. MSS. 2. tab. 58. Burm. Amer. 79. tab. 90. fig. 1.) "Leaves digitate in fevens, quite entire; stem smooth; peduncles many-flowered." *Root* very thick, tuberous, sweet-tafted, abounding in a milky juice, esteemed purgative. *Stems* fermentous, deep green, about the size of a finger, branched, climbing to the top of the highest trees. *Leaves* on long purplish petioles, bright green; segments about three inches long, oval-lanceolate, acute, slightly sinuated, smooth; mid-rib purple underneath. *Flowers* large, scarlet; peduncles axillary, solitary, short, slender; corollas bell-shaped, tubular at the base; border open, slightly crenate; stigma capitate. A native of St. Domingo. 114. *C. pentaphyllus*. Linn. 24. Mart. 41. Deffr. 101. Lam. 2101. Willd. 82. (*C. pentaphyllos* hirsutus; Plum. Cat. 1. MSS. 2. tab. 54. *C. americanus* pent. & heptaphyllus major; Herm. lugbd. 183. tab. 185. Tourm. 84. *Ipomæa* pentaphylla; Jacq. Col. 2. 297. ic. rar. 2. tab. 319.) "Very hairy; leaves digitate, in fives; leaflets egg-shaped, acuminate; peduncles many-flowered." *Stems*, petioles, peduncles, and calyxes rough with numerous long, stiff, reddish hairs. *Root* annual, long, slender, fibrous. *Stem* generally fingle, sometimes thirty-eight feet high, cylindrical, branched, about the size of the human little finger, cinereous brown, woody and smooth at the base,

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reddish above, green near the top. *Leaves* alternate, petioled; segments quite entire, clothed on both sides with fine decumbent hairs. *Flowers* yellowish white; peduncles about four inches long, axillary, solitary, cylindrical, dichotomous, often furnished with small bracts under the divisions; pedicels very short; calyx-leaves acute, two outward ones longer, more hirute, and of a purplish colour; corolla campanulate, twice the length of the calyx, slightly five-lobed; stigma capitate, two-lobed. *Capsule* two-celled. *Seeds* two in each cell. A native of South America, cultivated in the botanic garden at Paris. Miller received seeds from Cartagena in New Spain, which he cultivated under the name of *C. pentaphyllus*, and which differs from the above in being perennial, and having only two purple flowers on each peduncle. 113. *C. quinquefolius*. Linn. 25? Mart. 40. Dfr. 102. Lam. 2102. Willd. 79. Swartz. 63. Pluk. Alm. 116. tab. 167. fig. 6. "Leaves digitate, smooth, toothed; peduncles even-furcated." Linn. "Leaves digitate, smooth, toothed; stem hispid; peduncles many-flowered." Lam. *Stems* very long, slender, cylindrical, hispid, branched. *Leaves* alternate, petioled, smooth, bright green; segments lanceolate; middle one largest, near two inches long, about half an inch broad. *Flowers* white; peduncles longer than the leaves, slender, axillary, solitary, somewhat villous, dichotomous, from three to six-flowered, with small awl-shaped bracts at the divisions; calyx smooth, segments oblong, the three inner ones larger; corollas campanulate, five-toothed. *Capsule* four-celled. Dfr. Two celled, two-seeded. Swartz. A native of the West Indies. The *C. quinquefolius* of Miller seems a different plant. It was raised by him from seeds sent from New Spain, and is thus described. *Stems* thirty feet high or more, woody, with a purple bark. *Leaves* deeply dividid into five sharp-pointed lobes. *Flowers* large, purple; peduncles long, thick, with a bent joint in the middle. *Capsules* round, as large as a middling apple, three-celled. *Seeds* two in each cell. 116. *C. ciffoides*. Lam. Ill. 2103. "Hirute; leaves digitate, in fives, toothed; peduncles about three-flowered, shorter than the leaf; calyx hispid. A native of Cayenne. 117. *C. venosus*. Mart. 108. Dfr. 104. Lam. 2105. Willd. 80. Vahl. 3. 32. "Smooth; leaves digitate, in fives; leaflets petioled, ovate acuminate; common petioles with tendrils at the base." Lam. "Quite smooth; leaves digitate, in fives, quite entire; peduncles many-flowered." Vahl. *Stems* slender, cylindrical. *Leaves* petioled; leaflets acute at the base (rather than petioled), veined; middle one larger than the others, about two inches long; (common petioles with a shorter tendril at the base. Dfr. Peduncles with an ovate-heart-shaped, acuminate, solitary leaf at the base. Vahl. Is it not properly a stipula, which, as the peduncles are axillary, may be thought by one observer to accompany the petiole (by another, the peduncle?) *Flowers* in a corymb; peduncles solitary, dichotomous near the top, with small awl shaped bracts; calyxes short; segments egg-shaped, two larger; corollas funnel-shaped, tube nearly of the same diameter throughout, not gradually enlarged to the top; border but little widened; stigmas capitate, slightly two-lobed. Sent by Commerçon from the Isles of France and Bourbon. On a strict comparison it appears certain, that Desfontaineux and Vahl have described the same plant, and have given it the same name, without any knowledge of each others specimens. 118. *C. glaber*. Dfr. 103. Lam. 2104. Willd. 81. Aul. guan. 138. tab. 53. "Leaves digitate, in fives; leaflets ovate-lanceolate, quite entire, smooth; peduncles many-flowered." *Stems* numerous, long, cylindrical, flexible. *Leaves* alternate. *Flowers* white; peduncles axillary, solitary; pedicels long; calyx deeply divided;

segments long, firm, smooth, acute; tube of the corolla rather long; border open, with five rounded lobes; stigmas two, long, acute. A native of Cayenne. The whole plant is milky. 119. *C. eriopermus*. Dfr. 105. Lam. 2106. "Shrubby; leaves digitate; leaflets about eight, linear, very narrow; seeds very hirute." Whole plant, except the seeds, smooth. *Stems* barmentous, woody, cylindrical. *Leaves* about an inch long, including the petioles. *Flowers* purple, axillary, in small dichotomous racemes, shorter than the leaves; calyx-leaves obtuse, not a quarter of the length of the flowers; corollas cylindrical. *Capsules* egg-shaped, even-furcated, twice the length of the calyx, four-valved, two-celled. *Seeds* two in each cell; covered on their convex side with numerous, long, decumbent, whitish, silky hairs, directed towards the base. A native of St. Domingo. 120. *C. tenuifolius*. Willd. 109. Vahl. Symb. 3. 33. "Leaves digitate, in fives; leaflets linear; peduncles four or five-flowered." Whole plant smooth. *Stem* angular. *Leaves* petioled; leaflets very narrow, entire. *Peduncles* axillary, short; upper ones sometimes one-flowered. *Calyx* smooth, with oblong leaflets; stigma acute.

** *Stems* not twining.

121. *C. ficulus*. Linn. Sp. Pl. 26. Mart. 44. Dfr. 4. Lam. 2003. Willd. 84. Flor. Græc. tab. 194. (*C. ficinus* minor. flore parvo auriculato; Boec. Sic. 89. tab. 48. Tourn. Init. 83.) "Leaves cordate-egg-shaped; bracts lanceolate; peduncles longer than the petiole." Root annual. *Stems* one or two feet high, cylindrical, nearly simple, sometimes a little twining, but generally not at all. *Leaves* entire, acute. *Flowers* small, bluish; peduncles axillary, curved downwards near the top. A native of Sicily. 122. *C. poters*. Dfr. 33. Lam. 2031. "Filiform, somewhat erect; leaves linear, mucronate; peduncles spreading horizontally, longer than the leaf." Whole plant slightly villous. *Stems* about a foot and half high, very slender, little or not at all twining, cylindrical, somewhat branched. *Leaves* about an inch long, scarcely two lines broad, alternate, almost sessile, sometimes one or two-toothed. *Flowers* on long, axillary, simple peduncles, with two egg-shaped lanceolate bracts a little below the calyx; calyx-leaves egg-shaped, acute, half the length of the corolla. A native of Carolina. 123. *C. pentapetaloides*. Mart. 45. Willd. 85. Vahl. 2. 36. "Leaves lanceolate, obtuse, naked, linear; branches declining; flowers solitary, five-cleft half way down." Resembling *C. tricolor*, but smaller. *Leaves* somewhat petioled. Root annual. *Flowers* axillary, on short peduncles; bracts generally two obscure scales. *Flowers* bluish, with a yellow bottom; segments acute. A native of Majorca, and the islands of the Archipelago. 124. *C. ciliatus*. Roth. Catal. Bot. 2. 22. Ann. Bot. 2. 12. "Leaves oblong, wedge-shaped, emarginate, ciliated; stem prostrate; capsules very hairy." 125. *C. evolutooides*. Smith Prod. Flor. Græc. 134. Desfont. Atlant. 1. 176. tab. 49. Flor. Græc. tab. 198. "Leaves spatule-shaped, obtuse, hairy; upper ones embracing the stem; stem declining; flowers solitary, sessile." Root annual. A native of Cyprus. 126. *C. lineatus*. Linn. Sp. Pl. 29. Mart. 46. Dfr. 53. Lam. 2052. Willd. 86. Flor. Græc. tab. 199. (*C. argenteus* angustifolius, umbellatus, partim erectus partim supinus; Tourn. Cor. 1. *C. octafolius* β; Dfr. *C. marina* repens; Bar. Rar. 3. tab. 1132.) "Leaves lanceolate, silky, linear, petioled; peduncles two-flowered; calyxes silky, somewhat foliaceous." Linn. "Tomentous-silky; leaves oblong, obtuse, attenuated at the base, linear; peduncles two-flowered, shorter than the leaf." Lam. Root perennial, creeping,

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ing. *Stems* several, rising among a considerable number of root-leaves, from three to six inches high, weak, zig-zag, slightly angular, villous, a little branched. *Leaves* alternate, sessile, but so much narrowed at their lower extremity as to appear petioled, a little channelled at the base to embrace the stem, nerved; lower ones longer than the others, nearer together, reaching almost to the top of the stem. *Flowers* reddish; peduncles axillary, on the upper part of the stem, solitary, dichotomous near the top, and furnished at the division with two bractes, resembling the leaves in shape and silkiness, and extending a little beyond the calyx; besides these there are sometimes two other small linear bractes, shorter than the calyx; calyxes small; leaflets egg-shaped, acute, silky; corollas middle-sized, half open, villous on the outside. A native of the south of France, and the Levant. 127. *C. spicifolius*. D. fr. 41. Lam. 2039. Barr. Ic. 311. (*C. non convolvulus*; Mant. 29. tab. 140.) "Leaves linear-lanceolate, narrowed at the base, nearly simple; peduncles one-flowered, shorter than the leaf." *Stems* decumbent at the base, then ascending, a little zig-zag. *Leaves* alternate, about three lines long, resembling those of lavender; lower ones the same length as the others. *Flower* rather large; peduncles axillary, scarcely half the length of the leaves; bractes two, linear-lanceolate, situated near the calyx, and a little surpassing it; calyx about one-third of the length of the corolla, with five acute segments; ligmas long, filiform. A native of mountains in Spain. Willdenow thinks this and the preceding the same plant; and they are perhaps nothing more than varieties; but as La Marek and Desfontaux profess to have seen both of them growing in the botanic garden at Paris, in difference to their authority we have kept them distinct. 128. *C. faxatilis*. Mart. 110. Willd. 87. Vahl. Symb. 3. 33. Bar. Ic. 470. Boec. Musf. 2. 79. tab. 70. (*C. lauginifolius*; D. fr. 47. Lam. 2046. *C. argenteus* umbellatus lupinus; Tourn. Infl. 84. Lychnis sylvestris campanulata flore; Bauh. Pin. 206.) "Very hirsute; leaves linear; flowers in terminal heads; calyxes acuminate." *Root* perennial. *Stems* scarcely a foot long, cylindrical, a little branched. *Leaves* about an inch long, thinly set, alternate, sessile, hairy on the young shoots. *Flowers* white, with a slight tint of purple, sessile, eight or ten collected into a head at the extremity of the branches, which are commonly without leaves below to the extent of two inches, surrounded with a sort of involucre consisting of five or six rather broad leaves; each flower surrounded with some small linear bractes; calyxes divided to the base into minute segments, half the length of the corolla. 129. *C. Cneorum* Linn. Sp. Pl. 30. Mart. 47. Willd. 3. Flor. Græc. tab. 200. Bot. Mag. 459. (*C. argenteus*; D. fr. 48. Lam. 2047. *C. argenteus* umbellatus cretus; Tourn. Infl. 84. Morif. Hill. 2. 11. tab. 3. fig. 1. *Cneorum album*, folio argenteo molli; Bauh. Pin. 403. *Dorycnium*; Cluf. Hb. 2. 254.) "Leaves lanceolate, tomentous; flowers umbellic; calyxes hirsute; stem somewhat erect." Linn. "Shrubby, silky; leaves oblong, obtuse; flowers in terminal, capitate umbels; calyx short, somewhat reflex." Lam. *Root* perennial. *Stems* about three feet high, cylindrical, firm, upright. *Leaves* numerous, scattered, about an inch and half long, four or five lines broad, sessile, narrowed at the base, soft, clothed with a fine decumbent, silky, brilliant down. *Flowers* white, tinged with a pale red, on short peduncles; bractes resembling the leaves, but smaller; calyxes about a third of the length of the corolla, short, obtuse, deeply divided, villous; corolla silky on the outside; border rather open. A native of Candia and the islands of the Levant. 130. *C. oleifolius*. D. fr. 49. Lam. 2048. "Shrubby, silky; leaves linear-lanceolate; flowers in terminal capitate un-

bel; calyxes lanceolate." A native of the Levant; nearly allied to the preceding, and scarcely more than a variety 131. *C. linearis*. Willd. 89. Bot. Mag. 289. "Stems erect, shrubby; leaves linear, acute, clothed with silky hairs; flowers terminal, umbellate-panicled; calyxes hairy." Confounded by the English nurserymen with the next species. Most allied to *C. encephali* in having leaves much narrower, more pointed, and less silky. 132. *C. cantabrigiæ*. Linn. Sp. Pl. 31. Mart. 48. D. fr. 46. Lam. 2045. Willd. 90. Jacq. Flor. Ault. 3. tab. 296. (*C. linearis* folio; Bauh. Pin. 295. *C. linearis* folio asurgens; Tourn. Infl. 57. & humilior, 54.) "Leaves linear, acute; stem branched, somewhat dichotomous; calyxes hairy." Linn. "Hairy; leaves linear-lanceolate, acute; stem branched, rather erect; flowers clustered." Lam. *β. C. terrestris*; Linn. Sp. 27. Whole plant clothed with fine whitish hairs, soft to the touch. *Root* perennial. *Stems* about a foot high, cylindrical. *Leaves* two or three lines broad, alternate, sessile. *Flowers* rose-coloured or white, almost sessile, growing two or three together at the end of the stem and branches; bractes linear, acute, resembling the leaves but smaller; calyxes with five acute segments; corollas middle-sized, open, almost flat; ligmas two, filiform. A native of the south of Europe. 133. *C. suffruticosus*. Smith Prod. Flor. Græc. p. 135. Desfont. At, tab. 48. "Leaves linear-lanceolate; stem ascending, villous; peduncles axilary, one-flowered, three times the length of the leaf." *Root* perennial. A native of Barbary and Greece. 134. *C. Amanianus*. D. fr. 40. Lam. 2038. (*C. ramifolius*, cretus, argenteus miuimus; Amm. Ruth. 5. n. 6.) "Silky; leaves linear; peduncles one flowered; bractes long; calyx acute." Whole plant armed with a short silky silvery down. *Root* perennial. *Stems* from four to six inches high, slender, cylindrical, branched, rather erect. *Leaves* alternate, sessile; root-ones not less than half an inch long, narrowed at the base, obtuse; those on the stem and branches longer, acute. *Flowers* campanulate, pale white, starred with purple lines; peduncles filiform, axillary, solitary, nearly the length of the leaves, furnished a little above the middle with two bractes seven or eight lines long, dilating with the leaves only by being opposite; calyx short, with egg-shaped acute segments. A native of Siberia. 135. *C. pilosellofolius*. D. fr. 45. Lam. 2044. Willd. 92. (*C. orientalis*, humifolus, pilosella foliis; Tourn. Cor. 1.) "Leaves lanceolate, sessile, entire; peduncles elongated, many-flowered, loosely branched." *Root* perennial. *Stems* cylindrical, slender, slightly hairy, decumbent. *Leaves* alternate, three or four lines broad; base, especially at the edges, with long separate hairs. *Flowers* small, campanulate; peduncles from four to six-flowered; bractes opposite, small, lanceolate like the leaves, situated at the base of the pedicels; calyx-leaves egg-shaped, acute, villous, half the length of the corolla. A native of the Levant. 136. *C. dorycnium*. Linn. Sp. Pl. 28. Mart. 49. D. fr. 38. Lam. 2039. Willd. 93. Flor. Græc. tab. 201. (*C. ramifolius* incanus, foliis pilosellæ; Tourn. Infl. 84.) "Leaves almost linear, silky; stem shrubby, panicled; calyxes almost naked, obtuse." *Root* perennial. *Stems* a foot and half high, cylindrical, almost smooth, a little zig-zag, much branched, with few leaves, especially towards the top. *Leaves* alternate, sessile, narrow. *Flowers* generally solitary, sessile in the forks of the branches or at their summit, commonly accompanied with one or two small leaves; calyxes very small; corollas campanulate, open, villous on the outside, three or four times the length of the calyxes. A native of the Levant. 137. *C. proflerens*. Willd. 34. Vahl. Ecolg. 1. 18. "Leaves linear, silky underneath; heads of

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flowers terminal, and in the divisions of the branches; bracts egg-shaped, very hirsute on the outside. A native of South America. 138. *C. lanatur.* Mart. 80. Willd. 95. Vahl. Symb. 1. 16. Flor. Græc. tab. 202. (*C. orientalis humilis argenteus latifolius erectus & villosus*; Tournef. Cor. 1. *C. cneorum*; Forsk. *Ægypt.* 63. n. 124. *C. sericeus*; Burm. Ind. 49. tab. 19. fig. 3?) "Leaves lanceolate-linear, tomentous; old branches spinous; flowers capitate, involucred." *Stems* shrubby, erect, branched at the bottom; old branches leafless, barren; flowering branches from the base of the old ones, quite simple, seven inches long or more, erect, cylindrical, pineleaves, rigid, zig-zag towards the end, and covered with a soft shagreen. *Leaves* alternate; lower ones lanceolate, attenuated at the base, sometimes several from the same point at the foot of the branches, unequal; upper ones lanceolate-linear, sessile, acute; floral ones a little broader than the rest; all thickish, veinless, tomentous, but not silky. *Flowers* campanulate, hairy on the outside, the colour of *C. cneorum*; peduncles from almost all the axils, solitary, half the length of the leaf, from six to eight-flowered; pedicels none; involucre six-leaved, the length of the calyx; three outer leaflets egg-shaped, acute; three inner ones lanceolate; all of them, as well as the peduncles and calyxes, extremely hirsute, with long, very soft, shining hairs on the outside, only somewhat hairy within. *Bracts* two beneath each flower; calyx-segments linear; style bifid; stigmas acute. A native of the Lower Egypt and of Mount Sinai. 139. *C. Hystrix.* Mart. 81. Willd. 96. Vahl. Symb. 1. 16. (*C. spinosus*; Forsk. Arab. 106. n. 121.) "Shrubby; leaves oblong; flowers sessile, almost always solitary; branches spinefret." *Stem* rigid, much branched, diffuse; a foot high; branchlets somewhat silky. *Leaves* sessile, feathered, silky, entire, small. *Flowers* small, axillary, hirsute; bracts two, at the base of the calyx, oblong, rather acute, a little broader at the end and relaxed; two outer calyx-leaves oblong, rigid, larger than the others; stigmas two, capillary. A native of Arabia. 140. *C. spinosus.* Linn. jun. Supp. 137. Desf. 36. Lam. 2035. Willd. 97. (*C. fruticosus*; Pall. It. 2. 734. tab. m.) "Shrubby, erect; leaves lanceolate, silky; flowering branchlets spinous." *Root* perennial. *Stem* short, much branched. *Leaves* alternate, sessile. *Flowers* vertical, sessile; calyx-leaves egg-shaped, acuminate, concave, tomentous; three outer ones larger; corollas plaited, five-toothed, tomentous on the outside of the tube, with a reddish border. A native of Russia. 141. *C. Scoparius.* Linn. jun. Sup. 135. Mart. 50. Desf. 51. Lam. 2050. Willd. 98. "Leaves linear, somewhat hairy; peduncles about three-flowered; calyxes silky, egg-shaped, acute; stem shrubby; branches rod-like." The habit of a broom. *Root* perennial. *Stems* cylindrical, quite smooth; branches erect, simple. *Leaves* alternate, distant, short, thin, upright. *Flowers* white, villous on the outside; peduncles alternate, solitary, bracteate. A native of Africa and the Canary Islands. This species and *C. floridus* produce the true rose-wood of the shops. Ventenat suspects that these two may form a separate genus, having a one-celled capsule, which opens at the base and contains a single seed. 142. *C. secundus.* Desf. 41. Lam. 2051. "Tomentous-ferruginous; leaves sessile, lanceolate; heads of flowers thick-set, unilateral, nearly sessile." *Stems* the size of a goose-quill, cylindrical, somewhat zig-zag, but little branched. *Leaves* about an inch long, alternate, cottony on both sides, unilateral on the branches. *Flowers* five or six in a dense head, on very short peduncles, without pedicels, intermingled with bracts which resemble the young leaves, corollas a little villous on the outside. A native of Syria, observed by La Billardiere. 143. *C. Oenotheroides.* Linn. jun. Supp. 137. Mart. 51. Desf. 34. Lam. 2032. Willd. 99. "Shrubby, erect; leaves linear, somewhat hoary; peduncles axillary, solitary, erect, one-flowered, bracteate; calyxes lanceolate, smooth." *Stems* erect, cylindrical, reddish, and somewhat glaucous. *Leaves* about three inches long, narrow, lax. flat. *Flowers* twinned; peduncles short, angular; bracts two, recurved, awl-shaped; calyx-leaves quite smooth, rather spreading, hoary, membranous at the edges; corolla large, funnel-shaped. A native of the Cape of Good Hope, observed by Sparrman. 144. *C. floridus.* Linn. jun. Sup. 136. Mart. 52. Desf. 50. Lam. 2049. Willd. 100. Jacq. ic. 1. tab. 34. "Leaves oblong lanceolate, attenuated at the base, somewhat hairy; flowering branches and peduncles panicle." *Root* perennial. *Stems* about four feet high, woody, procumbent, smooth; branches slender, erect, stiff, hoary. *Leaves* three or four inches long, scattered, entire, on short petioles. *Flowers* pale red or white, numerous, rather small; peduncles axillary from the upper leaves, repeatedly branched, so as to form a large thyrsoid panicle; calyx-leaves egg-shaped, concave, acute. *Capsules* one-celled, one-seeded, opening from the bottom in ten valves. A native of the Canary Islands. 145. *C. cuneatus.* Willd. 101. "Stem shrubby, erect; leaves wedge-shaped, obtuse, mucronate, smooth; corymbs axillary, shorter than the leaves." *Root* perennial. *Stem* cylindrical, smooth. *Leaves* two inches long, quite entire, beset underneath with a few close-pressed hairs; petioles short, villous on the inside. *Flowers* purple; calyx-leaves obtuse, hairy; corolla an inch long, tube swelling. A native of the East Indies. 146. *C. corymbosus.* Linn. Sp. Pl. 33. Mart. 53. Desf. 62. Lam. 2051. Willd. 102. (*C. niveus, polyanthus*; Plum. Cat. 1. MSS. 2. tab. 50. Burm. Amer. tab. 89. fig. 2.) "Leaves heart-shaped; peduncles umbellated; stem creeping." *Stems* numerous, woody, the thickness of a goose-quill, with long branches. *Leaves* two or three inches long, alternate, petioled, fine green. *Flowers* a beautiful white, with still whiter rays; peduncles slender, nearly the length of the leaves, with one or two bracts, forming a corymb. *Capsules* membranous, top-shaped, one-celled. *Seeds* two or three. DeRouffaux describes the stems as twining, on the authority, as we suppose, of Plumier's MSS. A native of the West Indies. 147. *C. spithameus.* Linn. Sp. 32. Mart. 54. Willd. 103. Gron. Virg. 141. (*C. foliis cordatis pubescentibus incanis*; Walt. Car. 93.) "Leaves heart-shaped, pubescent; stem erect; peduncles one-flowered." *Flowers* large, white. A native of Virginia. 148. *C. perfolius.* Linn. Sp. Pl. 34. Mart. 55. Desf. 39. Lam. 2037. Willd. 104. Gmel. It. 3. 36. tab. 97. "Leaves egg-shaped, tomentous; peduncles one-flowered." Whole plant tomentous like the common mullein. *Root* perennial. *Stems* the size of a goose-quill, cylindrical. *Leaves* quite entire, obtuse, on very short petioles. *Flowers* white; peduncles axillary, solitary, the length of the leaves, with two egg-shaped bracts near the top; calyx-leaves egg-shaped; the three inner ones smaller; corolla campanulate, four times the length of the calyx; germ woolly; stigmas two, linear, thickish. A native of Persia on the shores of the Caspian Sea. 149. *C. tricolor.* Linn. Sp. Pl. 35. Mart. 56. Desf. 35. Lam. 2033. Willd. 105. Bot. Mag. 27. (*C. peregrinus cæruleus, folio oblongo*; Bauh. Pin. 295. *C. lustranicus, flore cæruleo*; Tournef. 83.) "Leaves lanceolate, egg-shaped, sessile; lower ones somewhat spatulate; peduncles one-flowered; stem declining." *Root* annual. *Stems* about a foot long, cylindrical, weak. *Leaves* sometimes smooth, often hairy, especially when young. *Flowers* yellowish at the bottom, white in the middle and fine sky-blue

blue on the upper part of the border; peduncles just above the leaves on the same side about two inches long. A native of Spain, Portugal, Sicily, and the coast of Barbary. It is generally called *C. minus* by the English gardeners. 150. *C. acetosellefolius*. Willd. 106. Vahl *elcog.* 1. 18. Plum. Amer. 9. tab. 105. "Leaves oblong-lanceolate, somewhat hastate; peduncles elongated, one-flowered; stem creeping." *Root* perennial. A native of South America. 151. *C. repens*. Linn. Sp. Pl. 36. Mart. 57. Desf. 30. Lam. 2029. Willd. 107. (*Ipomœa aquatica*; Forsk. Arab. 44. Ballei; Rheed. Mal. 11. 107. tab. 52.) "Leaves arrow-shaped, obtuse behind; peduncles one or two-flowered." *Root* perennial. *Stem* creeping, jointed, rooting, angular, compressed, subdivided. *Leaves* crowded, terminal, emarginate, smooth, somewhat succulent, on longish petioles. *Flowers* whitish, rather large; peduncles from the axis of the terminal petioles, erect. A native of the East and West Indies. 152. *C. reptans*. Linn. Sp. Pl. 37. Mart. 58. Desf. 31. Willd. 108. (*Olivis vagum*; Rumph. amb. 5. 419. tab. 155. fig. 1.) "Leaves hastate-lanceolate; auricles rounded; stem creeping; peduncles one or two-flowered." *Root* perennial. *Stem* filiform, smooth and even. *Leaves* smooth, acuminate. *Flowers* pale purple; peduncles shorter than the petioles; calyx rounded. *Capsule* smooth, two-celled, with two seeds in each cell. A native of the East Indies, China, and Cochinchina, where it is used as a potherb. 153. *C. edulis*. Mart. 59. Desf. 54. Lam. 2053. Willd. 109. Thunb. jap. 84. "Leaves heart-shaped, entire and three-lobed, smooth; stem creeping, angular." *Root* perennial, often as big as the human fist, tubercled, fleshy like *C. batatas*, esculent, soft, and sapid. Said to be brought to Japan by the Portuguese. 154. *C. birtus*. Linn. Sp. Pl. 38. Mart. 60. Desf. 83. Lam. 2081. "Leaves heart-shaped, somewhat hastate, villous; stem and petioles hairy; peduncles many-flowered." *Root* annual; *Stem* a little twining. *Leaves* but little hairy. *Flowers* alternate, pedicelled, smooth, on peduncles longer than the leaves; involucre to each pedicel, very small, lanceolate. A native of the East Indies. 155. *C. Soldanella*. Linn. Sp. Pl. 39. Mart. 61. Eng. Bot. 314. (*C. maritimus nostras rotundifolius*; Tournef. 83. *Soldanella maritima minor*; Bauh. Pin. 295.) "Leaves kidney-shaped; peduncles one-flowered, with winged angles." Dr. Smith. *Root* perennial, long, creeping. *Stems* five or six inches long, procumbent, few-flowered. *Leaves* alternate, petioled, entire or a little angular, smooth and even, somewhat fleshy. *Flowers* flesh-coloured, yellowish at the plaits; peduncles axillary, solitary, rather erect, thickened near the top, quadrangular; bractes large, egg-shaped, close to the flower; calyx-leaves large, egg-shaped. *Capsule* three-celled. *Seeds* black, one in each cell. A native of the sea coasts of Great Britain, and other parts of Europe. It abounds in a milky juice, which has a bitter, acrid, saline taste, and is esteemed a good purgative. 156. *C. Imperati*. Mart. 83. Willd. 112. Vahl *Symb.* 1. 17. (*C. Stoloniferus*; Desf. 43. Lam. 2041. Cyril. Pl. rar. fasc. 1. 14. tab. 5. *Soldanella vel brassica maritima major*; Bauh. Pin. 295. *C. maritimus major italicus*; Tournef. Inst. 83.) "Leaves panduriform, or entire, emarginate, heart-shaped; peduncles one-flowered; corolla bell-shaped; stem creeping." Vahl. "Procumbent; leaves egg-shaped, retuse, emarginate; lower ones undivided; upper ones sinuate-lobed at the side." Lam. Nearly allied to the preceding. *Root* perennial. *Stem* cylindrical, quite smooth, a little branched, extending far on the sand, rooting at the knots. *Leaves* alternate, smooth, shining, on long petioles. *Flowers* yellowish white; peduncles axillary, solitary, or in pairs, nearly the length of the petioles, with two small bractes;

calyx-leaves egg-shaped, obtuse; stigma capitate. A native of the sea-flore in Italy. 157. *C. arenarius*. Mart. 83. Lam. 2042. Willd. 63. Vahl. *Symb.* 1. 18. "Leaves oblong, emarginate, lobed at the base, or entire; peduncles one-flowered; corollas tubular." Whole plant smooth. *Stems* decumbent, filiform, zig-zag, purplish. *Leaves* clustered, veinless; petiole longer than the leaf. *Peduncles* in pairs or solitary, axillary, the length of the petioles; calyx-leaves equal, oblong, somewhat membranous; tube of the corolla enlarged gradually towards the top. A native of the Azores. 158. *C. maritimus*. Desf. 44. Lam. 2043. Pluk. phyt. tab. 24. fig. 5. "Leaves emarginate, two-lobed, wedge-shaped at the base; peduncles many-flowered; stem decumbent, throwing out roots." Whole plant smooth. *Stems* cylindrical. *Leaves* alternate, mucronate by the elongation of the principal nerve, entire, thick, fleshy; petioles channelled. *Flowers* purple, large, bell-shaped; peduncles from three to six-flowered, generally longer than the petioles, cylindrical, divided above the middle, and furnished at the divisions with small awl-shaped bractes; calyx-leaves egg-shaped, slightly mucronate. *Capsules* roundish. *Seeds* four. A native of the Isle of France, and of the East Indies. 159. *C. Pes caprae*. Linn. Sp. Pl. 40. Mart. 63. Willd. 113. (*C. maritimus* β .; Desf. Lam. *Ipomœa biloba*; Forsk. *C. maritimus zeylanicus*; Herm. lugdb. 174. tab. 175. *C. marinus*; Rumph. Amb. 5. 433. tab. 159. *C. maritimus* five *Soldanella* è Maderafrauta; Pluk. phyt. tab. 24. fig. 4. *Schovanna-adambe*; Rheed. Mal. 11. 17. tab. 57.) "Leaves deeply emarginate, crescent-shaped, truncate at the base; peduncles often one-flowered." *Root* annual. *Stem* somewhat shrubby, procumbent, creeping, a little villous, red. *Leaves* thick, tomentous. *Flowers* purplish. A native of the East Indies, China, Cochinchina, and the eastern coast of Africa. 160. *C. brasiliensis*. Linn. Sp. Pl. 41. Mart. 63. Willd. 114. (*C. maritimus* γ .; Desf. Lam. *C. maritimus*; Brown. Jam. C. marinus; Plum. Amer. Sp. tab. 104. Marcgr. bras. 51. Pif. bras. 258.) "Leaves slightly emarginate, roundish, egg-shaped, often three-flowered." *Stems* perennial, and trailing to a great distance. *Leaves* larger than those of the last two species; petioles marked near the leaf with two red spots. *Flowers* large, purple; peduncles long. *Capsules* large, three-celled. *Seeds* one in each cell. Whole plant milky and a strong purgative. A native of the coast of Brazil, and of the Straits of Magellan. 161. *C. multifidus*. Willd. 115. Thunb. prod. 35. "Leaves palmate; lobes seven, linear, entire; peduncles one-flowered; stem decumbent." A native of the Cape of Good Hope. 162. *C. sublobatus*. Linn. jun. Sup. 135. Desf. 55. Lam. 2054. Willd. 116. "Stem procumbent; upper leaves repand-toothed at the tip; flowers capitate." *Root* annual. *Leaves* a little villous; lower ones heart-shaped; upper ones repand and almost lobed. *Flowers* aggregate, three together, sessile, parallel, with a six-leaved involucre. *Flowers* large. A native of the East Indies. 163. *C. capensis*. Willd. 117. Thunb. prod. 35. "Leaves hastate; lobes semibifid; peduncles about two-flowered; stem decumbent, villous." A native of the Cape of Good Hope. 164. *C. sagittatus*. Willd. 118. Thunb. prod. 35. "Leaves hastate and arrow-shaped; peduncles one-flowered; stems prostrate." A native of the Cape of Good Hope. 165. *C. littoralis*. Linn. Sp. Pl. 42. Mart. 65. Desf. 28. Lam. 2027. Willd. 119. (*C. albus, folio laciniato, maritimus*, Plum. Cat. 1. Burm. Amer. 79. tab. 90. fig. 2. Tournef. 84.) "Leaves oblong, lobate-palmate; peduncles one-flowered; stem creeping." *Stems* very long, much branched, nearly the thickness of a goose-quill, white, tender, creeping and taking root. *Leaves* a little larger than the palm of the hand,

palmate in the likeness of a duck's foot, fleshy, tender, bright green, nerved, on longish petioles. *Flowers* large, white; peduncles axillary, solitary, rarely two flowered, shorter than the leaves; corolla campanulate; border spreading, slightly cut. *Capsule* vilious, silky wire. A native of the West Indies, 1766 *C. martinicensis*. Mart 42. Desf. 29. Lam. 2228 Jacq. Amer. 26. tab. 17. pi. 19. tab. 24. "Leaves elliptical, smooth; peduncles one-flowered, longer than the leaf; stem creeping." *Stems* cylindrical, smooth *Leaves* alternate, obtuse, mucronate by the projection of the middle nerve, entire, petioled. *Flowers* white; peduncles axillary, solitary, with two small bracts near the top; three outer calyx leaves large, egg-shaped, acute, lax; two inner ones smaller, lance-ovate, acuminate. A native of Martinico.

CONVOLVULUS *americanus subrotundis foliis*; Pluk. See IPOMÆA *bona nox*.

CONVOLVULUS *americanus madjuccæ folio*; Pluk. See IPOMÆA *tuberosa*.

CONVOLVULUS *brasilianus*; Rai. See CISSAMPÉLUS *parvica*.

CONVOLVULUS *coccineus*; Plum. See IPOMÆA *coccinea*.

CONVOLVULUS *filiformis*; Desf. Lam. See IPOMÆA *filiformis*.

CONVOLVULUS *fatidus*; Rumph. See PÆDERIA *fatida*.

CONVOLVULUS *foliis cordatis*; Linn. Hort. Cliff. See IPOMÆA *bona nox*.

CONVOLVULUS *herbaceus erectus foliis linearibus*; Brown. See EVOLVULUS *linifolius*.

CONVOLVULUS *herbaceus erectus foliis linearibus subhirsutus*; Brown. See EVOLVULUS *sericeus*.

CONVOLVULUS *indicus villosus*; Herm. See IPOMÆA *hepatici folio*.

CONVOLVULUS *linifolius*; Kniph. See EVOLVULUS *linifolius*.

CONVOLVULUS *major heptaphyllus*; Sloan. See IPOMÆA *tuberosa*.

CONVOLVULUS *minor pentaphyllus*; Catef. See IPOMÆA *Carolinus*.

CONVOLVULUS *minor repens nummularia folio*; Sloan. See EVOLVULUS *nummularius*.

CONVOLVULUS *minor semine triangulo*; C. Bauh. See POLYGONUM *Convolutus*.

CONVOLVULUS *nigrum*; Dod. See POLYGONUM *Convolutus*.

CONVOLVULUS *pinnatus*; Desf. See IPOMÆA *pinnata*.

CONVOLVULUS *repandus*; Desf. Lam. See IPOMÆA *repanda*.

CONVOLVULUS *stellatus*; Dill. See IPOMÆA *lacunosa*.

CONVOLVULUS *zeylanicus, Pes tigrinus*; Herm. See IPOMÆA *Pes tigridis*.

Ob! It is not easy, perhaps not possible, to draw a decisive line of separation between convolvulus and ipomæa. Tournefort attributed a bell shaped corolla to the former; and a funnel-shaped one to the latter, under the name of Quamoclit taken up from Clusius, and of which he knew only one species; but these characters were soon abandoned. Linnæus, Schreber, Willdenow, and La Marck, have assigned a two-celled capsule and a bifid stigma to convolvulus, and a three-celled capsule to ipomæa, but this distinction has also been found inconvenient in practice. Gærtner places under convolvulus all the species which have a proper capsule, whatever be the number of its cells; and confines the genus ipomæa to such as have a valvels berry, with four, or by abortion, two single-seeded cells; a distinction which excludes all the species of the latter, except bona nox and zeylanica. Unable to come to a satisfactory determination amidst this discordance of opinion, and unwilling to

increase a genus already embarrassingly large, we have made no alteration in the general distribution adopted by Linnæus and his followers: and have attempted to conduct the genuine and essential characters of convolvulus so as to include all the present received species.

CONVOLVULUS, in Rural Economy. See BIND-WEED and WEED.

CONVOLUTION, a winding or turning motion, proper to the trunks of some plants; as the *convolvulus*, or bind-weeds, and the claspers of vines, and briony.

Dr. Grew thinks, that all those plants whose roots are twisted, have such a *convolution*: and he assigns two great efficient causes of this winding motion, the sun and the moon. It is very easy to try whether there be any such convolution or not in the trunks of plants; which may be done, as he hints, by tying a little bit of paper to any of the branches which are exactly north, south, &c. and then seeing whether it will change its position or not, in respect of the point of the compass.

CONVOY, from the French *convoyer*, to conduct, escort; in Maritime Language, signifies one or more vessels of war, entrusted with the conduct of a fleet of merchants; serving as a watch, and a shelter from the insults of the enemies of the state to which they belong, or of pirates.

CONVOY, in Mechanics, denotes a brake, gripe, or regulator for moderating the velocity of tram or rail-way waggons on steep parts of their descents: in some instances waggons heavily laden with coals, lime-stone, &c. descend for considerable distances on steep rail ways, without horses, and regulated only by a man who rides behind them astride upon the convoy; as from Whibsey-flack to the Bradford-canal in the West-riding of Yorkshire, and other places. Horses are used to drag the empty waggons up the hill again. See our articles CANAL and RAIL-WAY.

On some rail-ways, where the trade is a descending one, and the declivity in some places 12 to 16 inches in a chain, the horses, in holding back to moderate the velocity of the trams, are very liable to be thrown down and much injured, and even killed by the momentum of the trams; for obviating this evil, Mr. Charles Le Caan contrived a convoy, check, or stop, a model and description of which he presented to the Society of Arts in 1805, (see Transactions, Soc. Arts, xxiii. 316.) in which the convoy, in form of circular wedges, to act before the front wheels of the trams, is suspended by chains from the shafts by which the horse draws the tram, so as to cause no impediment to the motion of the wheels, as long as the horse is on his legs, and the shafts nearly in an horizontal position; but in case of the horse falling, and the shafts by that means declining downwards, the convoy instantly drops and stops the further progress of the wheels on the tram-plates; other kinds of convoys and stoppers are described in our article CANAL.

In 1805, Mr. F. D. Walker applied a similar principle to that of Mr. Le Caan's convoy, to the shafts of a four-wheeled carriage called a scotch; which convoy, on being let down by means of a pedal acted on by the coachman's foot, checked the motion of the four wheels in descending steep hills, and greatly secured the carriage and passengers from injury by runaway horses: for two years this contrivance has been used with perfect success by Mr. Walker, in frequently descending very steep hills, without locking the wheels.

CONVOY, in Military Language, denotes some succour or supply of men, money, ammunition, provisions, stores, &c. conveyed in time of war by land or water, to a town or an army. A body of men, that marches to protect any thing, and prevent it from falling into the hands of an enemy,

enemy, is also called a *convoy*. An officer, who has the command of a convoy, should take all possible precautions for its security, and should endeavour, before it marches, or sets out, to procure good intelligence concerning the enemy's out-parties. And as the commanding officer of the place, from which the convoy is to fit out, and those of such other places, by which it is to pass, are the most proper persons for him to apply to for assistance, he should take such measures as will enable him to keep up a constant intercourse with them. The conducting of a convoy is one of the most important and most difficult of all military operations. The strength of the detachment employed to escort a convoy should have a reference to the importance of the convoy itself. For there are cases when the escort should be commanded by an able and experienced general.

When it may be necessary to pass the night in the open fields, the custom is to encamp, that is, to form a close with the waggons, for the troops to sleep in, and this is a good precaution against any unexpected attempt of the enemy to surprise them. But if they should find themselves on the point of being attacked during the march, urgent necessity alone should constrain them to adopt this method; and especially the consideration of their being very inferior to the enemy, since they would thus tie up their own hands and render it impossible for themselves not to surrender, in case it should happen that they were not seasonably relieved. When the convoy is considerable; when it is to pass between places in the hands of the enemy; and when it runs any risk of being attacked; it ought to have a large escort, which is to be disposed in such a manner as to cover the convoy, instead of being covered by it. And as soon as the commanding officer hears of the enemy's being at hand, he is to leave a few detachments to accompany the waggons, and save them from such of the enemy's parties as might attempt to turn them into a wrong road, or break their chain; and assembling the rest of his troops, infantry as well as cavalry, seize the most favourable post within his power, to stop the enemy, or fight him, if he cannot avoid it. In the mean time, the convoy is to make the best of its way, and to get as far from the danger as possible. Should the troops, at any time, think it proper to cover themselves with the waggons of a convoy, they should be made to march in two columns, at a small distance asunder; and if the files should prove too long in two columns, they must be formed into three or four. In this disposition, which, however, the ground will not always allow of, as soon as the enemy is observed to be preparing for a serious attack, the horses are to be immediately unharnessed, and removed, not only that the waggons may be brought more closely together, so as to form a rampart, but to save the horses, of which, otherwise, so many might be lost, as to render it necessary, even after repulsing the enemy, to abandon part of the convoy. This must also be the case, if the troops should be stopped, and obliged to fight in their march, as it would be impossible that several horses should not be maimed or killed. It appears, therefore, that, in order to save a convoy, the troops should not think of covering themselves with it. If at any time a retreat should be necessary with a great number of baggage waggons, the retreating troops should not think so much of the protection they might afford, as the embarrassments they must create. The 10,000 Greeks hid themselves of theirs; and, confining themselves to some beasts of burden, took the resolution of fighting, uncovered. Moreover, regard should be had to the country which the troops are to traverse, and the kind of enemy with which they have to contend. If the country is an extensive plain, and the enemy very strong in ca-

valry, like the Turks, the waggons may prove of great service; besides those for the baggage, which in cases of necessity may be used for that purpose, the army should provide itself with some of these belonging to the inhabitants, to carry the chevaux-de-frise, and the sick and wounded.

Convoy, Order of, in Naval Tactics, denotes that which a fleet holds in making a straight course; the ships being all in the wake of one another, steering on the same point of the compass, and forming a right line. This order, according to M. Bourdieu de Villehuet, is the most simple, and the only one a fleet ought to be in at all times, for the following reasons—it is easily preserved; it cannot be discom-p sed in 20 out of the 32 shifts of wind, and is easily reformed in the 12 other changes; and it is easy to pass from that order to those that are proper for the security of a fleet, in all possible cases, either to preserve one's self, to attack, or to defend. If the fleet be numerous, the ships are to be arranged parallel to one another, that of the admiral occupying the middle, and steering all three the same course.

To form the order of convoy in one line. When the fleet is in no particular order of sailing, the leading ship is to veer sufficiently for the others to get in her wake, and steer the same course she holds. The commanding officer generally takes this post, when the Squadron is not numerous. That the order may be the sooner formed, every ship of the fleet or Squadron should chase at the same time that which is to be a-head of her in the line, taking care to manœuvre in such a manner as to avoid running foul of those which cross her fore-foot in endeavouring to join their leaders in the line. Therefore, such ships as are to leeward of others should take care not to permit obliquately in weathering them; but they must back, or go a-tern if necessary, by keeping away a little more. Such as should already be in the column, and are to be more a-tern, must bring to till they are in their posts, or stand on under a very easy fail, that each ship may contribute to the celerity of forming the order.

To form the order of convoy in three columns. The leaders of each of the three divisions are to place themselves in a line right a-breast of one another; and at a proper distance between themselves, according to the length of the columns, which will accelerate the disposition. Then every ship of each particular Squadron, chasing that which is to be next a-head of her, will come and take their station a-tern of one another at the rear of the leading ship of the division, and steer directly after her. This order, which in practice is easily maintained, has the advantage of keeping the fleet close and connected, without causing any delay in its progress. The best sailors can regulate their velocity by that of those which are inferior to them in sailing; and these, on the other hand, may, with a little attention, carry as much sail as the weather will admit, by which means all imaginable courses may, without breaking, be steered.

To change from the order of convoy, in one line, to the order of battle, continuing on the same tack. The headmost ship is to haul close by the wind on the same tack, and the rest of the fleet are to make the same movement in succession, steering the proper distances from each other.

To change from the order of convoy, in one line, to that of battle on the other tack. The headmost ship is to veer and to come to the wind on the other tack; then all the vessels of the fleet are to perform the same manœuvre in succession. Otherwise, after having formed the order of battle on the same tack, as before, the van-ship is to tack; and all the ships of the fleet are to follow in succession, to form the order of battle on the other tack. Or, if you are steering a

course in the order of convoy, 4 points large, the order of battle on the other tack may be formed at once, by all the ships veering or flaying together.

To change from the order of convoy, in three columns, to the order of battle on the same tack. If the fleet has the wind on the beam, or between close-hauled and eight points large, (See Plate I. *Naval Tactics*, fig. 1) the ships of the lee-column are all to bring to at the same time. The other two columns stand on. When the leader of the weather-column brings the lee leader to bear on the close-hauled line, he tacks, and is followed in succession. The centre-column does the same. But as the weather-column has a greater distance to run, it must make all possible sail, while the centre-column need not make so much; because the centre-column is not to begin to haul its wind till the centre-ship of the weather-column has got on the close-hauled line. The lee-column is to follow in the same manner, when the centre-ship of the centre-column is close by the wind.

If the wind be more than eight points, or right aft, (fig. 2.) ; the column which is to form the van-guard in the order of battle is instantly to haul its wind in succession, with all fails set; while the two others, continuing their course, will put themselves successively by the wind, on the close-hauled line upon which the order of battle is to be formed, and consequently in the wake of the weather-column.

If the columns be close on a wind, it then becomes a case within the usual fifth order of sailing. See *Order of SAILING*.

To change from the order of convoy, in three columns, to the order of battle on the other tack. The fleet may be put first in order of battle, on the same tack; then, making the ships tack in succession, they will be in order of battle on the other tack. But the time of evolution may be diminished, (fig. 3.) by making the two weather-columns bring to, when sailing between close-hauled and eight points large, while the ships of the lee-column veer in succession, and keep their wind on the other tack. The centre-ship of the lee-column having veered, the centre-column is to fill, the leader of which bears away, running exactly with the wind right-aft, and is followed in succession by the ships of his division, till they are in the wake of the lee-column, then on the other tack; when the leader of the centre-column hauls by the wind, the ships of his division haul in succession. When the centre-ship of the centre-column has bore away, the weather squadron manœuvres in the same manner, and thereby completes the order of battle.

To change from the order of convoy to that of retreat. Whether the fleet be the order of convoy in one line or in three columns, they are first to form in the order of battle on the same tack; and thence they are to pass to the order of retreat. See *Order of SAILING*.

To change from the order of battle to the order of convoy, in one line, on the same tack. The van-ship is to bear away as far as the intended course, and the rest are to execute the same manœuvre in succession; so that when the rear-ship shall have made the same movement, the evolution will be completed, and the order of convoy formed on the same tack.

To change from the order of battle to the order of convoy, in one line, on the other tack. The van-ship is to tack and run one point large, till she can bear away, under the stern of the rear-ship, as far as the course which the fleet is to hold. All the ships are to perform the same manœuvre at the same points, to change the order and get upon the other tack. The van-ship, instead of tacking, may veer and run a little time before the wind, before getting on the other tack; then she will heave to the wind on the fleet's course, without

fear of breaking through the rear. This movement is shorter and preferable, since the order of convoy is never held to keep by the wind.

To change from the order of battle to the order of convoy, in three columns, on the same tack. The three leaders of the columns are to bear away together, and steer on the intended course; then the ships of each squadron are to execute the same manœuvre in succession, following the same direction; so that the three rear-ships, veering at the same time in the wake of their respective columns, will complete the evolution. The columns will find themselves too distant from each other; but, as there is nothing which disturbs them, and they have the wind right-aft or very large, it will be easy for them to close as much as may be necessary.

To change from the line of battle to the order of convoy, in three columns, on the other tack. The three leading ships of the columns are to heave in stays at the same time, and bear away on the perpendicular of the wind on the other tack; then the ships of each squadron are to perform the same manœuvre in succession; and when the rear-ships shall have turned about and be in a line with their respective columns, and the leaders of the weather-divisions shall, by crowding all the fails, have come a-bread of the van-ship of the lee squadron, the evolution will be completed. If the fleet is to steer more large than the perpendicular to the wind, it will be easily formed, by making the leaders and their columns bear away in succession, then putting afterwards the columns at the necessary distance from each other.

To change from the order of retreat to the order of convoy, in one line. One of the wings is to haul together close by the wind, on the same tack as the line of bearing on which they are formed, in order to bear away in succession at the point of the angle, in the wake of the other wing; the ships of which are to run with the wind four points large, on their line of bearing; and, when the last ship of the weather-wing is in the wake of her line, the order of convoy is formed. If it be necessary to sail more large, or if you would not keep away so much, the same ships may keep their wind more, and follow the van-ship in succession.

To change from the order of retreat to the order of convoy, in three columns. First form the order of battle, and pass from that to the order of convoy, in three columns.

To restore the order of convoy in one line, when the wind comes a-head more than close-hauled. The order of convoy, it is plain, cannot be disturbed by all the shifts of wind as long as it is more abast than the starboard and larboard lines of bearing; because the ships, steering large in the wake of each other, can easily maintain their poils, having only their fails to trim, whether the fleet be in one line or in several columns. But if the wind draws more a-head than one of the lines above mentioned, it is evident that the ships being obliged to veer, or pay off, all at the same time, on the same tack, the order will be disturbed. In order to restore it on the same tack, when the fleet is in one line in the order of convoy; if we suppose the fleet steering large on the starboard tack, and the wind comes suddenly right a-head, which would throw all the fails flat a-back on their masts, the van-ship is to cast instantly to port, and bring to on the starboard tack, while all the other ships of the fleet are to box off, together and at the same time, to starboard, and make all fail, in order to come with celerity close by the wind on the larboard tack, and get into the wake of the van-ship, then to tack and take their stations successively, under an easy fall, and bringing to likewise till the rear-ship, which has a good way to run, be in her poil. If you should wish to get on the other tack, then the van-ship is to cast to starboard,

larboard, to bring to on the larboard tack by the wind; then the rest of the fleet would cast the other way, to tack afterwards successively in the wake of the ship which lies to, and take their station there, as has been said before, with this difference, that, after the restoring of the order, you would find yourself on the larboard tack. If the sudden shift of wind be not quite a-head, or if it be six points, or between six and twelve, the van-ship is, nevertheless, to bring to on one tack, while the rest of the fleet, casting on the starboard, make all sail to gain her wake, to tack there, and thus regain their stations. The order of convoy may be restored by a shorter and more simple method, which, however, will cause the fleet to drop to leeward more than the former does. In the same case as the last, when the wind comes right a-head, the whole fleet is to pay off on the same tack, if the ships are all on one line, and the rear-ship must bring to, while the rest of the ships running five points large (if the wind has shifted six points beyond the direction of close-hauled), will come and bring to successively a-head of the van-ship, on that line of bearing which they are to hold, observing that such ships are to carry a greater and proportionable press of sail, as, being nearer the van-ship, they have consequently more way to run before they can regain their posts. To know how many points or degrees the weather-ships have to run large to get into their stations, add eight points or 90 degrees to the half of the points or degrees the wind has shifted beyond one of the two lines of bearing; and, in regaining your posts, you will have the number of points by which you differ from the first course you steered.

To restore the order of convoy, in three columns, when disturbed by a sudden shift of wind right a-head. In this case, the whole fleet must cast the same way all together, leaving the three van-ships of the columns lying to, close to the wind on the tack on which you purpose to continue close-hauled, while the ships of the three columns running large all together on a course (to leeward of the first), which must always be determined by half the number of points or degrees the wind has shifted beyond the direction of close-hauled, added to eight points or 90 degrees, will bear away with care for their stations in the close-hauled line of bearing, which they are to hold to the windward side of their rear-ship, where they will arrive successively, by carrying more sail according as they may be nearer to the van, because in that case they have a greater distance to run.

We shall close this article with some remarks on the conveyance of merchant ships, under the protection of men of war. For the due care of a large fleet, the convoy should have a number of frigates, distributed a-head, a-stern, and on the wings of the fleet, which is always to be kept in the order of convoy, on three, four, five, or six columns, according to the number of which it is composed; some other frigates are also to be sent on the look-out, to desery what passes at a distance, and to give timely warning of the approach of the enemy. If these should discover an enemy of superior force, they should make it answer by signal; and it may be advisable that they should steer a different course from that of the fleet, in order to deceive the hostile ships in sight. The men of war are to hold themselves in the order of convoy a little a-head, and to windward of the weather-column of the fleet; because they will then be able readily to attend wherever their presence may be necessary; the frigates will, with alacrity and exactness, repeat their signals from one to another, that their purport may be expeditiously known to the commanding officer, who must not neglect to have all suspected and neutral ships chased, and even stopped by the frigates, which are always to be supported by one or two

line-of-battle ships, according to the exigency of circumstances. The progress of the whole fleet will be regulated by that of the worst going ships; which, however, are to be abandoned, when found to cause too great a loss of time; for to risk a small and partial loss, is better than to expose the whole fleet by delay. Between the columns, there should be floops of war and other swift sailing light vessels, to maintain order, and keep the ships in their stations. Their particular business will be to make the tardy ships to sail with greater expedition, to oblige those ships that are out of their post to return it, and in the evening to give an account to the frigates, having charge of going the round, of those which have not manœuvred well; and these will make their report to the commodore.

During the night, the same order will be observed, except with respect to the look-out frigates, which are to be called in within a certain distance of the fleet, and which are to be allowed lights as well as the rest of the men of war. They are to take special care to oblige all straggling ships to return to the convoy, and to fire, without hesitation, on all strange vessels coming from the main sea, in order to give the alarm. Every night they are to be supported on the wings by some line-of-battle ships. Elements and Practice of Rigging and Seamanship, vol. ii. pt. 2.

CONUS, in *Carchology*, a genus in the Linnæan system, distinguished by that writer as having the shell univalve, convoluted, and turbinate; aperture effuse, longitudinal, linear, without teeth, and entire at the base; pillar smooth. Animal a limax.

Species.

* Section *truncati*, spire nearly truncated.

MARMOREUS. Shell conic, brown with ovate white spots; whorls of the spire canalliculated. Linn.

Inhabits the Asiatic and American seas, and comprehends several distinct varieties. The shell is finely striated, and varies from fulvous to blackish; the spots are often of triangular shape, and running into bands; whorls emarginate, and armed with spinous tubercles.

IMPERIALIS. Shell whitish with longitudinal livid bands, and narrow belts composed of brown and white. Linn. *Kraenboorn*, Rumpf. *Corona imperialis*, Argenv.

A scarce species. The shell is generally marked with two yellowish bands. Supposed to be from the East Indies.

LITTÉRATUS. Shell conic, white with brown dots. Linn. *Volva muscalis*, Rumpf.

Inhabits the Asiatic ocean, and varies from white to reddish, or yellowish; the spots or dots are usually of a somewhat quadrangular form disposed in rows, between which are a few pale yellow bands or chestnut coloured lines; the spire is striped with brown.

GENERALIS. Shell conic, polished, spire flat and muricated; whorls canalliculated. Gmel.

A native of India. The colour of this shell varies from brown to yellow or orange, and is encircled with two, three, or four bands, marked with elongated spots; spire whitish, varied with undulated stripes, and pointed in the middle.

VIROGO. Shell conic, with the base bluish. Linn.

Several varieties of this African species are described by Knorr, Lister, and Chemnitz, from which it appears this shell varies from white to yellow, or yellowish, and is sometimes tessellated with white and red, or white with a straw-coloured band; spire blue, or white marked with an ochraceous band.

CARPANEUS. Shell conic, glabrous, with the base brown; spire a little convex. Linn.

Few distinct varieties of this species are described by Gualtieri, Bonanni, Favanne, and other writers. It is a native of Africa, and is commonly either of an olive, brown, or chestnut, or varied with those colours, and marked with one or two white bands, undulated spots, and numerous rows of dots; spine in general striped. This is an Asiatic shell.

TRIBUNUS. Shell white, with three yellowish bands, spotted with chestnut; spine a little convex; and the base transversely striated. Gmel.

Described on the authority of Martini, who has given a figure of it in his work on Conchology; its native country is unknown. The shell is marked with a few wavy chestnut lines.

MILES. Shell conic, rough, with the base brown; spine convex. Gmel. *Pseudo-archibalthasias*, Argenv.

This shell is a native of India, and is of a white or yellowish colour, with longitudinal undulated lines, the base transversely striated, near the spine a brown band, the spine itself spotted with brown.

CINGULUM. Shell conic, yellowish, with a single elevated belt in the middle; spine acute. Gmel.

Inhabits the Friendly Isles.

* * Section *Pyriiformes*, &c. Pyriiform with a rounded base, the cylinder half as long again as the spine.

PRINCEPS. Shell yellow, with purplish-brown longitudinal ramose lines. Linn.

Length of this shell about two inches and a half; the spine is obtuse and finely striated transversely; the body marked with two white bands which have a few brown spots, the rest of the shell spotted with chestnut. Inhabits the Indies.

AMMIRALIS. Shell with rough punctures at the base. Linn.

The varieties of this species, according to the character assigned it by Linnæus, are numerous beyond example in any other shell, amounting to nearly forty distinct kinds, independently of a much greater number not hitherto well defined. Among the principal varieties the following are most interesting.

Larvatus, *fasciis nullis*, &c. Without bands, figured by Martini.

Americanus, with irregular bands, and admitting of several varieties, as those having the shell brown, and clouded or spotted with white. Shell reticulated and clouded with chestnut; white, spotted, dotted, and clouded with brown; white, having the bands marked with orange lines. Another strong variety *anglicus*, figured in the work of Gualtieri, is of a red colour marked with numerous punctured white belts, and has the spine spotted with brown. The variety *coronatus*, described by Argenville, is distinguished by a belt of reddish dots, and transverse elevated lines, and is sometimes marked with a yellow band in the middle, and numerous punctured belts; or sometimes brown with a white band, and an oblique row of whitish spots. *Regius* has two bands, which are generally of an orange colour with darker lines, the interstices white; shell with orange dots and undulated spots. Martini figures a variety of this kind, the shell of which is white with wavy brown spots, and the bands varied white and brown; another has the bands yellowish with trifarious brown lines, and the shell white striated with brown; and a third variety has the shell clouded white and brown, and the bands of a brown colour. In *ordinarius* the shell is testaceous spotted with white, the bands white,

and somewhat reticulated with an articulated belt in the middle. *Guineensis* has the shell of a straw colour, the middle band marked with angulated lines in a very beautiful manner. The shell of the variety *surinamensis* is of a bay colour with numerous dotted belts, the bands spotted and the lower one dotted with brown and white. This kind includes several inferior varieties. The variety *summus* has the shell of a ferruginous colour with feathered white spots, and is marked with yellow bands, very finely reticulated; it varies in the number of the regular bands. *Occidentalis* is another strong variety; the shell testaceous spotted with white, and an articulated belt; bands yellow and reticulated. The last and principal variety of the genus princeps is the *cedo nulli*, a shell found in the South Seas in amazing variety, some kinds of which are however extremely beautiful and rare, and in high esteem with amateurs. The *geographicæ* *cedo nulli* is a fine and valuable kind, the prevailing colour of which is white, marbled with orange in a map-like manner. Another kind, called the "king of the fouth," (*Roi du Sud*, Argenv.) is of a fine deep golden orange with a white belt, and several distinct circles composed of clear white spots, three of which circles are disposed between the belt and the spine. Before the revolution in France there were three specimens of this kind known in the cabinets of Paris; one in that of Madame la Princesse de Banderle, another in that of the king, and the third, superior in perfection to either, in the possession of M. le Comte de la Tour d'Auvergne, which last was obtained from the Isle of France, and was known by the title of *Le Cedo nulli aux îles*. But the *banded cedo nulli* bears the highest value. This shell, called by the French *cedo nulli a bandes*, or by some more emphatically *la reine du midi*, is better known in England by the name of Lyonet's *cedo nulli*; it was formerly treasured in the cabinet of that distinguished amateur, and estimated at a considerable price, the sum of one hundred pounds sterling being actually refused by its possessor, who was nevertheless disposed to part with it at a fair valuation. Lyonet was an ingenious naturalist resident at the Hague, and, according to popular report, obtained this shell from the cabinet of M. de la Faille, auditor of finances to the states general of Holland, at the death of that eminent collector.

A particular account of this curious shell is given by Argenville, who pronounces it unique; this author describes it from a drawing made under the immediate inspection of Lyonet, the original of which we have seen, and are satisfied in the accuracy of his description. The shell from this drawing appears to be very elegant; its size is about that of the other varieties of the *cedo nulli*, which vary from an inch and an half to an inch and three quarters in length, and measure rather more than three quarters of an inch in the widest part. The colour is yellow, divided by four distinct bands of marbled white, the one of which across the middle of the shell, and another next the base of the spine, are the broadest and most beautifully variegated: the spine itself is fasciated longitudinally. At the first glance the yellow appears two principal bands of pretty considerable breadth, one above and the other below the band of marbled white which encircles the middle of the shell. The two last-mentioned yellow bands are beset with four equidistant transverse striae of little prominent dots, which give the shell in this part a slightly scabrous appearance.

It is only in conformity with popular report, that the shell of Lyonet; as before intimated, is presumed to be the celebrated *cedo nulli* of La Faille's cabinet, the truth of which has been contested by respectable authority. Favanne
thinks

thinks it is not the same, and Gerfaint positively declares it is not. The individual shell of so much repute in the collection of La Faille, according to the latter writers, was sold at the same time, with the other articles, at the Hague, about the year 1728, and was bought by a dealer for the king of Portugal's cabinet, at a price exceeding a thousand French livres. Hence it is imagined that Lyonet procured his famous shell from some other source. If we are not mistaken in our information, there were originally two shells of this same kind in the cabinet of La Faille, who presented Lyonet with one of them, and which, if true, at once resolves the mystery. The fate of Lyonet's shell is not exactly known; it is believed, at present, to enrich one of the Parisian museums.

We shall lastly mention a variety of the *cedo-nulli*, formerly in the rich cabinet of Madame de Bandeville, called *le cedo-nulli marbré*, from the beautiful variegated or marble-like appearance of its colours, which were blueish and violet on a ground of white. The shell was also embellished with three yellowish zones, and beset with a number of little roundish granulations of a white colour encircled with red.

VICARIUS. Shell testaceous, spotted with white, with four yellow immaculate bands, the second divided angularly. Gmel. *Archibalafus secundus*, Argenv.

Said to inhabit the southern ocean.

SENIATOR. Shell conic, smooth, glabrous with obtuse sculptured whorls. Martini.

Native place unknown; the shell is yellow spotted with white, and marked with very numerous transverse striae, composed of white and brown dots.

NOBILIS. Shell sub-cylindrical, smooth and glabrous. Linn. *Tigris lutea*, Argenv.

This species is finely polished, of a yellow or brown colour, occasionally shaded with olivaceous, spotted with white, and marked with very minutely punctured transverse striae.

GENUANUS. Shell with linear belts articulated with white and brown. Linn. *Gensefche toot*, Rumpf. *Jamar*, Adanf.

Found on the shores of Guinea. The shell is red, with bands alternately testated with brown and red. The "*A la papilionis*" of Argenville, called also by English collectors the butterfly cone, is considered as a variety of this species.

GLAUCUS. Shell emarginate at the base, and striated; spire unarmed, with the whorls contiguous. Linn. *Boter-vegie van Boer*. Rumpf.

A native of India and Africa. The shell is varied with brown, chestnut, and red spots, sometimes placed in rows, and the spire, which is transversely striated, varies in being more or less convex, and marked with spots, which are sometimes square.

MONACHUS. Shell gibbous, clouded with blueish brown, acute, and striated at the base. Linn. *Capucinus f. anticula*, Rumpf.

Supposed to be a native of India. Shell sometimes marked with dots disposed in rows.

MINIMUS. Shell greyish, surrounded with oblong dots. Linn.

Delineated in the works of Martini and Knorr; the native country unknown.

RUSTICUS. Shell ovate, rugged, and muricated at the base; the spire conico-convex. Linn.

There are two varieties of this species, one of which, *voluta cinerea* of Rumphius, is without any band, the other has a band, clouded with whitish, and is varied with blackish lines and dots. This shell inhabits Africa.

MERCATOR. Shell ovate and white, with reticulate yellow bands. Linn. *Tilin*, Adans.

Inhabits the shores of Africa. Shell of moderate size, sometimes yellowish, with brown or tawny bands.

BETULINUS. Shell slightly emarginate at the base, and wrinkled; the spire flattish and mucronated. Linn.

This is a native of India; the shell is rather large, and admits of several varieties, being either yellow or ochraceous, with testated spotted bands, and intermediate lines of yellow or brown; white, with three rows of violet characters; or white fasciated, spotted and dotted with brown. The *Conus Methusa* of Martini is esteemed a variety of this species.

FIGULINUS. Shell slightly emarginate at the base, and wrinkled; spire acumined, with flattish whorls. Linn. *Voluta figula*, Rumpf.

Length about three inches; brown, ferruginous, or yellow, and rarely olive, with darker lines; within generally whitish. A variety described by Knorr is of a more elongated form, the colour orange, with darker lines, and two yellowish bands; the spire reddish, spotted with black. Inhabits India.

EBREUS. Shell ovate and white, with black bands, composed of transverse spots. Linn. *Musica rusticorum*, Rumpf. *Hebraica*, Argenv. *Coupet*, Adans.

Native of the same country as the last. Shell rather small, and sometimes reddish, with parallelogramatic spots, which are often chestnut. There are several varieties of this species. It is known by the name of the Hebrew character cone, among English collectors.

STERCUS MUSCARUM. Shell emarginate at the base, and striated; whorls of the spire canaliculated. Linn. *Voluta arcuata*, Rumpf.

Inhabits Asia. This shell is of a long and narrow form, and white colour, with scattered black or red spots, which are sometimes united into bands; whorls of the spire obtuse, and in some of its varieties tuberculated.

VARIUS. Shell elongated and muricated, with the spire coronated and acute. Linn.

A native of the Indian ocean. The shell is white, clouded with brown or yellow, and granulated striae disposed over the whole surface.

ACHATINUS. Shell elongated, very finely striated transversely, and variously clouded and spotted with white; spire short, spotted with brown, and red at the tip. Gmel.

Several varieties of this shell are described by Seba and Chemnitz; the species is a native of the American ocean.

RADIATUS. Shell radiated and fasciated with white. Gmel.

Native country unknown; the shell is brown, pale yellow, or cinereous, and is figured by Martini.

LEONINUS. Shell with pale yellow or chestnut spots; commonly marked transversely with white or yellow bands, composed of grains or spots. Linn.

Found in the Indian ocean; and is a species comprehending an amazing number of varieties, as may be seen by the works of Knorr, Martini, Seba, Chemnitz, and others; about fourteen distinct varieties are ascertained.

JASPEIDUS. Shell light olive, with multifarious white dots, and an oblique band. Martini.

This is a shell of an oblong form, and small size. The native place is uncertain.

NEBULOSUS. Shell brown clouded with blue, and white spots. Gmel. Bonanni, &c. A doubtful species; the country unknown.

COFFEE. Shell short, brown, with two white bands; that nearest the spire spotted with brown. Martini.

Shell of moderate size; country undetermined.

AMADIS. Shell pale brown, with a broad band, and articulated belts above and beneath; spire acute, crowned with tubercles, and very finely striated transversely. Argenv. Zoonorph. Country unknown; shell varies in being more or less ventricose.

VULMINIFUS. Spire acute, and with the pillar-lip spotted with chefnut; shell fluted longitudinally with chefnut; base acute, and striated obliquely. Martini.

ARACHINOIDEUS. Shell reticulated with chefnut, with two or three darker bands; spire coronated and acute. Argenv. Zoonorph.

Defered as an extremely rare shell, and probably not of this tube. Its native place is unknown.

COSTATUS. Shell brown, with a white band, undulated with reddish, with thick and broad striae; spire nodulous, with a granulated band. Gualt. Country unknown.

LEUCOSTICTUS. Shell white, clouded, striped, and spotted with brown, and marked with numerous rows of white and brown dots; spire crowned with tubercles. Gmel.

Inhabits the Indian ocean; and has the spire of the shell sometimes acute.

CITRINUS. Shell citron colour, with black lines interrupted beneath; spire crowned with tubercles, and with the base white. Gmel. Inhabits the Caraccas.

INSULARIS. Shell white, with chefnut clouds, spots, and dots; and spire acute. Gmel. Country unknown.

CORONATUS. Shell with alternate articulate belts, and tessellated spots; spire crowned with tubercles. Gmel.

A small and extremely variable species, and which is oftentimes marked with a white band. Its country is unknown.

PUNCTATUS. Shell with two yellowish-brown bands, and numerous lines of dots; spire varied with yellow dots and lines. Knorr.

ZEYLANICUS. Shell snowy, with rosy and brown clouds, and numerous articulated belts, varied with white and chefnut; spire pointed. Martini. The base of this species is grooved obliquely.

SOLIDUS. Shell conic, thick, transversely striated, clouded with white and brown, with a broad white band, and pyramidal spire; the whorls canalculated. Chemn.

*** Section *elongati*, &c. Elongated and rounded at the base; the cylinder twice the length of the spire.

CRAVUS. Shell with convex smooth striae; the base bluish. Gmel.

An extremely rare species, found in the Indian Ocean. The shell is long, yellow, with white spots, and two deeper bands spotted with white; the spire spotted, and gradually tapering to an obtuse point.

NUSSATELLA. Shell somewhat cylindrical, red, not crowned with tubercles, rough, with tuberculated striae. Gmel. *Terebellum granulosum*, Rumpf.

This is a scarce species, and inhabits the island Nussatello in Asia. The shell is pale, clouded, and spotted with red, or rarely entirely white; with yellowish-brown, granulated, transverse striae; and the spire ending in an obtuse point.

TERESELLUM. Shell white, shaded with blue, subcylindrical, with annulated striae, and yellow bands. Gmel. Inhabits the Indian seas.

FUSUS. Shell fusiform, white transversely striated. Gmel. Martini, &c.

COCCINEUS. Shell red, with transverse lines dotted with

black, with a white band and spire, spotted with red. Gmel., Knorr, &c.

CAEUS. Shell somewhat cylindrical, with annulated ribs, red, with darker clouds, and bars of white; spire spotted. Gmel.

Figured by Liller and Knorr, and is supposed to be a variety only of *C. granulosus*. Its country is unknown.

GRANULATUS. Shell rough, unarmed; spire smooth and grooved. Linn. *Voluta granulata*, Rumpf.

Inhabits the African ocean. Shell red, with large fulcations, fasciated with white and purple linear dots.

OCHROLEUCUS. Shell sub-cylindrical, yellow; the base obliquely striated with a contiguous white band; spire pointed, and marked with striped spots. Gmel.

The native country is unknown. A variety of it is found of a chefnut colour, varied with decussating striae, dotted with red.

LAEVIS. Shell rufous, with fulvous spots, and transverse striae; spire spotted with yellow; base obliquely striated. Gmel., Valent. &c.

AFFINIS. Shell bluish-white, with four fulvous linear bands, and intermediate dull purple dots or marks. Martini.

VIOLACEUS. Shell white, clouded and banded with violet; rays pale brown. Martini.

POLYZONIAS. Shell white within; externally yellowish-brown, and rough, with very fine granulated lines; white band at the spire, denticulated beneath; another at the base paler, and numerous blisiform bands. Born.

BIFASCIATUS. Shell white, with angular chefnut lines, and two orange bands; spire prominent; base surrounded with orange lines, and intermediate tessellated spots. Born.

NIVEUS. Shell conic and snowy; spire prominent and coronated; aperture large. Born.

ARAUZIACUS. Shell not crowned, smooth, with whitish bands; whorls grooved at the tips. Gmel. *Oranjen admiraal*, Rumpf.

A beautiful and rare species found in India. The colour is in general whitish, with two or three orange bands, and white lines, tessellated with brown spots; spire with oblong spots of red, white, and brown.

MAGUS. Shell sub-cylindrical, with longitudinal bands dotted with white. Linn. *Voluta maculosa*, Rumpf.

A native of India. Shell white, with dotted lines, and oblong, chefnut, yellow, and brown spots; spire acute and spotted.

STRIATUS. Shell ovate-oblong, gibbous, clouded, with very fine parallel brown striae. Linn. *Voluta tigrina*, Rumpf. *Melar*, Adans.

Common upon the coast of Africa. Shell four inches long, snowy, with sometimes reddish or yellowish striae; the base emarginate and transversely striated.

TEXTILE. Shell reticulated, with yellow veins, and spotted with yellow and brown. Linn. *Pannus aureus*, Argenv. *Loman*, Adans.

A native of Asia. Chemnitz describes a variety of this species, of a white colour, with three orange bands; and another of a bloom colour, with two darker bands.

AULICUS. Shell white, with brown reticular veins, and interrupted longitudinal bands. Linn. *Nigella*, Argenv.

Nearly allied to the former, and supposed by some to be a variety: it likewise inhabits Asia, and admits of many varieties, several of which are figured by Martini.

THOMÆ. Shell smooth, white, with bay characters, and

and rows of dots, and three white belts and spots; tip reddish; spire conic, with grooved whorls. Gmel.

A native of the Indian seas.

**** Section. Shell ventricose in the middle, and narrow at each end.

SINENSIS. Yellow, ocellated with white, and transversely striated at the base. Gmel., Regenf., &c.

**** Section. Shell ventricose, and tinkling when thrown down on its back.

SPECTRUM. Shell blueish, with yellow clouds, and yellowish white dots and striae. Linn. *Voluta spectrorum*, Rumpf.

Inhabits the Asiatic seas. Four distinct varieties are figured by Chemnitz.

CULLATUS. Shell yellow, clouded with white. Linn. *Potan*, Adans.

Native country unknown. Shell thin, often spotted, clouded, or barred, and more or less ventricose; aperture large and blueish; spire sometimes flat, sometimes acute.

TULIPA. Shell oblong, gibbous, smooth; aperture gaping. Gmel. *Tulipa*, Argenv.

Inhabits India, Africa, and South America. Shell not coronated with tubercles; white, with a few clouds of blueish, brown, yellow, or red, and interrupted lines; aperture blueish; base obsoletely striated obliquely; spire acute, smooth, spotted, and finely striated transversely.

GEOGRAPHICUS. Shell oblong, gibbous, and coronated; aperture gaping. Gmel. *Nubecula*. Rumpf. *Textile sericum*, Argenv. *Nubecula*, *tulipa gallorum*, Klein. *Salar*, Adans.

A rare species found in the Indian and African seas. The shell is of a somewhat cylindrical form, wrinkled at the base, and rather narrower, pellucid, white; spotted and clouded with brown; aperture white; spire sometimes rosy.

NUBECULA. Shell white, clouded and spotted with orange, and scattered white dots; spire prominent and acute. Linn.

SPURIUS. Shell white, with alternate rows of irregular chequid or blackish spots, and interrupted punctured bands. Gmel., Gualt.

VEXILLUM. Shell brown, shaded with white, and marked with an interrupted white band. Rumpf., &c.

VENTRICOSUS. Shell brown, bared with white, beneath narrower, shaded with blueish, and smooth; spire conic and exerted. Kaemm. Country unknown.

CONUSANCE, in *Linn.* See COGNIZANCE.

CONUSOR. See COGNISOR.

CONVULSIONS, in *Pathology*, from *convellere*, *I rent* or *tear*, consist in violent, involuntary, and preternatural contraction and motion of the muscular fibres, in any part of the body.

By modern physicians, convulsions have been divided into two classes, under the terms of tonic and clonic, or *spasmodici* and *agilatorii*, according as the contractions are rigid, not alternating with relaxation, or throw the muscles into a state of constant motion, being immediately succeeded by relaxation, and again returning, alternately. These two species of morbid contraction of the muscles are generally distinguished at present by the terms, *spasm*, which denotes the fixed contraction, and *convulsion*, which implies the preternatural motion. The term *σπασμὸς*, *spasm*, was applied, however, by the Greek physicians, to the convulsive motions; and the rigid contraction was denominated *τῆσις*, *tetanus*. "Frigus modo nervorum distentionem, modo rigorem infert; illud *σπασμὸς*; hoc *τῆσις*; Græcè nominatur." Celsus

de Med. lib. ii. cap. 3. The word *nervus* signified a tendon, as well as an elongation of the brain and spinal marrow, which is now exclusively called a nerve; hence the Roman name for convulsions, which signifies distention of the tendons. And accordingly, those slighter convulsive motions of the muscles of the arms, which occur in fever, and occasion a playing of the tendons under the finger of a person, feeling the pulse, are now called a starting of the tendons, *subsaltus tendinum*. But these different forms of spasm and convulsion are frequently mixed, or pass into each other; and similar causes, affecting the brain and nervous system, produce both the one and the other.

It were vain to attempt to give an explanation of the nature or proximate cause of convulsive motions; since we are ignorant of the nature of the nervous power, or of that medium by which the muscles are connected with the common sensorium, and the volition of the mind is communicated to the muscles. We must be content with the observation of facts: the minute operations of nature are inferrible. The mechanical physicians had, indeed, no difficulty in accounting for the morbid, as well as the healthy operations of the nervous system: their imagination furnished them with a cause for every effect. Thus they supposed, like the natural philosophers, the existence of a subtle, æthereal fluid, the motions and vibrations of which produced all the effects which they observed. By farther supposition, different physiologists explained the mode in which this gratuitous fluid operated. Borelli fancied that there might be oblong vesicles in the fibres of the nerves and muscles, which were rendered spherical by the force of the nervous fluid, and therefore shorter. Others imagined that the influx of the nervous fluid separated the parallel fibres of the muscles from each other, and thus shortened the length of the whole. But it were useless to enumerate the various futile hypotheses, which originated in an erroneous philosophy. All that we know on this subject is, that force of the muscles of the body contract, in a state of health, by the will of the mind, as those of the trunk and extremities:—others, apparently without the intervention of an act of volition, although subject in a great measure to the will, in consequence of a local sensation; as the diaphragm, and the other muscles of respiration; the eyelids, in nictitation, &c.:—and others, again, are excited to contraction, altogether independently of the will, by an irritation so obscure, as to excite no perception in the mind; as the heart, which continues its unperceived motions, in consequence of the irritation or stimulus of the discharging blood, which is returned into its cavities by the veins. The contractions, produced by one or other of these causes, are regular in force and velocity, according to the degree of excitement; are always soon succeeded by a state of relaxation; and are not repeated, except when the will or the irritations again operate. In the morbid or convulsive state, the contractions of the muscles, ordinarily depending on the will, are excited without the concurrence of the will, or in a way contrary to what the will intends; and in the other instances, they are excited disproportionately to the action of the usual and natural irritations. Hence it may be concluded, without any gratuitous hypothesis, that when these convulsive motions are excited, independent of, or in opposition to, the will, some change in the condition of the seat of volition, the brain, and its elongations, the nerves, has occurred; and, if the convulsions are partial, that some great local irritation has been applied.

Now, although it be confessed that the actual condition of the brain, which occasions convulsions of the moving fibres, be unknown, as well as its condition and mode of operation

operation in health; yet certain conditions of the body, in general, have been observed to be connected with the occurrence of convulsions, which lead to a knowledge of the state of the brain in the gross, and serve as valuable guides in our practice in these diseases.

Convulsions have been chiefly observed to occur, when the body was in a state of repletion, inanition, or great irritation. It may seem inexplicable, that the two opposite conditions of repletion and inanition should give rise to similar morbid appearances; but the knowledge of the fact, which is established beyond a doubt, is sufficient for our practical purposes. We shall illustrate the operation of each of these states in producing convulsive diseases.

1. *Repletion of the system at large, or of the brain in particular, is a state in which convulsions frequently occur.* Numerous instances are on record, in which epilepsy has occurred, where a general plethoric state of the constitution was present. Epileptic convulsions have sometimes succeeded apoplexy, which is known to originate in over-turgescence of the brain. Every occasional fulness, or unusual impulse of the blood into the vessels of the brain, such as from a fit of anger, the heat of the sun, or of a warm chamber, violent exercise, a surfeit, or a fit of drunkenness, are frequently the immediate exciting causes of convulsions. (Cullen, *First Lines*, § 1296.) Hence also, in inflammatory fevers, as in the eruptive fever of the small-pox, where the blood is carried to the brain more abundantly, and with greater impetus than in health, convulsions are frequently produced; especially where the circulation is hurried by a hot regimen. The suppression of accustomed discharges, or the omission of habitual evacuations, have also been the occasion of convulsive affections, in consequence of the general plethora which ensues. But the most marked and striking instance of convulsions, induced by repletion, occurs in the puerperal state. They generally come on in the early stage of labour, and are attended with fulness and distention of the features, and other obvious marks of determination of blood to the head; they speedily cease when the delivery is accomplished, if they do not prove fatal before that takes place; and copious blood-letting is the only effectual remedy. In all these instances, indeed, which have just been mentioned, the good effects of evacuating medicines, of a spare diet, and cool regimen, in removing the diseases; and the bad consequences which have ensued, under the employment of an opposite treatment, point out repletion as the cause of the mischief. This is, also, still more clearly ascertained from the dissection of those, who have died in consequence of convulsions, occurring under such circumstances; marks of a congestion in the brain having been generally observed. See EPILEPSY.

2. *Inanition is a frequent cause of convulsions.* It has been observed from the earliest ages, that convulsions invariably precede death, when it is occasioned by loss of blood; and the fact is daily exemplified in slaughter-houses, when animals are killed by opening the large blood vessels. Hippocrates states, in his Aphorisms, Sect. v. Aph. 3, that convulsions, or hicough (which is, in fact, a convulsion of the diaphragm), succeeding a great hæmorrhage, are dangerous, and he repeats the observation in Sect. vii. Aph. 9. From this cause convulsions sometimes occur in the puerperal state, where great hæmorrhage from the uterus has occurred. But in such instances, the countenance, so far from being flushed, with a fulness of the features, is pallid, and the features are sharp and sunk; there are cold sweats, and other symptoms of exhaustion, which mark the distinction between this sort of convulsive disorder, and the proper puerperal convulsions, mentioned under the former

head. In these convulsions from inanition, the contrary remedies, cordials, and powerful stimulants, largely and frequently administered, afford the only means of saving life. "Si fluxus mellebrii," says Hippocrates, "animi deliquium et convulsio supervenit, malum." Sect. v. Aph. 65. Other great evacuations also excite convulsions; such as great discharges from the bowels by purging. In the early periods of the history of medicine, when the limited catalogue of the materia medica debarred the physician from the choice of expedients, according to the circumstances of the case, it would appear that this unfortunate consequence of a violent purgative was by no means uncommon, since we find it often alluded to by Hippocrates. "Convulsion from Hel-lebore is fatal." Sect. v. Aph. 1, and again, he observes, in Sect. vii. Aph. 25; "Convulsions from a purge are fatal." Happily the numerous articles of mild operation, which we now possess, render such an occurrence unknown to the physicians of modern times. Convulsions have been, likewise, observed to occur, in consequence of exhaustion of the animal powers, by other means; such as by excessive fatigue; by want of food; by long continued and severe mental exertion; &c.

The cure of convulsions, occasioned by inanition, from any of the causes just stated, will obviously consist, in the use of such remedies as will put a stop to the evacuations; in the administration of cordials and stimulants, to counteract the present failure of the vital powers; and in the frequent supply of moderate quantities of a cordial and nutritious aliment, to restore the mass of circulating fluids, and the strength of the body. Rest, food, and relaxation, will be the remedies required in the last-mentioned instances.

But 3, *Irritation, corporeal and mental, is the most fruitful source of convulsions.* The degree of corporeal irritation, which is sufficient to occasion convulsions, varies greatly; not only according to the peculiarities of age, and constitution, but according to the part to which it is applied, and sometimes according to circumstances, which are not obvious. Sometimes the irritation amounts to severe agonizing pain; more commonly to a moderate degree of uneasiness; and frequently it is such as to excite no perception: sometimes it is a titillation, or attended with sensations on the whole pleasurable. It may excite convulsions of the muscles in general, when applied to the brain itself; or to other parts of the body, as to the bowels, stomach, kidneys, and other viscera; to the gums, the skin, and the organs of sense.

Convulsions are among the most common symptoms of irritation of the brain itself, either from external or internal causes. Thus they are frequently excited by blows, or wounds, on the head; by fractures of the cranium when a portion of the bone is depressed, or fragments of it are driven in upon the membranes of the brain; by effusions of blood, lymph, serum, or pus, in the ventricles or on the surface; by bony excrescences from the internal surfaces of the skull; or by tumours, thickening, or abscesses, in the membranes or substance of the brain. Mechanical injuries of the nerves, which are elongations of the brain, have also given rise to general convulsions.

Irritations of parts distant from the seat of sensation and voluntary motion, produce the same effects. Thus wounds of the skin, and of the muscles and tendons in the extremities, occasion the most painful and fatal of all convulsive affections, the *tetanus*; and it is remarkable, that it is not a large discharging wound, which in general excites this disease; but a superficial injury, or a wound just healing, when the irritation would seem to be less powerful. In this disease, all the antagonist muscles of the body are seized

seized at once with a convulsive action, so that the trunk and limbs become perfectly rigid, and the jaw is locked. Sometimes the muscles of the back overpower their antagonists, the body is then bent backwards like a bow, and the patient rests on the head and the heels; this state is termed *opisthotonos*. Sometimes, on the contrary, the action of the abdominal muscles is most powerful, and the body is then bent forwards in a similar manner; this condition is called *emprostotonos*. (See these articles.)

Several instances of convulsions are related by authors, in which stones, of sharp and irregular figures, were found after death in the urinary bladder, or lying in the pelvis of the kidney, or in the course of the ureters. In others, convulsions, which had occurred in consequence of such irritations, ceased upon the discharge of calculi with the urine.

Irritations in the alimentary canal are very frequently the cause of general convulsions, more especially in young children. In children, indeed, it has been said that convulsions are not to be considered so much a disease themselves, as the indication of disease in the bowels, or other parts. (Med. Obs. and Inq. vol. iii. p. 202.) The presence of worms, of undigested aliment, of morbid secretions, or even a retention of the natural fæces, by constipation, are common causes of convulsions at an early age. The retention of the meconium is said to occasion the locked jaw of new-born infants, in warm climates, the *trismus nascentium* of authors. Some children, in fact, are so irritable during the few first years of their life, as to be thrown into convulsions by very slight causes of irritation; a disposition which is only removed, as the constitution becomes strengthened by age. The irritation of the rising teeth, when the gums do not readily yield to their pressure, has been frequently observed to excite convulsions in children, which were removed on the appearance of the teeth above the gum, or by the division of the gum by means of a lancet. For it is remarkable, that the greater temporary irritation of a cutting instrument is borne, without any convulsion being excited, while the constant uneasiness of the irritating tooth had frequently been productive of the convulsions. In the same way, when convulsions are occasioned by the irritation of worms, or of undigested food, in the intestines, the additional irritation of a cathartic medicine shall not increase the convulsive affection, which ceases, when its operation is completed. In the treatment of the convulsions of children, where the irritating cause is obvious, but cannot be instantly removed, the convulsive motions may be frequently suspended in the mean time, by immersion in the warm bath, by warm fomentations, or by the use of a small dose of an opiate, proportioned to the age and strength of the child, and the violence of the disease. But such measures are only palliative; the radical cure will depend upon the removal of the cause of irritation.

In constitutions of peculiar irritability, certain irritations of the organs of sense have given rise to convulsions. Thus in regard to the sense of touch, a case is related by Van Swieten in which titillation of the soles of the feet of a young girl, excited convulsions: he also mentions instances of the same effects being produced by a sudden exposure to great light, or great noise; a boy was thrown into convulsions by the unexpected sound of trumpets. Certain powerful odours have occasioned convulsive motions when applied to the organ of smelling. It seems to have been a custom formerly, says the author just mentioned, for those who purchased slaves, to try them with the smell of the jet-stone, in order to discover whether they were subject to the epilepsy. Arctæus has remark-

ed that by this odour the epileptic paroxysm was excited; and Apulius, who was accused of magic, in pleading his own cause, made the following observation. "But if I wanted to throw down an epileptic person in a fit, what need could there be for a charm to do it? seeing the jet-stone, when it is burnt, as I read in physical authors, discovers this disease effectually; and by the smell of it they commonly try the health of the slaves in the markets." Van Swieten. Com. § 1075.

Many poisons, especially the vegetable poisons, by their action on the nervous system, when taken into the stomach, produce the most terrible convulsions. The cicuta aquatica, or water-hemlock, is said by Wepfer to have been eaten by several children, who mistook the roots for parsnips; they were all seized with severe convulsions, which proved fatal to two of them; the rest having been made to vomit, and ejected the poison from the stomach, speedily recovered. Thus vegetable narcotics, even opium itself in an over-dose, have produced similar effects.

Mental irritations, or violent emotions of the mind, frequently give rise to general convulsions, especially in females, and those of hysterical habits. The influence of the mind on the body is too obvious to require much illustration. The actions of the heart, the circulation of the blood, and the functions of the viscera, are variously modified by emotions of the mind, and no organ is more fully affected by them in its functions than the brain itself. Different emotions seem to affect the system in different and even opposite ways; some rousing it to actions of unusual vigour, quickening the circulation, and strengthening the powers of volition; others, again, paralyzing its strength, and giving languor to all its motions. Hence the passions have been divided into two classes, exciting, and depressing passions. Now these opposite passions, which seem to produce the same effects as *repletion* on the one hand, and *inanition* on the other, alike excite convulsions of the body. This may be exemplified in the leading passions, anger, and fear, both of which are occasionally the causes of convulsions. In a man under the influence of the *excitement* of anger, the heart beats with greater force and celerity; the pulse is fuller, stronger, and swifter; every part swells and grows broader; a greater heat overpreads the whole body; almost every muscle is extended; the eyes are prominent from their sockets, and look fierce and sparkling, being charged with blood. These symptoms imply a corresponding fulness and force in the vessels of the brain, which, when carried to a certain extent, induce convulsions. On the contrary, a man under the *depression* of fear, grows pale and cold, and shrinks in every part of the body; his pulse is quick, but small and unequal; the heart palpitates; the lungs are oppressed, and sobs and sighings follow; his strength fails him; his whole body trembles, and he is scarcely able to articulate. These phenomena shew a depression, a collapse of the powers of life, resembling that which occurs from inanition, and, like that, producing sometimes a general convulsion. See Swieten Com. in § 204. Many examples might be quoted of the convulsive attacks occasioned by these passions, and especially by fear. We shall mention one instance from the latter cause, for the sake of illustrating the effects of another principle, the association of ideas, in re-exciting convulsions, thus originally produced. A boy was so much frightened by a large dog jumping upon him, that he presently fell down attacked with epileptic convulsions; afterwards, the paroxysm was brought on by the sight of any large dog, or even by hearing him bark. This effect of association is frequently observed in a minor degree; thus, any substance used as a vehicle for an emetic medicine, will, in some persons,

ions, when taken alone, excite sickness for some time afterwards. Van Swieten affirms that he has seen a person, who, after having frequently taken a nauseous purging draught, upon seeing the cup out of which he took it, not only shuddered, and became squeamish, but likewise had several stools; thus the sole idea of a nauseous remedy being renewed, supplied the place of a purge, and disturbed the whole body. Comment. in § 1075.

There is another prolific source of convulsive affections, which must not be overlooked in describing the mental causes of these formidable disorders; namely, the principle of *imitation*. This principle sometimes operates alone; sometimes its operation is combined with an impression of fear; and sometimes with various other strong impressions made on the imagination. This involuntary imitation is the source of almost all that is learnt in infancy; and its importance in the formation of character, has been well illustrated by Dr. Aikin. See *Athenæum*, No. xiii. Jan. 1808. In after-life we all experience its operation, in the irresistible propensities to yawn, to laugh, to weep, with others. Hence much of the effect of theatrical representations, especially crowded audiences: hence also the facility with which a *panic* spreads among an army of soldiers; and hence the power, on the one hand, and the cowardice, on the other, of a *mob*. This tendency to receive impressions and emotions involuntarily from others, and more especially, when they are accompanied with corporeal motions, and the tendency to repeat those motions involuntarily ourselves, are principles rooted in the human constitution; and upon them much of the history of insurrections, and also of the propagation of religious enthusiasm, depends, as well as the minor circumstances of convulsive diseases.

Every physician has witnessed the effect of the sight of an hysterical convulsion, on other women predisposed to that disease. It is not uncommon to find several women thus convulsed, one after the other, from this cause. We have even known the scream of one woman, seized with an hysterical paroxysm, excite convulsions in another, who heard it in a different room. The well-known cases which occurred in the orphan-hospital at Haerlem, under the care of Dr. Boerhaave, show the extensive operation of this principle, and also that these imitative attacks may be effectually prevented, by exciting a strong counter-impression in the mind. That celebrated physician, finding that epileptic convulsions, which had occurred in one boy, attacked, one after another, all the boys who witnessed the paroxysms, by threats of inflicting severe bodily pain on the first who should be attacked with these fits, succeeded in preventing the recurrence of the epilepsy.

This principle is still farther exemplified in the epidemical convulsions which have occurred at different times in different countries. In several districts of Scotland such epidemics have frequently appeared. The Rev. W. Archibald, parochial clergyman of Unit, the most northerly of the Shetlands, gives the following account of epidemic convulsions which occurred in his parish, "There is a shocking distemper, which has of late years prevailed pretty much, especially among young women, and was hardly known thirty or forty years ago. About that period only one person was subject to it. The inhabitants give it the name of convulsion fits; and indeed, in appearance, it something resembles an epilepsy. In its first rise, it began with a palpitation of the heart, of which they complained for a considerable time; it at length produced swooning fits, in which people seized with it would lie motionless upwards of an hour. At length, as the distemper gathered strength, when any violent passion seized, or on a

fulden surprise, they would all at once fall down, toss their arms about, writhe their bodies into many odd shapes, crying out all the while most dismal y, throwing their heads about from side to side, with their eyes fixed and glaring. At first this distemper obtained in a private way with one female, but being seized in a public way at church, the disease was communicated to others, but whether by the influence of fear or sympathy is not easy to determine. However this was, our public assemblies, especially at church, became greatly disturbed with their outcries. This distemper always prevails most violently during the summer-time, in which season, for many years, we are hardly one sabbath free." The Rev. Mr. Morrison, giving an account of a similar epidemic in his parish of Delling, says, "It most commonly attacks them when the church is crowded, and often interrupts the service in this and many other churches in the country. On a sacramental occasion, fifty or sixty are sometimes carried out of the church, and laid in the church yard, where they struggle and roar with all their strength for five or ten minutes, and then rise up without recollecting a single circumstance that happened to them." *Statistical Acc. of Scotland*, vol. i. p. 385. See *Edin. Med. and Surg. Journ.* N^o xii. In another parish, Northmaven, a cure is said to have been effected, as in the hospital at Haerlem, by a strong counter-impression upon the mind. "The cure is attributed to a rough fellow of a kirks-ficer, who tossed a woman in that state, with whom he had been frequently troubled, into a ditch of water. She was never known to have the disease afterwards, and others dreaded the like treatment." *Stat. Acc.* vol. xii. p. 363.

A similar prevalence of convulsive affections, which occurred on the estates of the earl of Uxbridge and Holland Giffith, esq. in the isle of Anglesea, was checked by the judicious precautions recommended by Dr. Haygarth, from a knowledge of the principle which we are illustrating. He advised that all girls and young women should be prevented from any communication with persons affected with those convulsions, and that those who were ill should be kept separated as much as possible. See *Treat. on the Imagination as a Cause and as a Cure of the Disorders of the Body*. Bath, 1800.

This principle of imitation, especially when the imagination is strongly excited by images of terror or superstition, has been resorted to by designing men for the purposes of imposing on the public credulity, with a view to their own profit. Upon this was founded the success of Mesmer, De Manauduc, and other empirics, in the disgraceful practices of animal magnetism, as it was called; the nature and imposition of which were fully detected and exposed by the commissions appointed by the French king for the purpose of the investigation. The celebrated Dr. Franklin was one of these commissioners, and his report has fully developed the mystery of the magnetizers. By the aid of circumstances, of situation, geom., &c. and by their own enthusiasm, they gradually worked on the minds of their company, who were already pre-disposed to receive any impression, for they did not operate on single individuals, until they brought them, mind and body, to a state of extreme irritability; then, assuming extravagant gestures and violent motions, the spectators were led to an involuntary imitation, and as soon as one of the party shewed any symptoms of violent or convulsive exertion, the rest were speedily affected in the same way. This was called the crisis, and the operation was considered as complete. Dr. Franklin shewed, that, without the aid of local circumstances, of numbers, &c. the powers of the magnetizer amounted to nothing.

It were unnecessary to pursue this illustration farther, or it

might be shewn that the propagation of religious enthusiasm and fanaticism is effected by the same means; is frequently connected with convulsive motions, or frantic gestures, amounting nearly to convulsions; whence we find jumpers, whirlers, and originally quakers, as the distinguishing appellations of sects; and that it depends much upon the contagion of the principle of imitation among crowded assemblies, for its success.

But to return to the subject of convulsions, more strictly within the sphere of pathology. We have mentioned the indications and means of cure, in most cases, as they occurred. In convulsions, which come under the two first heads, as arising from repletion and inanition, it must be obvious, that an evacuating system must be adopted in the first, and the contrary, or a system of support and nutrition, in the second. The individual expedients to be adopted, on either of these occasions, will readily suggest themselves, according to the peculiar circumstances of the case. In convulsions, which arise from irritation, the discovery and removal of the irritating cause, where it is of a nature to be removed, is not less obviously requisite for the cure. But in the mean time, before any of these intentions can be fulfilled, the violence of the convulsive motions may continue, so as to injure the body, or destroy life. It is desirable, therefore, that some palliative measures should be adopted; and these are chiefly the use of medicines of the antispasmodic class, such as opium, musk, æther, and other powerful stimulants; the use of the warm bath; or of the opposite expedient, the cold bath. Of these remedies, with the exception of the last, little is required to be said; the efficacy of the former being well understood. But as the cold bath is a powerful expedient, and can be often resorted to more speedily than the others, it may be necessary to mention the nature of its powers. Dr. Currie, from an experience of eight years, asserts that the cold bath is very efficacious in removing the convulsions of children, whether the disorder originates in worms or other causes; that it seldom fails in stopping the paroxysms, at least for some time, thereby giving an opportunity of employing the means fitted to remove the particular irritation. Several cases of tetanus have also been cured by the cold bath of late years. In the convulsions of hysteria, the cold bath, or indeed a plentiful affusion of cold water, is an almost infallible remedy. Dr. Currie observes, that the efficacy of the cold bath in convulsive disorders is the greatest, when it is employed during the presence of the convulsion; and also that it is of greater efficacy in general convulsive affections, than in those which are only partial. In chorea sancti Viti, for instance, it has been frequently tried without any success. See Currie, Reports on Water, &c. Append. p. 13. et seq.

Where the source of irritation is not discoverable, besides these palliative means, other medicines are commonly employed to give strength and vigour, and to lessen the irritability of the moving fibre, so as to render it less susceptible of being excited to extraordinary action. The various articles of tonic and corroborant medicine have been administered with this view, but most frequently, the metallic salts and oxides; as the sulphates of zinc, and iron, and copper; the oxide of zinc; and even the caustic nitrate of silver has been employed in small doses.

CONVULSIVE DISEASES, those diseases in which convulsions are the leading symptoms. See CONVULSIONS. These diseases have received different appellations, and also require different methods of treatment, according to the varieties of their form. Some consist of general convulsions of the whole muscular system, as tetanus, epilepsy, some forms of hysteria, &c.; others are distinguished by the con-

vulsions being confined to particular parts; as trismus, when the muscles of the jaw are affected with spasm; chorea, or St. Vitus' dance. Hiccough, and even cough, may be considered as partial convulsions. See these articles respectively.

CONVULSIVE Asthma. See ASTHMA.

CONWAY, in Geography, a river in North Wales, called by Ptolemy and Antoninus *Conovius*. *Kynwy*, in the ancient British language, signifies the great river, from which are derived the words *Conwy* and *Convery*. This stream, considered one of the finest in Europe, rises in the mountains of Penmachno, out of Llyn Conwy, and is navigable for small vessels to Llanrwst bridge; erected by Ieigo Jones with a centre arch 60 feet wide (see CANAL); but receiving many tributary streams in the course of 12 miles, it becomes sufficiently deep to bear ships of considerable bulk, and is nearly a mile in breadth at high water, but not more than 150 feet at low water, and eight feet deep, at the ferry opposite the town of Conway, beyond which it flows into the Irish Sea. The spring-tides vary from 14 to 15 feet; consequently vessels of 400 tons burthen may approach close to the town; nevertheless the shifting sand-banks make the entrance of the port dangerous. The *mya margaritifera* of Linnæus, or pearl muscle, made the river of importance previous to the Roman invasion. Such was its celebrity, that Suetonius acknowledged the pearl-fishery of the Conway to have been one of his inducements for undertaking the subjugation of Wales. According to Pliny, the muscles, called by the natives *gregindilæ*, were sought for with avidity by the Romans, and the pearls found within them highly valued; and in proof of which it is asserted, that Julius Cæsar dedicated a breast-plate, set with British pearls, to Venus Genetrix, and placed it in her temple at Rome. A fine specimen from the Conway is said to have been presented to Catharine, consort of Charles II., by sir Richard Wynne of Guedri; and it is further said, that it has since contributed to adorn the regal crown of England. Lady Newborough possesses a good collection of the Conway pearls, which she purchased of those who were fortunate enough to find them, as there is no regular fishery at present. The late sir Robert Vaughan had obtained a sufficient number to appear at court, with a button and loop to his hat, formed of these beautiful productions, about 28 years past.

CONWAY, or ABERCONWAY, an ancient town of Carnarvonshire, North Wales, is seated on the river Conway, near its confluence with the Irish Sea. This place does not appear to have acquired any consequence till the time of Hugh Lupus, earl of Chester, who fortified the mouth of the river about the year 1068; and it obtained more distinguished importance during the reign of Edward I., who enlarged the fortifications, and erected a very strong castle in 1284. The outline of this venerable and romantic place is triangular, and is still surrounded with embattled walls. These are erected in many places upon solid rocks, and are one mile and an half in circumference; they had four gates, and were defended by 24 ballions; in addition to which, two curtains projected into the river, where they terminated with watch-towers; but these and one of the former have fallen. Edward I. evinced great skill in constructing the defensive works of Conway, and particularly by erecting his superb castle on the base of the triangle next the river, where nature had placed a vast perpendicular rock of slate. He thus protected England from the incursions of the Welsh, who were commanded by Llewellyn; and afforded himself and successors an impregnable post for collecting the means of invasion, when an opportunity offered for entering Wales with any prospect of success. By this castle he had it in his power

to occupy the neighbouring passes of Penmaen-Mawr at pleasure, and by that means to cut off all communication with the interior of the principality; and yet this fortress had once nearly cost him his crown, in proceeding to it at the head of his army. On this occasion, Edward incautiously crossed the river Conway with a few attendants, and was separated from the town by the flowing of the tide. At this critical moment the Welsh attacked the castle; but although the monarch and his little band of soldiers were deluged with every refreshment, except honey and water, they had the bravery and address to resist their opponents, till the ebbing of the tide. Richard II. took refuge in this castle, on his return from Ireland in 1399, and was delivered into the power of his enemies from it, through the treachery of the duke of Northumberland. During the civil war, Charles I. particularly requested Williams, archbishop of York, to put the castle in a complete state of defence, for his use; and pledged his honour that the custody of it should remain with the prelate, or any person he thought proper to appoint, till the sum expended was repaid. When the repairs were accomplished, Williams placed the castle under the government of his nephew, William Hooker. The neighbouring gentry, conceiving it a secure depository, sent their most valuable writings and plate to the keeping of the archbishop and Hooker; the former giving his receipts, and making himself responsible in case of loss. About a year afterwards, colonel Sir John Owen obtained the appointment of governor of Conway castle from prince Rupert, and, proceeding suddenly to the place, ejected the prelate and his adherents, who were positively denied permission to remove the articles, for which receipts had been given. Greatly irritated at this unworthy conduct, Williams vainly applied to the court for redress. Yielding at length to the representations of general Mytton, who commanded the parliament's army, he adopted their cause, and fortified his own house, which was garrisoned by Mytton's troops. A conflict soon afterwards occurred, in which the prelate was wounded in the neck. After the rage of the civil wars, a grant was made of it to Edward, earl of Conway, who, in 1665, dilapidated the buildings. At present it is held by a private proprietor under the crown. A little hill is planted and laid out towards the mouth of the river, commanding a fine view of the town and castle on one side, and the sea on the other, to which is given the classical name of Arcadia. The ruins are still uncommonly magnificent, and bounded by the river, a creek, and the town. The walls are not greatly injured; and eight vast towers, furnished by turrets, are yet standing. In one of these is an oriel window, richly ornamented, where the toilet of queen Eleanor is said to have stood, at the period when her lord made the castle the scene of his hospitality: another of the towers, undermined by the inhabitants of Conway, split asunder, and a vast fragment fell upon the beach, where it lies, a wonderful specimen of ancient masonry. The hall, erected over extensive vaults, is lighted by six windows towards the country, and three on the opposite side. Six of the eight pointed arches of the roof are yet entire. The length of the hall is 139 feet, and the breadth 32. The castle is now held from the crown by O. Holland, esq., who pays a rent of 6*s.* 8*d.*, and is bound to furnish lord Hertford with a dish of fish, whenever he passes through Conway. However commanding and beautiful the town appears without the walls, the contrast within is melancholy in the extreme, where ruins and desolation prevail in every direction. Edward I., when he passed a Christmas here with his queen Eleanor and the whole court, erected the place into a free borough, and the mayor was constituted constable of the castle. The present government is composed of an alderman,

recorder, coroner, water bailiff, &c. Mr. Evans mentions, in his "Tour through North Wales," an old house situated in Cattle-freet, called the college, with a curious window, and several coats of arms of the Stanleys; and another of large dimensions, named *Plas Mawr*, built in 1585, by Robert Wynne, esq. of Guedir, which he supposes, from the inscriptions on the front, to have been erected for charitable purposes, particularly as there are many rude badges within, (probably of contributors); and the supporters of the arms of Dudley, earl of Leicester, decorate the walls and ceiling. The only religious structure in Conway was an abbey of Cistercian monks, founded by prince Llewelyn ap Iorwerth, in 1185, who was buried in the abbey church, where his body remained till the dissolution of the monastery, when it was carried to Llanrwst. Edward I., conceiving the monks improper inmates of his fortress, removed them to a new abbey, which he erected near Llanrwst, but did not deprive them of their privileges and endowments. Their old church was then made parochial, and the presentation granted to the abbot and convent, on condition they provided three chaplains, two of whom were to be Englishmen, and the third a Welshman; one of the former received the title and office of vicar, and, after having been named by the convent, was to be presented by the diocesan. The church of the original foundation is situated in the centre of the town; but it is more remarkable for its remote antiquity, than any beauty in the form or decorations. Cynan ap Owen Gwynedd was buried in this church, 1223; and there are at present several modern monuments of the Wynne family: one of the inscriptions within it records the interment of Nicholas Hooker of Conway, gentleman, in 1637, who is said to have been the 41st child of his father, by his wife Alice, and the father himself of 27 children. The tithes of the church are vested in three trustees, for the benefit of the poor of the town, and three villages in the neighbourhood: indeed the want of trade and manufactories renders the lower classes truly wretched, many of whom obtain a miserable subsistence by collecting and burning into *tarilla*, on the beach, different species of *judi* or sea-wreck, which is sold for trifling sums to the purchasers, who make a great profit on their labour. The inconsiderable trade now carried on consists of copper, lead, calamine, and potatoes for exportation; but little or nothing is imported. As Conway has hitherto been the great thoroughfare to Ireland, the inhabitants derived much advantage from the passengers; but the new road through the Orwyn mountains will soon rob them even of this support. Hills of lime-stone abound near this town, and some lead and copper mines, having chert, or a species of black hornstone for a matrix. In a black silicious mountain here masses of porous chert are found, which, on trial, are found as fit for making our mill-stones as those imported from France. Mr. Richard Doves, who made this discovery, and sent specimens of the stones to the Society of Arts, was rewarded by that patriotic body. See their Transactions, vol. xviii. p. 197. Situated 240 miles N.W. of London. Population in 1801 was 880; the number of houses 182. Bingley's and Evans's Tour in North Wales.

CONWAY, a township of America, in the province of New Brunswick, Sudbury county, on the western bank of St. John's river. It has the bay of Fundy on the south; and at the westernmost point of the township there is a tolerably good harbour, called Musquah Cove.—Also, a township in the N.E. corner of Strafford county, New Hampshire, on a bend in Saco river, incorporated in 1765, and containing 574 inhabitants. It was called "Pig-wacket," by the Indians.—Also, a thriving township in Hampshire county, Massachusetts, incorporated in 1767, and contain-

ing 2092 inhabitants. It lies 13 miles N.W. of Northampton, and 115 N.W. by W. of Boston.

CONWAY, *Cape*, a point of land on the east coast of New Holland, so called by captain Cook in 1770, and lying in S. lat. $26^{\circ} 36'$. W. long. $211^{\circ} 28'$; between which and cape Hillsborough is a bay, which the same navigator called *R. Puffin bay*. Within this cape there lie two or three small islands, which would serve to shelter that side of the bay from the southerly and south-easterly winds, that seem to prevail here as trade-winds. Among the many islands that lie upon this coast, called by Cook *Cumberland islands*, one is more remarkable than the rest: it is of small circuit, very high, and peaked, and lies E. by S., 10 miles from cape Conway, at the south end of the passage. This passage is from three to seven miles wide, and eight or nine leagues in length, N. by W. $\frac{1}{2}$ W., S. by E. $\frac{1}{2}$ E. It is formed by the main on the west, and by the islands on the east, one of which is at least five leagues in length. The depth of water, in running through it, was from 20 to 25 fathoms, with good anchorage every where; and the whole passage may be considered as one safe harbour, exclusive of the small bays and coves which abound on each side, where ships might lie as in a basin. The land both upon the main and islands is high, and diversified by hill and valley, wood and lawn, with a green and pleasant appearance. This passage, being discovered on Whitunday, was called *Whitunday passage*.

CONYA, a river of South America, in Surinam, or Dutch Guiana.

CONYBEARE, JOHN, in *Biography*, a celebrated English prelate, born in the neighbourhood of Exeter, and educated at the free-school in that city, from whence he was admitted at Exeter college, Oxford, where he applied himself so diligently to his studies, that, in 1710, when he was but 19 years of age, he was chosen probationary-fellow upon Sir William Petre's foundation. He obtained the several degrees with reputation, and was ordained priest in 1716. During the next year he officiated as curate at Fetcham in Surrey. Upon his return to Oxford, he became tutor to his own college, and gained much celebrity as a preacher. He was afterwards appointed by Dr. Gibson, bishop of London, to the situation of one of his majesty's preachers at Whitehall. In the year 1724, lord chancellor Macclesfield presented him with the rectory of St. Clements, Oxford; and in 1728, he took the degree of bachelor, and in the following year, that of doctor in divinity. In 1730, he was elected to the high and arduous office of master of Exeter college; and in a short time he undertook, at the desire of the bishop of London, and published a very excellent answer to Tindal's "Christianity as old as the Creation," under the title of "A Defence of revealed Religion against the Exceptions of a late Writer, &c." This was published in 1732; and before the end of that year he was raised to the office of dean of Christ-church. He now resigned the headship of his college, and speedily the rectory of St. Clements; and in 1734, he had the honour of entertaining, at his own apartments, the prince and princess of Orange, and of receiving the thanks of queen Caroline for his conduct on that occasion. From this period, to the year 1750, Dr. Conybeare received no additional preferment: he was then appointed to the bishopric of Bristol, which, though it increased his dignity in church preferment, was no addition to his fortune. This high honour was followed by a long train of illness, which terminated his valuable life in the year 1755. The good prelate left behind him a truly estimable character: he fulfilled all the duties of life with honour to himself, and for the advantage of those connected

with or dependent upon him. Zealously attached to the church, of which he was a distinguished member, he was, at the same time, candid and liberal towards protestant dissenters, with some of whom he had been educated, and with others he maintained an occasional but friendly correspondence through life. Two years after his decease, were published, for the benefit of his surviving relations, sermons in two volumes, 8vo. The very numerous list of subscribers who patronized this undertaking, shew in what high public estimation Dr. Conybeare was held by his contemporaries. Biog. Brit.

CONYZA, in *Botany*, (derivation uncertain.) Linn. Gen. 950. Schreb. 1286. Willd. 1480. Gært. 971. Juss. 180. Vert. 2. 511. Conle; and Encyc.

Gen. Ch. *Common calyx* either imbricated, or in several nearly equal ranks. *Cor.* Florets of the disk hermaphrodite, numerous, tubular, funnel-shaped; border five-cleft, patulous; florets of the circumference female, either apetalous or funnel-shaped, not composing a ray; border generally three-cleft. *Stam.* Filaments five, very short, capillary; anthers united into a hollow cylinder. *Pist.* In the disk. Germ oblong; style filiform, length of the stamens; stigma two-cleft: is the circumference styles and stigma more slender. *Seeds* oblong; down simple. *Recept.* naked, flat.

Ess. Ch. *Seeds* of the calyx imbricated, or in several nearly equal ranks. Florets of the circumference female, apetalous, or funnel-shaped, with a three-cleft border, not composing a ray. Down simple. Receptacle naked.

* *Leaves* not decurrent.

* *Herbaceous.*

1. *C. squarrosa*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Lam. Ill. Pl. 697. fig. 1. Gært. tab. 166. Eng. Bot. 1195. Flor. Dan. tab. 622. (*C. major vulgaris*; Bauh. Pin. 265. Tourn. 454. *C. Matthioli*, baccaris Monspeliensium; Clus. Hist. 2. 21. Lob. ic. 574. Blackw. tab. 102.) Great sea-bear, or Plowman's spikenard. "Leaves ovate-lanceolate, downy; stem corymbose; calyx-scalcs foliaceous, recurved, and prominent." *Root* biennial, branched, and fleshy. Whole herb soft and downy, in flavour bitter, and somewhat aromatic. *Stem* two or three feet high, erect, angular, leafy, but little branched, many-flowered. *Leaves* alternate, somewhat crenate, upper ones often entire. *Flowers* yellowish; calyx egg-shaped; outer scales green, recurved; inner ones reddish, erect, ciliated. *Seeds* angular; down scabrous. *Receptacle* tubercled. A native of England, and other parts of Europe, on a dry calcareous soil. 2. *C. linifolia*. Linn. Sp. Pl. 2. Mart. 2. (After dracunculoides; Lam. After solidaginoides; Willd. After americanus aibus, mez. raribus exalparatis foliis; Pluk. alm. 56. tab. 79. fig. 2.) "Leaves linear-lanceolate, quite entire; corollas rayed." *Stems* a foot or a foot and half high, erect, hardish, green. *Leaves* resembling those of mezerion or hyssop, only more obtuse, smooth, and stiff. *Flowers* on short terminal peduncles; florets white, slender, reflexed. Its radiate flower certainly excludes it from this genus; but as it is not inserted in our work under Aster, we have retained it here. A native of North America. 3. *C. scabra*. Linn. Mart. 113. Mart. 7. Willd. 2. "Leaves oblong; somewhat toothed, fissile, scabrous; peduncles one-flowered, elongated." *Leaves* rugged on both surfaces, four or five teeth on each side. *Peduncles* axillary, at the top of the branches, becoming finally six times the length of the leaves. A native of the East Indies. 4. *C. lymphitifolia*. Mart. 35. Houston MSS. "Leaves oblong-egg-shaped, scabrous; flowers in terminal racemes." *Root* perennial. *Stem* three feet high. *Leaves* four or five inches long, one inch and a half broad in the middle, rough,

like those of comfrey. *Flowers* yellow; on branched peduncles. Sent by Dr. Houtton to Miller from La Vera Cruz. 5. *C. foliolosa*. Willd. 3. "Leaves oblong, nearly entire, half embracing the stem, downy; peduncles one-flowered, finally much elongated." *Stem* much branched, diffuse, downy; branches thick set with leaves. *Leaves* alternate, downy on both surfaces. A native of the East Indies. 6. *C. patula*. Mart. 30. Willd. 4. Hort. Kew. 3. 184. "Leaves elliptical, serrated, villous underneath; calyxes somewhat globular; scales lanceolate, awl-shaped; bran being spreading." *Root* annual. *Stem* a foot and half high, taper, slightly covered with a mealy down. *Leaves* about four inches long, and two broad in the middle, diminishing gradually in size on the upper part of the stem and branches. *Flowers* purple; peduncles at the end of the branches generally three-flowered; calyxes soft and swollen in the middle; scales small and acute. A native of the northern parts of China, producing a succession of flowers from July to the end of autumn. 7. *C. paniculata*. Willd. 5. "Leaves oblong, sessile, downy on both surfaces; lower ones petioled; toothed; teeth reflexed; stem paniced; corymbs peduncled, axillary." *Stem* four feet high, about the thickness of a swan's quill, erect, cylindrical, hollow, striated; branches alternate, erect, simple. *Leaves* on the stem petioled, on the branches sessile. *Calyx*-scales linear-awl-shaped, spreading, reflexed. A native of the East Indies. 8. *C. bifrons*. Linn. Sp. Pl. 7. Mart. 9. Willd. 6. (*Eupatorium conyzoides maxima canadensis*; Pluk. alm. 141. tab. 87. fig. 4.) "Leaves ovate-oblong, embracing the stem, serrated, wrinkled." *Root* thick, fibrous. *Stems* several, erect. *Leaves* rough. *Flowers* yellow, in round terminal bunches. A native of Canada, flowering in July. Disting. from *Inula bifrons*. 9. *C. bifoliata*. Linn. Sp. Pl. 9. Mart. 10. Willd. 7. (*Eupatorium conyzoides integro jacobææ folio*; Pluk. alm. 140. tab. 177. fig. 1. *C. axillaris*; Lam. 2.) "Leaves oval, toothed; peduncles two-leaved; bractes opposite;" Linn. "Leaves cuspidate-toothed; lower ones petioled, roundish egg-shaped; upper ones sessile, oblong, wedge-shaped at the base; racemes axillary, leafy at the base, peduncled;" Willd. "Leaves inversely egg-shaped, unequally and finely toothed, petioled; racemes axillary, leafy at the base, forming a terminal panicle;" Lam. *Stem* a foot and half or two feet high, simple, slightly striated, downy. *Leaves* alternate, soft, green, and almost smooth above, cinereous and downy underneath. *Flowers* small; bractes truly alternate, though some seem opposite; calyxes villous, reddish; Lam. Described from a dried specimen in the Herbarium of Commerçon. In smaller specimens, probably the growth of a poor soil, the peduncles are one-flowered, with opposite bractes. In larger specimens the racemes are from three to six-flowered; peduncled, furnished with two, either opposite or alternate bractes, and sometimes with four alternate ones; bractes oblong, sessile, generally entire; Willd. A native of the East Indies and the Isle of France. 12. *C. pubigera*. Linn. Mant. 113. Mart. 11. Lam. 9. Willd. 8. Lour. Cochinchin. 495. (*Sonchus volubilis*; Rumph. Amb. 5. 299. tab. 103. fig. 2.) "Leaves oblong, somewhat toothed, nearly sessile; peduncles woolly, about two-flowered." *Branches* with a few scattered hairs. *Leaves* alternate, wedge-shaped at the base, green on both surfaces, with a few scattered hairs, not scabrous; Linn. *Stem* somewhat shrubby, eight feet high, cylindrical, climbing, branched. *Leaves* broad-lanceolate, somewhat pubescent, scattered, petioled. All the florets intermixed in a simple down; Lour. A native of the East Indies and China. 11. *C. striata*. Willd. 13. "Leaves linear-lanceolate, attenuated at the base, quite entire, hairy; flowers in corymbs; stem paniced, stiff." *Root* annual. *Stem* a foot

and half high, erect; branches short, erect, close to the stem. *Leaves* alternate, numerous, an inch long, obtuse, with a point, narrowed at the base. *Corymbs* small, fatigiate at the tops of the branches. *Flowers* small; down reddish. A native of the East Indies. 14. *C. canescens*. Linn. jun. Sup. 367. Mart. 5. Willd. 18. Thunb. prod. 153. (*C. pinnifolia*; Lam. 18. *Elechyrium peregrinum angustifolium* flocculis spadiceis in apices crispatis delinquentibus; Seb. Mif. 1. 38.) "Leaves linear, stiff, folded back at the edges; downy underneath; panicle fatigiate." Whole plant hoary. *Stem* from twelve to fifteen inches high, nearly simple, cylindrical, stiff, lateral branches short. *Leaves* three inches long, a line broad. *Flowers* purple; calyx short; scales imbricated, lanceolate, villous, only half the length of the flowers; down intermixed with the florets; giving the flowers a feathered appearance. 15. *C. oleifolia*. Lam. 22. Willd. 15. (*C. orientalis pumila incana oleæfolio*; Tourn. cor. 33.) "Leaves lanceolate, attenuated at the base, obtuse, downy; corymb terminal; stem simple." *Root* perennial. *Stem* seven or eight inches high, erect. *Leaves* not an inch long, three or four lines broad, scattered. *Flowers* in a close fatigiate corymb; peduncles scaly; calyx oblong; scales closely imbricated, egg-shaped, obtuse; down reddish, longer than the calyx. A native of America. 16. *C. viscosa*. Mart. 34. Hoffb. MSS. "Leaves egg-shaped, serrated, villous; flowers axillary and terminal." *Root* annual. Whole herb viscid. *Stem* a foot high, branched. *Leaves* one at each joint, sessile. *Flowers* white; peduncles slender; generally three-flowered. *Seeds* chaffy. A native of La Vera Cruz. 17. *C. mollis*. Willd. 19. "Leaves rhomboid-egg-shaped, nearly sessile, toothed, pubescent, tomentous underneath; stem naked upwards; flowers in a corymb." *Branches* cylindrical, striated. *Leaves* an inch long, very white underneath. *Corymb* terminal; branches alternate, few-flowered, divaricated; peduncles one-flowered; calyx-scales linear-lanceolate; down long, snow-white. 18. *C. chenopodiifolia*. Lam. 12. Willd. 20. "Leaves ovate-deltoid, unequally serrated, soft; racemes short, terminating the stem and branches." *Stem* tomentous upwards. *Leaves* alternate, petioled, tomentous when young, afterwards nearly smooth. *Flowers* whitish, sessile, four or five together at the top of the stem and branches; calyx-leaves linear, very narrow, tomentous, almost equal; bractes clothed with fine silky decumbent hairs. A native of the Isle of Bourbon. There is a variety with broader, roundish-egg-shaped leaves, a little cut at the base. 19. *C. cinerea*. Linn. Sp. Pl. 14. Mart. 16. Lam. 3. Willd. 21. (*Senecio india foliis ternis crenatis*; Burm. Zeyl. 211. tab. 96. fig. 1. *S. indicus atriplicis folio*; Mor. Hist. 106. tab. 17. fig. 7. *Olus serophinum*; Rumph. 6. tab. 14. fig. 1.) "Leaves egg-shaped, slightly crenate; lower ones obtuse, upper ones acute; panicles naked, terminal." *Root* annual. *Stem* about a foot high, slender, pubescent. *Leaves* small, rather distant, narrowed into a petiole, cinereous-green, whitish underneath. *Flowers* purple, small; peduncles branched, almost capillary; calyx-scales acute; down white, longer than the calyx. A native of the East Indies. 20. *C. prolifera*. Lam. 7. Willd. 22. (*Sonchus volubilis Javanus*; Rumph. 5. 299. tab. 104. 1?) "Branches proliforous at the top; leaves egg-shaped, toothed-angular, narrowed into a petiole; corymbs close, terminal." *Branches* finely striated, full of pith, scabrous, producing near the top some smaller villous branches, and giving the plant a proliforous appearance. *Leaves* small, acute, green, and almost smooth above, hoary, and clothed with short hairs underneath. *Corymb* almost sessile; calyx-scales awl-shaped, down white, the length of the calyx. A native of the island of Java. 21. *C. heterophylla*. Lam. 8. "Some of the leaves a little heart-shaped; others

others rounder; flowers panicled." *Stem* about a foot and half high, branched, finely striated, clothed with very short hairs. *Leaves* rather small, petioled, cinereous underneath. *Flowers* small; calyx-scales acute, purplish at the tip; down white, a little longer than the calyx. A native of the East Indies. 22. *C. lacera*. Lam. 5. Burm. Ind. 180. tab. 59. fig. 1. "Leaves somewhat lyrate, appearing torn, downy; flowers nodding." *Stem* about a foot and half high, simple, cylindrical, cottony. *Leaves* alternate, obtuse; lower ones petioled. *Flowers* in a small terminal panicle or raceme; peduncles axillary, very short, often in pairs; calyxes villous; scales imbricated, very narrow, awl-shaped; down whitish, not longer than the calyx. A native of Java. 23. *C. hirsuta*. Linn. Sp. Pl. 19. Mart. 19. Willd. 24. Burm. Ind. 180. Lour. Cochinchin. 495. "Leaves oval, quite entire, scabrous, hirsute underneath." *Stem* a foot high, upright, simple, cylindrical, hairy. *Leaves* scattered, somewhat acute, sometimes edged with very minute teeth. *Flowers* yellow, crowded, terminal; calyx short, hairy. A native of Java, China, and Cochinchina. 24. *C. pauciflora*. Willd. 25. "Leaves lanceolate-obovate, attenuated above and below, smooth, scabrous underneath, ferrated; branches one-flowered." *Root* annual. *Stem* from half a foot to a foot and half high, erect, striated, a little branched towards the top. *Leaves* an inch and half long, green. *Flowers* large, solitary, terminating the branches; calyx-scales awl-shaped; down scabrous. A native of Africa, about the river Senegal. 25. *C. aegyptiaca*. Mart. 27. Willd. 26. Hort. Kew. 3. 183. (*Erigeron aegyptiacum*; Linn. Mant. 112. E. ferratum. Forfk. aegypt. 148. C. capitata five globosa; Bocce. Sic. 13. tab. 7. fig. B. Morif. hist. 3. 114. tab. 20. fig. 14.) *Jacobaea aegypt. fol. glauco coronopi*; Boerh. lugdb. 99.) "Leaves oblong-spatulate, toothed, hairy; flowers in somewhat globular panicles; calyx-scales awl-shaped, soft." *Root* annual. *Stem* a foot and half high, erect, somewhat striated, green, pubescent, a little viscid. *Leaves* alternate, sessile, scarcely half embracing the stem, rather obtuse. *Flowers* yellow, terminal, four or five together, on purplish peduncles; calyx roundish; scales awl-shaped; florets minute; those of the circumference numerous; piths yellow, quickly vanishing, surrounding the disk with a broad downy ring. A native of Sicily and Egypt. 26. *C. Gouani*. Linn. Mant. 469. Willd. 27. (*Erigeron Gouani*; Jacq. Hort. 3. 43. tab. 79.) "Leaves lanceolate, serrated near the top, scabrous at the edges; lower ones inversely egg-shaped; flowers clustered; calyx-scales lanceolate, membranous at the margin." *Stem* a foot high, simple, with a few erect hairs. *Leaves* alternate, half embracing the stem, even-surfaced. *Flowers* panicled; calyx roundish, imbricated; scales smooth, convex, close; florets of the circumference apetalous, more numerous than those of the disk; stigma bifid, oblong. A native of the Canary Islands. 27. *C. fengalenfis*. Willd. 28. "Leaves oblong, inversely egg-shaped, toothed; teeth near the base; deeper flowers in somewhat of a clove corymb." *Stem* striated, hairy, hispid. *Leaves* sessile, scabrous on both surfaces with callous points; lower ones an inch long. *Flowers* at the top of the stem; calyx-scales linear-lanceolate, scabrous. A native of Africa, about the river Senegal. 28. *C. dentata*. Willd. 29. "Leaves lanceolate, embracing the stem, dilated at the base, pubescent, toothed; branchlets one-flowered; peduncles elongated; stem hairy." *Stem* cylindrical, branched. *Leaves* an inch long. *Flowers* on long peduncles; calyx-scales linear-awl-shaped, scabrous; lower ones ciliated. A native of Africa about the river Senegal. 29. *C. villosa*. Willd. 30. "Leaves lanceolate, embracing the stem, dilated at the base, villous, ferrated; branchlets one-flowered;

stem villous." But little different from the preceding. 30. *C. aurita*. Linn. jun. Sup. 367. Mart 24. Lam. 17. Willd. 31. "Leaves toothed; root-ones smoothish, inversely egg-shaped; stem ones oblong, pubescent, somewhat pinnatifid at the base; stem panicled; calyx-scales awl-shaped; outer ones hairy." *Root* annual. *Stem* a foot high, erect, red, hairy; branches erect, simple. *Root-leaves* marked with red veins, widely ferrated, and crenated between the ferratures; stem-leaves somewhat lanceolate, soft; ferrated near the top; sinuated in the middle; somewhat pinnated at the bottom; ferrate-toothed along the whole margin; pinnae two or three on each side, spreading. *Flowers* white, small; those of the circumference linear; piths longer, erect. A native of the East Indies. 31. *C. guineensis*. Willd. 32. "Leaves toothed; root-ones scabrous, inversely egg-shaped; those of the stem lanceolate, villous, somewhat pinnatifid at the base; flowers in corymbs; calyx-scales lanceolate; outer ones villous." *Root* annual. *Stem* a foot and half or two feet high, erect, villous. *Root-leaves* an inch and half or two inches long, obtuse, remotely ferrated; lower stem-leaves inversely egg-shaped, an inch long, widely-toothed, deeply auriculate-toothed at the base; those of the branches half an inch long, lanceolate, villous, toothed, somewhat pinnatifid at the base; teeth profound; teeth of the base quite entire, not ferrated as in the preceding. *Flowers* in a terminal corymb; calyx-scales lanceolate, acute; outer ones shorter, villous. Nearly allied to the preceding, but differs in the form of the calyx, and the teeth of the lower leaves. A native of Guinea. 32. *C. amplexicaulis*. Lam. 10. Willd. 35. "Leaves lanceolate, nearly embracing the stem, somewhat toothed, hairy; stem branched, divaricated; peduncles one-flowered." *Root* annual. *Stem* from half a foot to a foot high. *Root-leaves* inversely egg-shaped, toothed; those of the stem oblong or lanceolate, remotely toothed, almost entire towards the top of the branches. *Flowers* resembling those of *C. aurita*; peduncles axillary, solitary, an inch or an inch and half long. A native of the East Indies. 33. *C. obliqua*. Willd. 34. (*Erigeron obliquum*; Linn. Mant. 572.) "Leaves egg-shaped, nearly embracing the stem, finely toothed, oblique; stem much branched; peduncles one-flowered." *Root* annual. *Stem* three inches long, erect, cylindrical, hairy. *Leaves* alternate, veined, not wrinkled, fragil, beset with a few scattered hairs. *Flowers* yellow, solitary, numerous; calyx cylindrical, pubescent; scales numerous, equal, awl-shaped, approximate; florets of the circumference scarcely conspicuous, numerous; ligmas of the disk erect, of the circumference spreading. A native of the East Indies. 34. *C. orientalis*. Willd. 35. (*C. orientalis Asteris attici folio*; Tourn. Cor. 35.) "Leaves scabrous, ferrated; lower ones inversely egg-shaped, petioled; upper ones lanceolate, sessile; flowers terminal, clustered." *Root* perennial. *Stem* cylindrical, striated, hispid-scabrous, branched at the upper part; branches short, simple. *Flowers* yellow, crowded, in a sort of corymb at the top of the stem and branches; calyx-scales awl-shaped. A native of Armenia. 35. *C. ficula*. Willd. 36. (*Erigeron ficulum*; Linn. C. ficula annua, foliis atro-virentibus; Boc. Sic. 62. tab. 31. fig. 4. Morif. hist. 3. 115. tab. 20. fig. 28. Pluk. phyt. 168. fig. 2.) "Leaves linear-lanceolate, scabrous, nearly entire, revolute at the edges; stem panicled; peduncles one-flowered, leafy; lower calyx-scales lax." *Root* annual. *Stems* red. *Flowers* small; peduncles covered with minute linear, recurved leaves. In other respects resembling *erigeron graveolens*, but without a ray. Allied also to *inula pulicaris*. A native of Sicily and the south of France. 36. *C. fatida*. Willd. 37. (*Erigeron fetidum*. Linn. Seneceio africanus.

afficans peregrinis; Pluk. alm. 343. tab. 223. fig. 3.) "Leaves linear, attenuated at the base, mucronate; corymbs peduncled, close, terminal." *Root* perennial, too nearly allied to *inula foetida*, but has no ray. A native of Africa. 37. *C. pungens*. Lam. 21. Willd. 38. (*C. membranacea*; Vahl. act. 1719. p. 501.) "Leaves tri- or quadrifidate, awl-shaped, pungent; stem panicled, angular, smooth." *Stem* a foot high, branched. *Leaves* alternate, distant; two lateral segments very short. *Flowers* yellow, large, solitary; terminal; calyx top shaped or oblong, imbricated; scales egg-shaped, smooth; inner ones mucronate; down reddish, the length of the calyx. A native of Egypt, about Grand Cairo.

** *Stems shrubby.*

38. *C. fasciata*. Linn. Sp. Pl. 3. Mart. 4. Lam. 23. Willd. 45. (*Helichrysum folveltrii* Smilax; Bauh. Prod. 123. *Helichrysum folveltre latifolium*; Tournef. 452. *Helichrysum capitulis singularibus brevibus*; Mor. hist. 3. 87. H. taxatæ; Boec. Meth. 111. tab. 104. *Chrysothamnus latifolia major*; Barcl. Ic. 425.) "Leaves linear, somewhat toothed; peduncles very long, one-flowered." *Root* perennial. *Stems* about a foot high, slender, branched, cottony, a little procumbent when young. *Leaves* an inch and half long, two lines broad, green above, whitish underneath. *Flowers* yellow, solitary, on long peduncles; calyx-scales oblong, somewhat scariosus at the tip, lax. A native of Spain, Italy, the South of France, Palestine, &c. 39. *C. rubra*. Linn. Mant. 113. Mart. 6. Willd. 41. (*C. faxatilis* β. Lam. C. tomentosa; Forsk. Ægypt. 75.) "Leaves spatulate, somewhat toothed, downy; peduncles elongated, one-flowered." Very like the preceding, but the flowering stems have axillary branches of smaller leaves. *Leaves* broader, shorter, more obtuse, all except the lowermost white on both sides. *Flowers* yellow; peduncles shorter and thicker, with one or two lanceolate, not brittle-shaped, bractes; calyx-scales not acute and patulous, but rather obtuse and closely imbricated; outer ones egg-shaped, brown at the tip; middle ones linear, obtuse, with a brown line on the back. A native of Arabia. 40. *C. jordanii*. Linn. Mant. 466. Mart. 3. Lam. 22. Willd. 39. (*Gnaphalium fordii*; Linn. Sp. Pl. *Elichrysum sylvestre angustifolium*, capitulis conglobatis; Bauh. Pin. 264. *Stachæus citrina spuria*, longioribus foliis; Bar. Ic. 368. & 277.) "Leaves linear, quite entire; peduncles long, three-flowered." Nearly allied to *C. faxatilis*. *Stem* resembling that of lavender, about a foot high, slender, cottony. *Leaves* very narrow, soft, cottony, whitish. *Flowers* small; peduncles long, slender, cottony; calyxes conic; scales imbricated, a little scariosus at the tip. A native of the South of France and Italy. 41. *C. ericoides*. Lam. 51. Willd. 43. "Leaves linear, revolute, downy underneath; flowers globular, solitary, terminating the branches." *Stem* much branched; branches downy near the top. *Leaves* resembling those of *physica ericoides*, small, numerous, approximate, scattered, spreading. *Flowers* at the top of the lateral branches, which are so disposed as to give the stems the appearance of being covered with flowers; calyx-scales linear, scarcely imbricated; outer ones downy on the back; down reddish. A native of Peru. 42. *C. thymoides*. Lam. 42. Illus. Pl. 697. fig. 5. Willd. 44. "Leaves embracing the stem, egg-shaped, acute, keeled, compressed, imbricated in two rows; flowers solitary, sessile, lateral." A very singular plant in the form and disposition of its leaves, with somewhat of the habit of a *Thunia*. *Stem* a foot and half high, cylindrical, cottony towards the summit; branches in two rows, gradually diminishing in length from the bottom of the stem to the top. *Leaves* small, nu-

merous, concave, villous on the inside. *Flowers* axillary; calyx-scales few, oblong, smooth and even; down reddish. A native of Peru, found by Joseph Justif. 43. *C. cupressiformis*. Lam. 43. Ill. Pl. 697. fig. 3. Willd. 45. "Whole plant smooth; leaves minute, inversely egg-shaped, keeled, imbricated in four rows; flowers 4 leaved, terminal." A plant as singular as the preceding, with the habit and foliage of a cypress, and the flowers of an *Athanasia*. *Stem* rather thick, stiff, slender branched. *Leaves* thickly covering the branches. *Flowers* yellow, solitary, sessile; calyx cylindrical, scales imbricated, obtuse, inner ones the largest. Found by Commerçon in the Straits of Magellan. 44. *C. hypoides*. Lam. 44. Ill. Pl. 697. fig. 2. Willd. 46. "Leaves awl-shaped, imbricated, pressed close to the branches; flowers solitary, terminal." A shrub six or seven inches high. *Stem* stiff; branches erect, generally fasciculated so as to resemble *lycopodium selago*. *Leaves* three lines long, smooth, convex at the back, with two lateral furrows. *Flowers* white or lemon-coloured, sessile; calyx-scales imbricated, similar to the leaves but smaller; down white, twisted and appearing curled. Found by Commerçon in the Isle of Bourbon. 45. *C. hypoides*. Lam. 45. Willd. 47. "Prostrate; leaves linear, crowded, hoary underneath; branchlets terminated with a sessile flower." A small shrub. *Stem* divided into numerous, short, procumbent branches, throwing out fibrous roots; branches erect, in close tufts somewhat in the manner of a *Bryum*. *Leaves* small, numerous, placed very near each other, green above, whitish and cottony underneath. *Flowers* yellow, solitary; calyx almost cylindrical, containing from six to eight florets; scales imbricated, oblong; down the length of the calyx. Found by Commerçon in the Straits of Magellan. 46. *C. linearifolia*. Lam. 49. Willd. 48. "Smooth; leaves linear, neatly entire, narrowed towards the base; racemes short, leafy, terminal." A small much-branched shrub; branches slender, leafy towards the top, slightly striated. *Leaves* an inch long, two lines broad. *Flowers* sessile or nearly so; calyx oblong, imbricated; inner scales linear-lanceolate, white and scariosus at the edges; down reddish, the length of the calyx. A native of the Isle of Bourbon. 47. *C. punctata*. Willd. 49. "Leaves linear, acuminate, attenuated at the base, slightly marked with concave dots; peduncles very long, one-flowered." *Branches* cylindrical, striated, smooth. *Leaves* an inch and half long, alternate, crowded, somewhat fleshy, rather scabrous, quite entire and scabrous at the edges. *Peduncles* at least half a foot long, solitary or in pairs, bect with awl-shaped distant scales; calyx-scales lanceolate, acute; down reddish. A native of Chili. 48. *C. canariensis*. Willd. 50. "Leaves linear, attenuated at the base, rather obtuse, ferrated; corymbs terminal." *Branches* cylindrical; younger ones pubescent. *Leaves* alternate, crowded, spreading, green on both surfaces, somewhat scabrous. *Flowers* yellow; peduncles fealy; calyx-scales oblong, closely imbricated. A native of the Canaries. 49. *C. incana*. Willd. 51. (*Erigeron incanum*; Vahl. Symb. 1. 72.) "Leaves linear, attenuated at the base, somewhat toothed, downy; corymbs terminal." *Branches* downy. *Leaves* sessile, approximate, rather acute, a little revolute at the margin. *Corymbs* many-flowered; calyx-scales linear, somewhat villous; down ferruginous, longer than the calyx. A native of Arabia Felix. 50. *C. inuloides*. Mart. 25. Willd. 52. Hort. Kew. 3. 182. (*Chrysothamnus dichotoma*; Linn. jun. Supp. 359. Jacq. Ic. Rar. 1. tab. 171.) "Leaves wedge-shaped-linear, obtuse, crenate-toothed, smooth; anthers two bristled." *Stem* smooth, profliferous, dichotomously branched. *Leaves* rather short, a little obtuse, somewhat scabrous, with minute points.

Flowers

Flowers yellow, in terminal simple corymbs; peduncles hirsute; bracts awl-shaped; calyx purplish. A native of rocky ground in the island of Teneriffe. 51. *C. tomentosa*. Mart. 31. Mill. Dict. Houst. MSS. "Leaves oblong-egg-shaped, downy, cinereous underneath, flowers terminal, on branching peduncles." *Stem* ten or twelve feet high, much branched. *Leaves* alternate, on short petioles. *Flowers* white, in loose unilateral spikes. A native of La Vera Cruz in New Spain. 52. *C. cerylocomoides*. Willd. 53. Desfont. Atl. 2. 269. tab. 232. "Leaves linear, quite entire, villous; hairs pressed close; peduncles leafy, one-flowered." Whole plant cinereous green, clothed with short soft hairs pressed close to the surface. *Stems* a foot and half high, slender, branched. *Leaves* spreading. *Flowers* in loose panicles, on filiform peduncles; calyx ovate-cylindrical, scales linear, awl-shaped, imbricated, pubescent, membranous at the edges; florets of the circumference very small, scarcely conspicuous, without teeth. A native of Barbary. 53. *C. coronopus*. Lam. 35. Willd. 54. "Viloid leaves linear-lanceolate, ferrated serratures oblong, turned upwards; flowers globular in terminal corymbs." 54. *C. glutinosa*. Lam. 32. "Leaves lanceolate, serrated, green on both surfaces; viloid when young." A shrub four or five feet high, smooth. *Branches* lax, cylindrical, slightly striated, leafy towards the summit. *Leaves* ever-green, petioled, acute, shining. *Flowers* yellow, numerous, small, in a compound terminal corymb; calyx roundish, imbricated with egg-shaped scales; florets of the circumference very small; down white, short. A native of the Isle of France. 55. *C. appendiculata*. Lam. 31. Willd. 66. "Leaves lanceolate, ferrated, downy underneath, appendiced at the base." *Branches* tubercled, cottony towards the summit. *Leaves* near four inches long, about an inch broad, green above, cottony and whitish underneath, furnished at the base with some narrow appendages which are decurrent along the petiole. *Flowers* yellow, numerous, in a compound terminal corymb; peduncles and calyx cottony; bracts at the divisions of the peduncles linear. Found by Commerçon in the Isle of Bourbon. 56. *C. falsifolia*. Mart. 32. Lam. 33. Willd. 55. "Leaves linear-lanceolate, quite entire, revolute at the edges, attenuated upwards and downwards, downy underneath, corymb terminal, compound." *Branches* cylindrical, tubercled; younger ones downy. *Leaves* resembling those of *Salix viminalis*, two inches long, alternate, petioled. *Corymb* divaricated; peduncles downy; calyxes cylindrical, imbricated; outer scales egg-shaped, pubescent; inner ones longer, linear, smooth. There is a variety with very narrow, almost filiform leaves. 57. *C. laurifolia*. Lam. 34. Willd. 56. "Leaves oblong-lanceolate, narrowed at the base into a petiole, nearly entire; corymb terminal, compound, spreading." A very large shrub. *Branches* cylindrical, almost smooth, leafy on their upper part. *Leaves* about six inches long, rather more than an inch broad, feathered, slightly pubescent, sometimes slightly crenulate. *Flowers* numerous, globular; peduncles clothed with short, woolly hairs; calyx-scales ovate lanceolate, almost smooth; down reddish. Found by Commerçon in the Isle of Bourbon. It seems to have some affinity with *Baccharis arborca* of Linnæus. There is a variety with smooth leaves broader at the top, smaller flowers and longer down, which perhaps may prove a distinct species. 58. *C. uniflora*. Mart. 38. Mill. Houst. MSS. "Leaves lanceolate, acute, sessile; flowers solitary, lateral, calyxes coloured." *Stem* eight or ten feet high, with numerous, long, slender branches. *Leaves* three inches long, three quarters of an inch broad in the middle. *Leaves* growing close to the stems of the smaller branches. *Flowers* white, with a purple calyx,

sitting close to the base of the leaves, one at each joint of the branch. A native of Carthage in New Spain. 59. *C. purpurascens*. Mart. 42. Willd. 9. Swartz. prod. 112. (*C. odorata* minor; Brown. Jam. 318. *C. major* odorata; Sloan. Hist. 1. 258. tab. 158. fig. 1.) "Leaves ovate-lanceolate, ferrated, somewhat downy; stem somewhat herbaceous, simple below, corymbous above; flowers egg-shaped." *Stem* four or five feet high (sixteen or twenty inches; Brown.) *Leaves* on the stem and lower branches four inches long, one inch broad in the middle, on short petioles; on the upper branches much narrower, acute. *Flowers* purple, in round terminal bunches. A native of Jamaica. 60. *C. trinervis*. Mart. 37. Lam. 13. Willd. 10. "Leaves egg-shaped, smooth, three-nerved, quite entire, sessile; flowers in terminal spikes; stem shrubby." Mill. "Leaves ovate-lanceolate, quite entire, smooth, three-nerved; stem-leaves alternate, those of the branches nearly opposite." Lam. *Stem* six or seven feet high, dividing into several woody branches. *Flowers* white. Sent by Robert Millar from Carthage in New Spain. Miller. *Stem* smooth, leafy, full of pith, with numerous lateral and axillary branches. *Leaves* acute, on very short petioles. *Flowers* in a naked, moderate sized, panicle at the summit of the stem and branches; calyx smooth, imbricated with egg-shaped scales; down reddish, longer than the calyx. Found by Commerçon in Brazil. It perhaps may be doubted whether Millar's be the same plant. 61. *C. ferrulata*. Lam. 14. Willd. 11. "Leaves ovate-lanceolate, broader at the base, acutely ferrated, petioled, nearly smooth; corymbs branched, terminal." *Stem* two or three feet high, hard, full of pith, cylindrical, almost smooth, branched. *Leaves* alternate, acute, three-nerved. *Calyx* smooth, imbricated; down reddish. A native of Brazil. 62. *C. madagascariensis*. Lam. 15. Willd. 12. "Leaves lanceolate-linear, dilutely ferrated, smooth; panicle cymous, lax, terminal." *Leaves* three or four inches long, four or five lines broad, erect, quite smooth, on short petioles. *Flowers* small; calyx short, smooth, imbricated; down reddish. A native of Madagascar. 63. *C. candida*. Linn. [Sp. Pl. 12. Mart. 13. Lam. 19. Willd. 16. (*C. cretica* fruticosa, folio molli candidissimo; Tourn. Cor. 33. *C. saxatilis* folio flaginis; Buxb. Cent. 2. 23. tab. 17. *Jacobæa cretica* lucana; Barr. Ic. 217.) "Leaves egg-shaped, downy; flowers crowded; peduncles lateral and terminal." Whole plant white and cottony. *Stem* somewhat shrubby, six inches high or more, rather slender, erect, cylindrical. *Leaves* on long petioles, entire, soft. *Flowers* purple; peduncles one, two, or three-flowered; bracts oblong, sessile, situated just below the calyx; calyx short, imbricated; scales oblong, lanceolate, lax. A native of the island of Candia. Linnæus mentions a rayed variety. 64. *C. verbascifolia*. Willd. 17. (*C. verbasci* foliis ferratis; Tourn. It. 455. Alter tomentosus luteus verbasci folio; Bocc. Sic. 60. tab. 31. fig. 2. After ragufinus; Zann. Hill. 33.) "Leaves egg-shaped, petioled, crenate, obtuse, downy, wrinkled with veins; peduncles one-flowered, solitary, terminal and axillary, thickened upwards." *Stems* like those of *C. candida*. *Leaves* an inch, or an inch and half long, on long petioles. *Flowers* yellow. In other respects similar to the preceding. A native of Sicily, Greece, and Armenia. 65. *C. balsamifera*. Linn. Sp. Pl. 13. Mart. 15. Lam. 11. Willd. 18. (*C. odorata*; Rumph. Amb. 6. tab. 24. fig. 1.) "Leaves oblong-lanceolate, doubly toothed, acute, downy underneath, wrinkled with veins; petioles toothed; corymb terminal, divaricated." *Stem* from four to six feet high, branched. *Leaves* large, profoundly toothed at the base, where they appear pinnatifid,

tifid, very soft; upper ones entire. *Flowers* in terminal panicled racemes; peduncles and calyx clothed with a fine, whitish cottony down; calyx-lobes narrow, awl-shaped; down reddish, longer than the calyx. A native of the East Indies. It has an aromatic smell, resembling that of sage. 66. *C. cinerifolia*. Linn Sp. Pl. 16. Mart. 18. Lam. 4. Willd. 73. Lour. Coch. 496. Burm. Ind. 179. (Senecio amboniensis; Rumph. Amb. 6. 36. tab. 14. fig. 2.) "Leaves lanceolate-egg-shaped, reflex-ferrated, downy underneath; flowers terminal, clustered." *Stem* somewhat shrubby, four feet high, erect, cylindrical, smooth, branched at the top. *Leaves* harshish, petioled, alternate. *Involucres* yellow, peduncled, terminal. *Receptacles* somewhat villous. *Lour.* *Flowers* seldom more than three together. Linn. "The plant described by La Marek, which is cultivated in the Paris garden, has a stem only a foot high, and bluish purple flowers. In other respects it corresponds with the above description." 67. *C. corymbosa*. Mart. 35. Mill. Houft. MSS. "Arborescent; leaves lanceolate; flowers in terminal corymbs, on branching peduncles." *Stem* fourteen or sixteen feet high, divided at the top into many woody branches. *Leaves* alternate, on short petioles. *Flowers* white. Sent by Dr. Houlston from La Vera Cruz in New Spain. 68. *C. laevis*. Mart. 41. "Leaves ovate-oblong, obtuse, ferrated, half embracing the stem; flowers in terminal corymbs." *Stem* ten or twelve feet high, sending out many strong woody branches. *Flowers* purple. A native of Campeachy. 69. *C. tortuosa*. Linn. Hort. Clif. 465. Mart. 12. Willd. 57. "Stem crooked; leaves ovate-oblong, quite entire; racemes reflexed." *Branches* somewhat hirsute, striated, simple. *Leaves* veined, scabrous on both surfaces, on very short petioles. *Flowers* in simple, short, terminal, and axillary racemes, alternate, sessile, turned upwards; calyx roundish, imbricated; scales egg-shaped, inner ones lanceolate; down fetaceous, fastigiata. A native of La Vera Cruz. 70. *C. scandens*. Mart. 36. Mill. Houft. MSS. "Leaves lanceolate, scabrous, nerved, sessile; racemes recurved; flowers ascending; peduncles lateral; stem climbing." *Stem* fourteen or sixteen feet high, much-branched. *Leaves* the size of those of the bay tree, and full as thick in their texture. *Flowers* white, in long unilateral racemes. A native of La Vera Cruz. 71. *C. rigida*. Mart. 43. Willd. 58. Swartz. Prod. 113. "Leaves petioled, inversely egg-shaped, entire, scabrous, veined underneath; spikes zig-zag; flowers unilateral, in pairs." A native of Jamaica. 72. *C. amygdalina*. Lam. 38. "Leaves petioled, ovate-lanceolate, ferrated, somewhat downy; flowers in a terminal corymb." *Leaves* resembling those of the almond-tree, much veined underneath. *Calyx* almost smooth, short, imbricated; scales lanceolate, a little scarious at the edges; down reddish. Found by Commerçon in the Isle of Bourbon. There is a variety with nearly sessile leaves, clothed on both surfaces with a whitish almost silky down. 73. *C. pedunculata*. Mart. 40. "Leaves ovate-lanceolate, three-nerved; peduncles very long, terminal; flowers in a corymb." *Stem* six or seven feet high, branched. *Leaves* smooth, alternate, on short petioles. *Flowers* purple; calyx-scales short, chaffy. A native of Campeachy. 74. *C. melastemoides*. Lam. 40. "Leaves egg-shaped, sessile, toothed, three-nerved, naked and wrinkled above, clothed with a silky down underneath." *Leaves* alternate, sometimes five-nerved, an inch and half long. *Flowers* collected into a dense terminal corymb; calyx-scales linear-acute, almost equal, a little scarious at the edges; down reddish, a little longer than the calyx. Found by Commerçon in the Isle of Bourbon. 75. *C. lobospermifolia*. Lam. 41. Willd. 62. "Leaves lanceo-

late, toothed at the tip, hairy on both surfaces, crowded; inner calyx-scales div." A humble shrub, not more than four or five inches high. *Stem* branched; branches leafy at the summit. *Leaves* narrowed towards the base, almost three-nerved, near an inch and half long. *Flowers* in a terminal corymb; peduncles villous, with narrow bractes; calyx-scales linear-acute; outer ones villous. Found by Commerçon in the Isle of France. 76. *C. lobotryfolia*. Lam. 37. Willd. 67. "Leaves sessile, oblong, quite entire, somewhat downy; corymb terminal, villous; flowers clustered." *Leaves* four or five inches long, one inch broad, growing near each other at the top of the branches, clothed on both surfaces with a cottony reddish down. *Flowers* from four to six in a corymb; peduncles villous; calyx-scales linear, villous; down reddish, longer than the calyx. Found by Commerçon in the Isle of Bourbon. 77. *C. panamerisii*. Willd. 64. "Leaves sessile, ovate-lanceolate, leabrous, quite entire, triply-nerved; panicle terminal." *Stem* cylindrical, striated, smooth. *Leaves* an inch and half long, regularly veined. *Peduncles* long, one or two-flowered; calyx-scales oblong, adpressed; down reddish. 78. *C. pyriformis*. Lam. 36. Willd. 65. "Leaves egg-shaped, acuminate, somewhat toothed, smooth; corymb panicled, lax." *Branches* smooth. *Leaves* alternate, petioled. *Flowers* whitish; calyx short, smooth, imbricated; down reddish, longer than the calyx. Found by Commerçon in the island of Java. 79. *C. argentea*. Lam. 24. Willd. 67. "Leaves egg-shaped, tomentous-silky, half embracing the stem; flowers fissile, terminal, clustered." Abundantly clothed, like a graphalium, with a silvery silky down. *Stem* cylindrical, simple. *Leaves* scattered, numerous. *Flowers* yellow, two or three together; flowers shorter than the calyx; calyx-scales narrow, erect, bearded." Found by Commerçon in the Isle of Bourbon. 80. *C. populosifolia*. Lam. 25. Willd. 68. "Leaves heart-shaped, petioled, downy, quite entire; calyxes hemispherical." *Branches* short, thick, stiff, knotty, cottony, striated, leafy towards the summit. *Leaves* acute. *Flowers* large, from five to seven in a terminal corymb; peduncles an inch long, simple, thickened under the calyx, angular; calyx cottony, imbricated; flowers numerous; down reddish, longer than the calyx, stiffish. Found by Commerçon in the Isle of France. 81. *C. carolinensis*. Willd. 69. Jacq. Ic. rar. 3. tab. 585. "Leaves ovate-lanceolate, quite entire, hoary, downy underneath; corymb terminal, compound." *Stem* five feet high. *Branches* cylindrical, downy. *Leaves* at least two inches long, petioled. *Flowers* violet, small; calyx-scales oblong, downy. A native of Carolina, Florida, and the Bahama Islands. 82. *C. odorata*. Linn. 15. Mart. 17. Lam. 26. Willd. 70. (*C. verbasci* folio undulato; Plum. Sp. 9. Burm. Amer. tab. 97. Tourn. Inst. 455. *C. major* odorata, five barbaensis; Sloan. Jam. Hist. 1. 258. tab. 152. fig. 1. β C. folio verbasci dentato; Plum. Sp. 9. Burm. Amer. tab. 97. Tourn. 455.) "Leaves egg-shaped, petioled, somewhat toothed, downy; flowers aggregate, in a corymb; calyxes hemispherical." An odoriferous shrub, from four to six feet high. *Stem* erect, branched. *Leaves* four or five inches long, more than two inches broad, some entire, others slightly toothed. *Flowers* purple; peduncles short, cottony; calyx imbricated, cottony; scales short, rather obtuse. A native of South America. 83. *C. arborescens*. Linn. Sp. Pl. 18. Mart. 20. Lam. 27. Willd. 71. Plum. Sp. 10. Burm. Amer. tab. 132. fig. 2. (*C. fruticosa* flore pallido purpureo; Sloan. Jam. 124. Hist. 1. 257. *Eupatorium erectum* hirsutum, foliis oblongis rugosis Brown. Jam. 313.) "Leaves egg-shaped, quite entire, acute, downy underneath; spikes recurved, unilateral, bractea

bracts reflexed." Four or five feet high. *Stem* erect, branched towards the top; branches divaricated, sub-divided, bending down, diverging, villous, with a blackish shagreen. *Leaves* two inches long, alternate, on short petioles, wrinkled, green above; pale, pubescent, and nerved underneath. *Flowers* pale purple, in a unilateral spike, or rather raceme. A native of South America. 84. *C. scorpioides*. Lam. 28. "Leaves ovate-lanceolate, petioled, entire, even-furcated; spikis unilateral, revolute, naked." Nearly allied to the preceding, and perhaps only a variety, but its leaves are even-furcated above, and almost smooth underneath. *Flowers* in linear racemes, recurved like the tail of a scorpion; calyx-scales lanceolate; inner ones a little villous at the tip; down white. Found by Commerçon in Brazil. 85. *C. frutescens*. Linn. Sp. Pl. 17. Mart. 1. Lam. 29. Willd. 72. (*C. frutescens*, cydoniaefolio; Plum. Sp. 9. Burm. Amer. tab. 95. fig. 1. Tourn. 455.) "Leaves egg-shaped, quite entire, obtuse; flowers sessile, alternate; branchlets zig zag." A petty shrub, resembling rosemary, but with longer and more slender branches. *Leaves* numerous, alternate, petioled, white with down. *Flowers* purple, axillary, solitary. A native of South America. 86. *C. incisa*. Mart. 29. Willd. 43. Hort. Kew. 3. 184. "Leaves egg-shaped, somewhat heart-shaped, hairy-viscid, toothed, auricled at the base; receptacle honey-combed." Whole plant clothed with viscid hairs. *Stem* three feet high. *Leaves* an inch long, petioled, deeply cut. *Corymbs* terminal, few-flowered, on long peduncles. A native of the Cape of Good Hope, found by Francis Masson. 87. *C. arbutifolia*. Lam. 52. Willd. 74. "Leaves egg shaped, veined, sharply toothed, crowded; flowers sessile, terminal, globular." A smooth shrub, a foot and half high, or more. *Branches* erect, generally fasciculated, leafy on their upper part, naked towards the base, and marked with the scars of fallen leaves, with a decurrent line on each side. *Leaves* scattered, sessile, approximate, narrowed at the base. *Flowers* rather large, clustered; calyx imbricated; scales ovate-lanceolate; down reddish. Found by Joseph Jussieu in Peru. 88. *C. myrsinites*. Lam. 48. Willd. 75. "Leaves lanceolate, two-toothed; flowers globular, somewhat clustered, terminal." *Branches* slender, leafy on the upper part, somewhat angular. *Leaves* small. *Flowers* very small, almost sessile; calyx imbricated; scales egg-shaped, acute, slightly ciliated on the upper edge. A native of St. Domingo. 89. *C. magellanica*. Lam. 47. Willd. 76. "Smooth; leaves very small, ovate-wedge-shaped, obsoletely three-toothed; flowers lateral, solitary, terminating the branchlets." A low, much-branched, spreading shrub. *Leaves* numerous, approximate, obtuse. *Flowers* oval, sessile; calyx-scales egg-shaped. Found by Commerçon in the Straits of Magellan. 90. *C. cuneifolia*. Lam. 46. Willd. 77. (*Erigeron triennetatum*; Linn. jun. Supp.?) "Smooth; leaves wedge-shaped, toothed towards the tip; flowers axillary and terminal, somewhat clustered." Much-branched, viscid. *Leaves* sessile. *Flowers* nearly sessile; calyx egg-shaped, imbricated; scales ovate-acute, a little scarious, fringed towards the tip; down reddish, longer than the calyx. Found by Commerçon near Monte Video, and at the Straits of Magellan. The younger Linnæus's plant was found by Mutis in New Mexico. 91. *C. retusa*. Lam. 39. Willd. 78. "Leaves ovate-wedge-shaped, retuse, crenated near the tip, pubescent; flowers globular, terminal, and axillary, forming a corymb." *Stem* a foot and half or two feet high; branches numerous, cylindrical, naked, and knotty below, leafy near the summit. *Leaves* scattered, thickish, succulent, with three or five longitudinal nerves. *Flowers* whitish; peduncles branched, pubescent; calyx hemispherical, imbricated; scales egg-shaped, inner ones

somewhat scarious and lacerated at the edges; hermaphrodite florets of the disk numerous; female ones of the circumference in two or three ranks. Found by Commerçon in the Isle of Bourbon. 92. *C. buxifolia*. Lam. 50. Willd. 79. "Smooth; branches stiff; leaves oblong-egg-shaped, quite entire; flowers lateral, sessile." About four or five feet high. *Branches* erect, close, somewhat filiform, angular, tubercled, leafy towards the summit. *Leaves* six or seven lines long, scattered, approximate, almost sessile, narrowed towards the base. *Flowers* axillary, solitary; calyx imbricated; scales ovate-oblong, slightly ciliated near the tip; down whitish. Found in Peru by Joseph Jussieu. 93. *C. cartagenensis*. (*C. spicata*; Mart. 39.) "Leaves egg-shaped, three-nerved; flowers in axillary spikes." *Stem* ten or twelve feet high, dividing at the top into many woody branches. *Leaves* an inch long, alternate, sitting close to the branches, acuminate. *Flowers* white. A native of Carthage in New Spain.

** *Leaves decurrent.*

Herbaceous or Shrubby.

94. *C. genifelloides*. Lam. 56. Willd. 80. (Canambaya; Marg. Bras. 78.) "Stems somewhat shrubby, without leaves, nearly smooth; rings interrupted by joints, terminated by a short scale; flowers sessile, lateral, alternate." *Stems* from a foot to three feet long. *Wings* between each joint, broader on one side than on the other, decussated, green. *Flowers* yellow, situated at the joints in the upper part of the plant, solitary in the axil of the scale; calyx round, almost smooth, imbricated; scales ovate-acute; down reddish. A native of Peru. 95. *C. articulata*. Lam. 57. Ill. Pl. 697. fig. 4. Willd. 81. "Stem much branched, interruptedly winged; leaves oblong-elliptical, shorter than the joints; flowers panicled." *Stem* a foot and half high; branches compound, smooth, viscid towards the summit. *Flowers* pale yellow, sessile, almost globular, often clustered together in a kind of terminal spike or panicle; calyx imbricated, scales obtuse. Found by Commerçon at Monte Video. 96. *C. fagittalis*. Lam. 58. Willd. 82. "Leaves decurrent, lanceolate, finely toothed, a little scabrous, green on both surfaces; flowers clustered together at the top of the branches." *Stem* winged as in the two preceding. *Leaves* alternate, two or three inches long. *Flowers* from three to five in a cluster; calyx short; scales egg-shaped, somewhat pubescent; florets numerous; down longer than the calyx. Found by Commerçon at Monte Video. 97. *C. crispata*. Willd. 83. Vahl. 1. 71. Forsk. Arab. 119. n. 495. "Leaves lanceolate, ferrate-toothed, naked; peduncles one-flowered; stem shrubby." Whole plant smooth. *Stem* erect, striated; branches and peduncles with curled tooth-finnated wings. *Leaves* an inch and half long, remote. *Flowers* two or three at the top of the branches; peduncles half an inch long; calyx-scales linear-lanceolate, the length of the florets in the circumference. A native of Arabia Felix. 98. *C. arabica*. Willd. 84. (*Erigeron decurrens*; Vahl. Synb. 1. 72.) "Leaves linear, quite entire, downy; flowers panicled." *Stem* erect, striated, pubescent, downy near the top; branches woody. *Leaves* an inch and half long. *Pedicles* capillary, with two minute bracts near the top; calyxes villous; scales brilliant-shaped, shorter than the down. A native of Arabia Felix. 99. *C. thapsoides*. Willd. 85. Marsch. de Biberst. Fl. Caucas. "Leaves egg-shaped, mucronate, downy; lower ones ferrated; flowers in corymbs." *Root* perennial. A native of Mount Caucasus, near the shores of the Caspian sea. 100. *C. virgata*. Linn. Sp. Pl. 5. Mart. 22. Lam. 53. Willd. 86. (*C. helvii folio*; Pl. Sp. 9. Burm.

Burm. Amer. tab. 98. fig. 2. *C. angulatifolia* subincana; Brown. Jam. 318. *Helichrysum caule alato*; Sloan. Jam. 125. Hill t. 206. tab. 152. fig. 5.) "Leaves linear-lanceolate, finely serrated, downy underneath; spikes terminal, elongated, interrupted." *Root* perennial, woody. *Stem* about two feet high, erect. *Leaves* five or six inches long, alternate, green and smooth above, whitish and downy underneath. *Flowers* pale purple, sessile, lower ones three together, upper ones solitary; calyx oblong, imbricated; scales acute, rather hairy. A native of St. Domingo, Jamaica, and Carolina. 101. *C. rugosa*. Willd. 87. Vahl. Symb. 1. 71. "Leaves elliptical, crenated, downy underneath; flowers in a head." *Branches* woody; wings quite entire, smooth on one side, very downy on the other. *Leaves* an inch and half long, wrinkled, smooth above, downy underneath. *Peduncles* the length of the leaves, from the axils of the upper leaves. A native of Brazil. 102. *C. alopecuroides*. Lam. 54. Willd. 83. Plam. Sp. 9. Burm. Amer. tab. 98. fig. 1. "Leaves egg-shaped, finely serrated, downy underneath; spike terminal, dense, interrupted at the base." *Root* perennial, spindle-shaped, woody. *Stems* about two feet high; wings green on one side, white and downy on the other. *Leaves* alternate; green, smooth, somewhat wrinkled above, whitish and downy underneath. *Flowers* sessile; calyx imbricated, downy at the base; inner scales longer and smooth towards the tip; down rather long. A native of Martinica and Brazil. 103. *C. spicata*. Lam. 55. Willd. 809. Cav. Ic. t. 8. tab. 12. "Stem somewhat shrubby, simple; leaves ovate-lanceolate, finely serrated, downy underneath; spike terminal, dense, entire." *Stem* a foot and half high, erect, striated with green and white. *Leaves* from three to four inches long, six or eight lines broad, alternate, green and smooth above, white and downy underneath. *Flowers* sessile; calyx clothed with a thick down, imbricated; scales narrow-lanceolate, inner ones longer. Female florets intermingled with the hermaphrodites. A native of South America. Obf. As the genera *Baccharis* and *Conyza* now stand, this species belongs to the former. 104. *C. redolens*. Willd. 90. (*Gnaphalium redolens*; Forst. Prod. n. 535.) "Leaves lanceolate, quite entire, downy underneath; spikes terminal, glomerated." *Stem* woody, branched. *Leaves* half an inch long, obtuse. *Spikes* half an inch long; calyxes villous. A native of New Caledonia. 105. *C. decurrens*. Linn. Sp. Pl. 6. Mart. 23. Willd. 91. (*C. alopecuroides*, β . Lam.?) "Leaves lanceolate, finely serrated; stem somewhat dichotomous; flowers axillary, sessile, glomerated." *Root* annual. Whole plant downy. *Stem* about three inches long, erect. A native of the East Indies.

Obf. The only essential distinction between *Baccharis* and *Conyza* consists in the former having the hermaphrodite and female florets intermingled with each other; whereas, in the latter, the female florets are all collected in the circumference, but without rendering the compound flower properly radiate. In dried specimens, it is not always possible to determine these characters with certainty; so that, as La Marek observes, some of the foregoing species may belong to *Baccharis*. Jusseu, Gærtner, and La Marek, are of opinion, that the two genera are scarcely distinct. The latter, however, suggests that two genera might be formed out of them, distinguished by the form of the calyx: one of them with the calyx of *Erigeron*, *i. e.* not properly imbricated, having linear, nearly equal scales in several ranks; the other with the calyx of *Eupatorium*, *i. e.* strictly imbricated. If any of the species should be found to have all the florets hermaphrodite, they must be referred to *Eupatorium*. *Erigeron* differs in having a radiate flower.

Willdenow, in the third part of his third volume, published since our article *Baccharis* went to the press, has added the following species to that genus. 1. *B. viscosa*, 4. Linn. "Leaves elliptical, rather acute, three-nerved, quite entire, petioled; younger ones viscid." *Flowers* in terminal, compound, peduncled corymbs. A native of the Isles Mauritius and Bourbon. 2. *B. arbutifolia*, 6. Vahl. Symb. 3. 97. "Leaves oblong, sessile, rigid, acutely serrated, reticularly veined; corymb terminal; flowers clustered." A smooth shrub. A native of Peru. 3. *B. sessiliflora*, 7. Vahl. 3. 97. "Leaves oblong, sessile, toothed, and entire; flowers terminal, sessile." *Flowers* twice as large as those of *B. halimifolia*. A native of Brazil. 4. *C. villosa*, 9. Vahl. 3. 98. "Leaves lanceolate, petioled, serrated on the upper part, villous-downy underneath." *Branches*, *peduncles*, and *pedicels*, villous-downy. *Corymbs* long, peduncled, fastigiate; calyx-leaves brittle-shaped. A native of Arabia Felix. 5. *C. tridentata*, 12. Vahl. 3. 98. "Leaves sessile, wedge-shaped, even surfaced, three toothed at the tip." *Flowers* in terminal and axillary corymbs. A native of Brazil. 6. *B. dioica*, 13. Vahl. 3. 98. tab. 74. "Leaves wedge-shaped, somewhat retuse, quite entire, even-surfaced, three-nerved; flowers dioicous." *Flowers* from four to seven, sessile, clustered. A native of Montserrat and Dominica.

Conyza asteroides of Linnæus and Martyn is after *Conyzoides* of Willdenow. It is excluded from the present genus by its radiate flower.

CONYZA aegyptiaca juniperifolia; Vaill. See STAEHELINA *Spinosa*.

CONYZA asiatica, flore bullato aureo; Pluk. See CHRYSOCOMA *conauvea*.

CONYZA africana frutescens, foliis erice kamatis. See STOEBE *athiopica*.

CONYZA africana frutescens, sœvo salvio; Tourn. See TARCHONANTHUS *camphoratus*.

CONYZA africana latifolia fatida; Pluk. Moris. See GNAPHALIUM *fatidulum*.

CONYZA africana tenuifolia subfrutescens; Dill. See CHRYSOCOMA *scabra*.

CONYZA americana frutescens setidissima; Dill. See BACCHARIS *fatida*.

CONYZA americana scandens, foliis sabrotundis; Amm. Herb. See MIKANIA *houltonis*. *Eupatorium*; Hoult. Linn.

CONYZA anthelmintica; Linn. See VERNONIA *anthelmintica*.

CONYZA aqualica, asteris flore aureo; C. Bauh. See INULA *britannica* β .

CONYZA arborefcens lutea, folio trifido; Plum. See CALEA *lobata*.

CONYZA aromatica frutescens mauritanica; Pluk. See PTERONIA *camphorata*.

CONYZA carulea acris; C. Bauh. See ERIGERON *acris*.

CONYZA carulea alpina major; C. Bauh. See ERIGERON *uniflorum*.

CONYZA carulea alpina minor; C. Bauh. See ERIGERON *alpinum*.

CONYZA capitata, seu globosa; Bocc. See INULA *viscosa*.

CONYZA Dioscoridis; Raw. See BACCHARIS *Dioscoridis*.

CONYZA femina Theophrasti; C. Bauh. See ERIGERON *gracilescens*.

CONYZA fatida; Lam. See BACCHARIS *fatida*.

CONYZA frutescens, foliis angustioribus; Fcw. Peruv. See BACCHARIS *trifolia*.

CONYZA fruticosa cisti odore; Sloan. See *EUPATORIUM villosum*.

CONYZA fruticosa cisti odore, floribus pallide purpureis; Sloan. See *CALEA jamaicensis*.

CONYZA helenitis mellita incana; Lob. See *CINERARIA campestris*.

CONYZA incana; C. Bauh. See *CINERARIA campestris*.

CONYZA lini julis asperis; A. M. Ruth. See *CHRYSOCOMA biflora*.

CONYZA lobata; Linn. See *CALEA lobata*.

CONYZA major altera; C. Bauh. See *BACCHARIS Diofcoridis*.

CONYZA major altera; Thal. See *BUPHTHALMUM salicifolium*.

CONYZA major; Dod. See *INULA viscosa*.

CONYZA major, flore globofo; C. Bauh. See *INULA pulicaris*.

CONYZA marina; Magnol. Moris. See *ERIGERON tuberosum*.

CONYZA mas Theophrasti; C. Bauh. See *INULA viscosa*.

CONYZA media asteris flore luteo; C. Bauh. See *INULA dysenterica*.

CONYZA media crispata; Rai. See *INULA pulicaris* ?.

CONYZA media, monspeliensis affinis; J. Bauh. See *INULA spiraeifolia*.

CONYZA melitenfis; Bocc. See *INULA fetida*.

CONYZA minima; Dod. See *INULA pulicaris*.

CONYZA minor exotica; C. Bauh. See *INULA pulicaris* ?.

CONYZA minor hispanica; Pluk. See *INULA pulicaris* ?.

CONYZA minor vera; Lob. Barr. See *ERIGERON graveolens*.

CONYZA palustris serratifolia; C. Bauh. See *SENECIO paludosus*.

CONYZA pannonica lanuginosa; C. Bauh. Morif. See *INULA oculus christi*.

CONYZA praedia; Bocc. See *INULA bisfrons*.

CONYZA rugosa; Hort. Kew. See *ERIGERON rugosum*.

CONYZA scandens, solaris folio, angulosa; Plum. See *MIKANIA scandens*.

CONYZA sericea; Willd. See *CHRYSOCOMA sericea*.

CONYZA 3, austriaca; Chuf. See *INULA oculus christi*.

CONYZA lyrice; J. Bauh. Rai. Gron. See *BACCHARIS Diofcoridis*.

CONYZA tomentosa & incana; A. M. Ruth. See *CHRYSOCOMA villosa*.

CONYZIS AFFINIS; C. Bauh. See *INULA britannica*.

CONYZOIDES; Dill. See *ERIGERON acre*.

CONZ. See *CONSARBRUCK*.

CONZA, in *Geography*, a town of Naples, in the province of Principato Ultra, considered as the capital of the province; situated at the foot of the Apennines, near the head of the Ofauto; the see of an archbishop. The chief article of its commerce is marble. Distant 48 miles E. of Naples. N. lat. 40° 50'. E. long. 15° 10'.

COOCH BAHAR, or *COOS-BAYHAR*, a district of Balar, in the province of Bengal, separated from that of Rungpore, by the river Durlah. In this district, an usage of a very singular kind has prevailed from remote antiquity, and actually exists at this day. If a reit, or peasant, owes a sum of money, and cannot satisfy his creditor, he is compelled to give up his wife as a pledge, and possession of her is kept till the debt is discharged. It sometimes happens, according to report, that the wife of a debtor is not re-

deemed for the space of one, two, or three years; and then, if during her residence and connection with the creditor, a family shall have been the consequence, half of it is considered as the property of the person with whom she lived, and half that of her real husband. This country has a most wretched appearance, and its inhabitants are a miserable and puny race. Those of the lower ranks, without scruple, dispose of their children for slaves, to any purchaser, and for a very trifling consideration. Nothing is more common, in this unnatural traffic, than to see a mother drags up her child, and bring it to market, with no other view or hope, than to enhance the price she may procure for it. Indeed the extreme poverty and wretchedness of these people will sufficiently appear, when we reflect that the value of the peasant's subsistence amounts to no more than one penny a day, even allowing him to make his meal of two pounds of boiled rice, with a due proportion of salt, oil, vegetable, fish, and chili, the latter of which is a kind of red pepper, in universal use, made from the "capsicum annuum" of Linnæus. The situation of the district exhibits an union of facts, not unfrequently observed, viz. the great facility of obtaining food, and at the same time the wretched indolence of the lower order of inhabitants. Turner's Thibet, p. 11, &c.

COOGHEN, *LEONARD VAN*, in *Biography*, a painter, born at Haarlem in 1610, and scholar of Jac. Jordans. He also amused himself with etching, and published two or three sets of prints, in which the style of Salvator Rosa was imitated with the most happy success. These etchings, several of which represent groups of military figures, are dated from 1664 to 1666. He died in 1681. Heinecken.

COOK, *JAMES*, one of the most eminent navigators and discoverers of unknown territories and seas, recorded either in ancient or modern history, was descended from an obscure family in Northumberland: his father, James Cook, having occupied the humble station of a servant in husbandry, and his mother, whose Christian name was Grace, being a person of the same rank and condition. The subject of this article claims a more distinguished notice, and a more extended detail of particulars, than we have been accustomed to introduce in those biographical sketches that occur in this work. Independently of the singular merit of captain Cook himself, to which a peculiar tribute is due, his voyages and discoveries are so immediately connected with science, both geographical and nautical, as to entitle them to a conspicuous place in a general Dictionary of the Arts and Sciences. The parents of captain Cook, who were noted in their lowly station for honesty, sobriety, and diligence, were settled for some time before his birth at Marton, a village in the North Riding of Yorkshire; and in this place their son James, destined to give celebrity to their name and family, was born on the 27th of October, in the year 1728. Having received the first rudiments of education at his native place, he was further instructed in writing, and the first five rules of arithmetic at Aytton, near which place his father was settled in the service of Thomas Skotow, esq.; and, at the age of 13 years, he was apprenticed to a shop keeper, at Staiths, a fishing town about 10 miles from Whitby. The sea, however, was the object towards which he manifested an early inclination; and, in consequence of some disagreement with his master, he obtained his discharge, and determining to indulge his natural propensity, he bound himself for seven years to Messrs. Walkers of Whitby, quakers by religious profession, who employed two ships in the coal trade. At the expiration of his apprenticeship, he continued in vessels of this description, as a common sailor, till at length he was appointed mate in one of Mr. John Walker's ships. At this time, he was not distinguished by

any peculiar traits of character, though without doubt he must have acquired a considerable degree of knowledge in practical navigation. In the Spring of the year 1755, when hostilities commenced between England and France, Mr. Cook, and the ship to which he belonged, happened to be in the river Thames; and after concealing himself for some time, to avoid being impressed, he determined to enter voluntarily into the British navy. His first situation in his majesty's service, was on board the *Eagle* man of war, to the command of which, captain (afterwards sir Hugh) Palliser was appointed in October 1755. As an active diligent seaman, he recommended himself to the captain's notice; and in consequence of his own acknowledged merit, as well as some private interference, he obtained on the 16th of May, 1759, a master's warrant for the *Grampus* sloop; but this appointment not taking effect, he was made master of the *Garland*, a ship which had failed before he could join her; and therefore, on the 16th of May, he was appointed to the *Mercury*. This ship was destined to North America, where he joined the fleet under the command of sir Charles Saunders, which, in conjunction with the land forces under general Wolfe, was engaged in the famous siege of Quebec. As it was necessary to take the soundings in the river St. Lawrence, between the island of Orleans and the north shore, directly in the front of the French fortified camp at Montmorency and Beauport, Mr. Cook was recommended by captain Palliser, who well knew his sagacity and resolution, to this difficult and hazardous service. He performed it, with great personal risk, to the satisfaction of his employers; and furnished the admiral with a complete and correct draught of the channel and soundings. Before this time, it is thought that he had scarcely ever used a pencil, and that he had no knowledge of drawing. He afterwards surveyed those parts of the river, below Quebec, which navigators had found to be attended with difficulty and danger; this business was executed with his customary diligence and skill; and when his undertaking was finished, his chart of the river St. Lawrence was published, with the necessary soundings and directions for navigating that river. This chart has superseded the necessity of any other. After the expedition to Quebec, Mr. Cook was appointed, by warrant from lord Colville, master of the Northumberland man of war; and in this station, his conduct was such, as to gain him the esteem and friendship of his commander. During the station of his ship at Halifax, he read Euclid, and devoted his leisure hours to the study of astronomy, and other branches of science. In September 1762, the Northumberland came to Newfoundland, to assist in the recapture of the island from the French; and after this service was accomplished, Mr. Cook surveyed the harbour of Placentia, and the heights of the place, with a diligence which engaged the notice of captain (afterwards admiral) Greaves, the governor of Newfoundland. The governor formed a very high opinion of his abilities and character; and this opinion was amply confirmed by the concurring testimony of all the officers under whom he had served. Upon Mr. Cook's return to England, towards the close of the year 1762, he married an amiable woman, who deserved and enjoyed his tenderest affection and regard. Early in the year 1763, he accompanied captain Greaves to Newfoundland, as surveyor of its coasts; and having executed the business that had been assigned him, he returned to England. In April 1764, he was appointed, under the orders of commodore Palliser, marine surveyor of Newfoundland and Labrador; and of the satisfactory manner in which he executed this office, the charts which he afterwards published, afford sufficient evidence. These services were continued till the

year 1767; and whilst he was employed in them, he transmitted to the Royal Society an observation of the eclipse of the sun at Newfoundland, with the longitude deduced from it, (see Phil. Transf. vol. 57.) from which our navigator appears to have already acquired the character of an able mathematician. But a new and more interesting scene opens upon us in the prosecution of these memoirs. A spirit of discovery had been excited towards the latter end of the 15th century, and in the following century it was very vigorous and active; but soon after the commencement of the 17th century, it began to decline: at a subsequent period, during the reign of king George II., it again began to revive; and two voyages were performed for the purpose of discovering a north-west passage through Hudson's Bay. But the noblest displays of this spirit were exhibited during the present reign; and it was reserved for Mr. Cook to furnish the most illustrious example of its influence. Soon after the peace of 1763, two voyages round the world were undertaken by captains Byron, Wallis, and Carteret, to whom we are indebted for several discoveries, which served to extend the knowledge of geography and navigation; but before the return of the two last of these commanders, another voyage was projected, on a more extensive scale than either of the former. The transit of Venus in 1769, which was likely to be observed with the greatest advantage in some of the islands of the South Sea, afforded a peculiar inducement to this expedition; and after a variety of preliminary consultations and debates, Mr. Cook, who was strongly recommended by Mr. Stephens, secretary to the admiralty, and by sir Hugh Palliser, who had long known his abilities and character, was appointed to the command of it, with the rank of a lieutenant in the royal navy, to which he was promoted on the 25th of May 1768. A vessel of 370 tons, called the *Endeavour*, was prepared for this purpose; but before the necessary arrangements were completed captain Wallis returned, and upon being consulted he recommended Port Royal Harbour in George's island, now known by the name of Otaheite, as the most proper place for the proposed observation of the transit. Lieutenant Cook was accompanied by Mr. Charles Green, who had been assistant to Dr. Bradley at the Royal Observatory at Greenwich, and also by Joseph Banks, Esq. now sir Joseph Banks, bart. and president of the Royal Society, and Dr. Solander, gentlemen whose zeal for the promotion of science have been uniform and ardent. Lieutenant Cook had further views in this voyage than the mere observation of the transit, and accordingly, when that business was accomplished, he was directed to pursue further discoveries in the great Southern Ocean. The complement of Cook's ship consisted of 84 persons, besides the commander; she was victualled for 18 months; and furnished with 10 carriage and 12 swivel guns, together with an ample store of ammunition and other necessaries. On the 26th of August our navigators set sail from Plymouth Sound; and on the 1st of September anchored in Tunchiale road, in the island of Madeira. Here they were hospitably entertained; and having laid in a fresh stock of beef, water, and wine, they left the island in the night of the 18th of September. In their way to Rio de Janeiro, they had an opportunity of accounting for that luminous appearance of the sea, which had been often noticed by navigators, and ascribed to various causes. They determined by experiment, fully to their satisfaction, that the flashes which they had observed proceeded from some luminous animal. Their reception at Rio de Janeiro was very different from that which they had met with at Madeira; and it was through mere necessity that they were detained there from the 13th of November to the 7th of the following

following month, when they proceeded on their voyage. On the 14th of January 1799, lieutenant Cook entered the strait of Le Maire, and having contended for some time with a violent tide, he anchored on the next day, first before a small cove, which was understood to be Port Maurice, and afterwards in the bay of Good Success. During the course of the Endeavour in this station, Mr. Banks, Dr. Sclander, Mr. Monkhouse the surgeon, and Mr. Green the astronomer, with their attendants and servants, and two seamen, ascended the mountains in search of plants. This excursion has been often related, and the effect of the cold of the climate is well known. (See COOK. For an account of the inhabitants of the desolate regions adjacent to this strait; see LE MAIRÉ.) It has been a question among former navigators which is the best passage from the Atlantic to the Pacific ocean; and the doubling of Cape Horn has been so much dreaded, that it has been thought more eligible to pass through the strait of Magalhaens or Magellan. Lieutenant Cook has settled this point; for he was no more than 37 days in coming round the land of Terra del Fuego, from the E. entrance of the strait of Le Maire till he had advanced about 12 degrees to the westward and $7\frac{1}{2}$ to the northward of the straits of Magalhaens, and during this time the ship received scarcely any damage; whereas it would have required three months to reach the Pacific ocean through this strait, and in passing it his people would have been much fatigued, and the anchors, cables, sails, and rigging of the vessel would have been much injured. In short, lieutenant Cook, by setting the example of doubling Cape Horn, and by accurately ascertaining the latitude and longitude of different places, as well as by his instructions to future voyagers, has performed the most essential service to this part of navigation. In the prosecution of the voyage from Cape Horn to Otaheite, several islands were discovered, to which were given the names of Lagoon island, S. lat. $18^{\circ} 47'$. W. long. $129^{\circ} 28'$, Thrumb-cap, S. lat. $18^{\circ} 35'$. W. long. $139^{\circ} 48'$, Bow island, S. lat. $18^{\circ} 23'$. W. long. $141^{\circ} 12'$, the Groups, the easternmost in S. lat. $18^{\circ} 12'$. W. long. $142^{\circ} 42'$, Bird island, S. lat. $17^{\circ} 48'$. W. long. $143^{\circ} 35'$, and Chain island, S. lat. $17^{\circ} 25'$. W. long. $145^{\circ} 54'$. Most of these islands were inhabited; and the verdure, or groves of palm-trees, which were visible in some of them, gave them the appearance of a terrestrial paradise to persons who had so lately witnessed the dreary coasts of Terra del Fuego.

On the 13th of April the Endeavour anchored in Port Royal bay, called by the natives "Matavai," in the island of Otaheite. Having fixed upon a place proper for accomplishing the grand object of their commission, they erected an observatory, S. lat. $17^{\circ} 29' 15''$. W. long. $149^{\circ} 32' 30''$, and carried their astronomical quadrant, and some other instruments, on shore. On the following day, very much to their surprize and grief, the quadrant was not to be found. By the judicious and spirited exertions of Mr. Banks, the instrument was restored. The transit was observed with great advantage. A particular account of the observation may be seen in the Phil. Trans. vol. lxi. p. 397. See VENUS. As we shall have occasion to mention some of the leading circumstances that occurred on this and other visits to Otaheite, under that article, we shall attend lieutenant Cook in his departure from the island. Previously to their setting sail, Tupia, one of the natives, the prime minister of Oherea, when he was in the height of her power, and chief priest of the country, who had been a constant companion of the English during their abode on the island, came on board the ship, with a boy thirteen years of age, and intreated that they might be permitted to proceed with them on their

voyage. Lieutenant Cook gladly accepted the proposal. On the 15th of July the English weighed anchor, and whilst they were proceeding on their voyage, Tupia informed lieutenant Cook that at four of the neighbouring islands, which he distinguished by the names of *Huabeine*, *Uiutea*, *Otaha*, and *Bolabola*, they might procure hogs, fowls, and other refreshments, in great abundance. Accordingly, having passed *Telurua*, they approached the N.W. part of Hnaheine on the 16th of July, and in the afternoon anchored in a small but excellent harbour on the W. side of the island, called *Owharee*; and having procured a variety of necessary articles of refreshment, they sailed on the 19th for *Uiutea*, in a good harbour of which the ship anchored on the next day.

The lieutenant hoisted an English jack on this island, and, in the name of his Britannic majesty, took possession of this, and the three neighbouring islands, *Huabeine*, *Otaha*, and *Bolabola*, all of which were in sight. The harbour or bay in which the Endeavour had anchored was called by the native *Oopoo*, and extends almost the whole length of the east side of the island. In its greatest extent it is capable of accommodating any number of ships. After having surveyed the northern and southern parts of this island, they set sail on the 24th; but after encountering considerable danger and discovering several small islands, they returned to *Uiutea*, and cast anchor on the 1st of August in a harbour on the west side of the island. *Tupia* had previously apprized them of the formidable character of the inhabitants of *Bolabola*, but on intercourse with them, and particularly with *Oopoo*, they found there was no foundation for the terrors which *Tupia* had endeavoured to excite. Having finished their necessary repairs, and obtained a fresh stock of provisions, they prepared for leaving the island. The principal islands, about which the English had now spent somewhat more than three weeks, were six in number; viz. *Uiutea*, *Otaha*, *Bolabola*, *Huabeine*, *Tubai*, and *Maurua*; which see respectively. Our voyagers pursued their course till the 13th, when land was discovered bearing S. E., and which *Tupia* informed them was an island called *Oheteroa*. As the inhabitants manifested a hostile disposition, lieutenant Cook, with equal wisdom and humanity, made no attempt for landing. By *Tupia* our navigators were informed, that various islands lay at different distances, and in different directions from *Oheteroa*, between the south and the north-west; and that to the north-east there was an island called *Manua*, or *Bird island*. He also described several islands towards the west; probably *Bolcawen* and *Keppel's islands*, which had been discovered by Captain Wallis. The farthest island towards the south, of which *Tupia* had any knowledge, was called *Moutou*, about three days sail from *Oheteroa*. But his father, he said, had informed him, that there were other islands farther to the south. Lieutenant Cook determined, all circumstances duly considered, to stand southward in search of a continent. On the 15th of August, our voyagers sailed from *Oheteroa*, and on the 30th, in lat. $38^{\circ} 20'$. W. long. $147^{\circ} 6'$, they observed a comet, the tail of which subtended an angle of 42 degrees. On the 6th of October they discovered an extensive tract of land, which they at first conceived to be the "Terra Australis incognita," but which proved, in the event, to be a part of New Zealand. Lieutenant Cook, having anchored, on the 8th, in a bay, at the entrance of a small river, went on shore, accompanied by Mr. Banks and Dr. Sclander, and attended with a party of men, in order to have some intercourse with the natives. They assumed a very hostile appearance; and made attempts for running away with the pinnace, which had been left at the entrance of the river. On the next day they exhibited the same formidable aspect, brandishing their

pikes and lances. Tupia addressed them in a language, which was a dialect of our own and which they understood; informing them that our voyagers only wanted provisions and water, in exchange for iron, the properties of which he explained as far as he was able. Their intentions, however, appeared to be unfriendly; and on the iron and beads, which were presented to them, they seemed to set little value. Tupia told them at length, that if they proceeded to any farther violence, some of them must fall victims to the just retaliation of the English. This salutary counsel, however, produced no effect; and some were killed, and several wounded in the conflict that ensued. The severity exercised on this occasion, was very different from the conduct which Mr. Cook's prudence and humanity suggested in other cases; and, on a calm review, it was not approved by himself; but he pleaded the nature of the service in which he was employed and the necessity of obtaining a knowledge of the country, which he had previously attempted to acquire by kind treatment, and with a view to which he was at length obliged to recur to hostile and fatal measures. The lieutenant finding all his efforts to establish an intercourse with the natives unavailing, determined to re-embark, and on the 11th of the month he left this inhospitable place, which, as it had supplied him with no article except wood, he denominated *Poverty-bay*, called by the natives *Tuomerōa*, or Long Sand, and situated in S. lat. $38^{\circ} 43'$, and W. long. $181^{\circ} 36'$. In this course he spent nearly six months, and made large additions to the knowledge of geography and navigation. By making the whole circuit of New Zealand, he ascertained it to consist of two islands. While the ship was hauling to the south end of a small island, called *Zeabewary* by the natives, and by the lieutenant "Portland island," it suddenly fell into shoal water and broken ground. The inhabitants, perceiving its distress, put off in five canoes, and assumed a very formidable and menacing aspect, and seemed to be prepared for action; and it was its little purpose that guns were fired in order to intimidate them. Whilst some kind of traffic was carrying on with one of the canoes, Tupia's boy, who was standing on the side of the ship, was seized by one of the New Zealanders, and carried off. Upon this atrocious act the marines were ordered to fire; and during the confusion that ensued, the boy made his escape and swam to the ship, though he was pursued by the largest of the canoes. To the cape where this unhappy transaction occurred, Mr. Cook gave the name of "Cape Kidnappers;" it lies in S. lat. $39^{\circ} 43'$, W. long. $182^{\circ} 24'$. Between this cape and the island Portland is a bay, which, in honour of sir Edward Hawke, the lieutenant called "Hawke's bay." While, on the 18th, the Endeavour lay a-breadth of a peninsula within Portland island, called *Terakako*, two of the natives, supposed to be their chiefs, confided so far in Mr. Cook, as to venture on board the ship, and remained there all night, their canoe being hoisted into the ship. On the 23d, while the ship was in *Tegadob* bay, lieutenant Cook went on shore to examine the watering places, and found the water excellent and conveniently situated, and the disposition of the people much more favourable than he expected. This bay is in S. lat. $39^{\circ} 22' 24''$, and W. long. $180^{\circ} 47'$. Here they supplied themselves with as much wood and water as they wanted. On the 28th, some gentlemen of the Endeavour went on shore on an island which lies to the left hand of the entrance of Tolaga bay; and there saw the largest canoe which they had yet observed, her length being $68\frac{1}{2}$ feet, her breadth 5 feet, and her height 3 feet 6 inches. While the ship was in Hicks's bay, the inhabitants of the adjoining coast were found to be very hostile. Early on the 1st of November, they counted 45 canoes coming from the shore towards the Endeavour, and several others

following them from another place. Some of the Indians traded freely; others added derision and insolence to fraud; and though several small shot were fired at them, the canoes merely dropped a-sterm, and set up their song of defiance as they departed from the ship. In standing westward from a small island called *Mawtobera*, the Endeavour encountered some danger amidst the adjacent rocks, but at length it escaped without injury near an island called by the lieutenant the *Mayor*; the inhabitants of the neighbouring coast displayed in many instances their hostility, and, in their traffic with our navigators, committed various acts of fraud and robbery. Here, viz. in S. lat. $36^{\circ} 48' 52''$, lieutenant Cook and Mr. Green made an observation of the transit of Mercury. In the mean while the ship was visited by two large canoes, one of which indicated hostile intentions on the part of its crew. In the course of their traffic, they were guilty of an act of fraud, accompanied with menaces and defiance, which induced Mr. Gore to fire at the offender and to kill him. At length, however, in consequence of small shot fired over their heads, they all fled with the utmost precipitation. On the 10th, our commander, accompanied by Mr. Banks, and the other gentlemen, examined a large river that empties itself into the head of Mercury bay, and found the situation abounding with conveniences, capable of an easy defence, and furnishing beds of excellent oysters; this river Mr. Cook called *Oyster river*. On the 15th he sailed out of "Mercury bay," so called in consequence of the observed transit of Mercury over the sun, and lying in S. lat. $36^{\circ} 47'$, W. long. $184^{\circ} 4'$. Another river lies at the head of the bay, which is the best or safest place for a ship that wants to stay for any length of time. This the lieutenant, observing a number of Mangroves about it, called "Mangrove river." Before the Endeavour left the bay, Mr. Cook, having displayed the English colours, took formal possession of the place in the name of his Britannic majesty, king George III. In the range from Mercury bay several canoes appeared apparently for hostile purposes; but their occupiers were instantly dispersed by a musket ball, fired through one of their boats; although Tupia's oratory had proved ineffectual. While Mr. Cook remained in the "Bay of islands," he took occasion to examine the interior part of the country and its produce. Some circumstances occurred which produced disagreement between the navigators and the inhabitants, and it required singular exertions of prudence, as well as of humanity on the part of Mr. Cook, to bring them to a termination. The number of inhabitants in the Bay of islands was found to be much greater than in any other part of New Zealand which the commander had hitherto visited; and though they did not appear to be united under one head, and though their towns were fortified, they seemed to live together in perfect amity. The Endeavour on the 6th of December, lying becalmed in "Doublets bay," an opportunity offered for making inquiries among the natives concerning their country; and Tupia enabled the lieutenant to learn, that at some distance, at a place called "Moore-whenua," the land would take a short turn to the southward, and thence extend no more to the well. This place the English gentlemen concluded to be the land discovered by Tasman, and which he had named "Cape Maria Van Diemen." The inhabitants, who seemed to be intelligent, farther informed them, that there was a country of great extent, to the N.W. by N. or N.N.W., called *Ulinarua*, where it was understood that the people eat hogs. Our navigators, on the 30th of December, saw the land, which they judged to be "Cape Maria Van Diemen," and which corresponded with the account given of it by the Indians. The next day, they had demonstrative evidence, from the appearance

ance of mount Carmel, that, where they now were, the breadth of New Zealand could not be more than two or three miles from sea to sea. During this part of the navigation, they encountered, in S. lat. 35°, and in the midst of summer, a long-continued and violent gale of wind; but as they were at a considerable distance from the land, they escaped the danger that alarmed them. The shore at "Queen Charlotte's Sound," where the English had arrived on the 14th of January, 1770, seemed to form several bays, into one of which lieutenant Cook proposed to take the ship for necessary repairs, and for obtaining a recruit of wood and water, of which they were supplied with great plenty. On landing they found an Indian family, in which they found horrid and indisputable proofs of the custom of eating human flesh. Evidences of the same custom appeared likewise on several other occasions. Whilst they were near this part of the country, they were entertained with the most enchanting melody of birds, who began their song about two hours after midnight and continued it till sun-rise; thus resembling the nightingales of our own country. Lieutenant Cook, upon ascending one of the hills of the country, had a view of the sea on the eastern side of it, and of a passage leading from it to that of the west, a little east of the inlet where the ship lay. The main land, S. E. of this inlet, appeared to be a narrow ridge of very high hills, forming part of the S. W. side of the strait. On the opposite side, the land trended away E. as far as the eye could reach; and to the S. E. was discovered an opening to the sea, which washed the eastern coast. The lieutenant saw, also, on the E. side of the inlet, some islands which he had before taken to be part of the main land. In returning to the ship, he examined the harbour and coves that lie behind the islands which he had seen from the hills; and he employed the next day in farther surveys and discoveries:—the gentlemen of the ship also accompanied him in visiting a town, which was built upon a small island or rock, very difficult of access, and which consisted of between 80 and 100 houses; the inhabitants of which were very friendly and attentive, and furnished them with a large quantity of dried fish. From a hill of considerable height, which afforded a view of the coast to the N. W., the farthest land that appeared was an island at the distance of about 10 leagues, lying not far from the main; between this island and the place where the commander stood, he discovered, close under the shore, several other islands, forming many bays, in which there appeared to be good anchorage for shipping. On the 30th of January the inlet where our voyagers now lay was named "Queen Charlotte's Sound," and a memorial was erected of their visit to this place. At the same time Mr. Cook took formal possession of this and the adjacent country in the name of king George III.; thus precluding the claims of future navigators, but reserving to the original inhabitants their natural rights. On Monday, the 5th of February, the Endeavour, after encountering a violent storm, got under sail; but was soon obliged to come to an anchor a little above Motuara. Upon inquiring he learnt that there was a distant country, towards the north, called *Ulmaroa*; but he could obtain no farther particulars. Lieutenant Cook, on the 6th of February, got out of the Sound, and in the evening saw two small islands, lying off "Cape Koamaroo," at the S. E. head of Queen Charlotte's Sound, and bearing E. at the distance of about four miles. The rapidity of the stream, occasioned by the tide of ebb, endangered the ship, and it was rescued by some favourable incidents; the narrowest part of the strait through which it was rapidly driven, lies between "Cape Tier-

avite," on the coast of the island of *Eakeinomauro*, and "Cape Koamaroo;" the distance between them being estimated at four or five leagues. During Mr. Cook's long and minute examination of the coast of New Zealand, he gave names to the bays, capes, promontories, islands, and rivers, and other places which he saw or visited; excepting in instances where their original appellations were learned from the natives. After having ascertained New Zealand to be an island, Mr. Cook wished to extend his acquaintance with the country. He completed his circumnavigation, by ranging from "Cape Turnagain," southward along the eastern coast of *Poenamoo*, round "Cape South," and back to the western entrance of the strait which he had passed, and which has been very properly called Cook's *Straits*; which see. In this range an island, lying about five leagues from the coast of *Touy-Poenamoo*, was discovered, and it was named "Banks's island." Lieutenant Cook, pursuing his course to the southward, wished to ascertain, whether *Poenamoo* was an island or a continent. In the prosecution of this object he passed some dangerous rocks on the 9th of March, and on the same day reached a point of land called "South Cape," in S. lat. 47° 19'. W. long. 192° 12', which proved to be the southern extremity of the country. On the 14th the Endeavour passed a small narrow opening in the land, where was a safe and convenient harbour, formed by an island, which lay eastward in the middle of the opening. On the land behind this opening are mountains, the summits of which were covered with snow, that had recently fallen. The land on each side of the entrance of the opening, rises almost perpendicularly from the sea to a stupendous height: and, on this account lieutenant Cook did not chuse to take the ship into the harbour. Before the 27th of March, the commander had circumnavigated the whole country of *Touy-Poenamoo*, and arrived within sight of the island before mentioned, lying nine leagues from the entrance into Queen Charlotte's Sound. With a view of obtaining a supply of water, he hauled round the island, and entered a bay, situated between that and Queen Charlotte's Sound, to which was given the name of *Admiralty-bay*; which see. Lieutenant Cook now directed his views towards Europe; and it was determined to return by the East Indies. In pursuance of this resolution, it was proposed that they should steer eastward till they should fall in with the east coast of New Holland, and then follow the direction of that coast towards the north, till they should arrive at its northern extremity. If that should be found impracticable, it was farther resolved that they should endeavour to fall in with the land, or islands, said to have been discovered by Quiros. For a farther account of *NEW ZEALAND*; see that article.

On the 31st of March our commander sailed from "Cape Farewell" in New Zealand, S. lat. 40° 53'. W. long. 18°, and pursued his voyage towards the west. On the 10th of April "New Holland," or as it is now called, "New South Wales," came in sight; and on the 28th, the ship anchored in *Batany-bay*; which see. During Mr. Cook's stay at this place, he caused the English colours to be displayed every day on shore, and took care that the ship's name, and the date of the year, should be inscribed on one of the trees near the watering-place. On the 6th of May our navigators sailed from this bay; and in their farther progress lieutenant Cook gave the names marked upon the map to the bays, capes, points, and remarkable hills that appeared successively in sight. On the 14th, as the Endeavour advanced to the northward, being then in S. lat. 30° 22'. W. long. 206° 35', the land gradually rose in height, so

that it may be called a hilly country. Between this latitude and Botany-bay, it exhibits a pleasing variety of ridges, hills, valleys, and plains, clothed with wood. On the 17th our navigators were in a bay called "Morston's bay," S. lat. $26^{\circ} 56'$. W. long. $206^{\circ} 28'$; and from appearances they concluded that this bay opened into a river; but they had not then leisure to ascertain the fact. On the 22d, as they were pursuing their voyage from "Harvey's bay," they discovered that the land was covered with olem nut-trees, which they had not seen from the time of their leaving the islands within the tropic. Early in the next day they went on shore, in order to examine the country, and found a channel leading into a large lagoon. Here they discovered a small river of fresh water, and room for a few ships to lie in great security. Near the lagoon grows the true Mangrove, such as exists in the West India islands, and the first of the kind that had been met with by our navigators. Among the islands and shoals they saw many large birds, which they judged to be pelicans, and on the shore a species of bustard of a considerable size and excellent food; so that in honour of it they called the inlet *England-bay*. S. lat. $24^{\circ} 4'$. W. long. $208^{\circ} 18'$. Here they found a number of small pearl-oysters, among others of various kinds; so that Mr. Cook was of opinion, that an advantageous pearl-fishery might be established in this place. On the 25th our voyagers, at the distance of one mile from the land, were abreast of the point which Mr. Cook found to lie directly under the tropic of Capricorn, in W. long. $208^{\circ} 58'$, and he therefore called it "Cape Capricorn." On the 26th the ship, being under sail, was surrounded with islands, which lay at different distances from the main land; and here Mr. Banks, in fishing, took two sorts of crabs, such as had not been seen before; one of them was adorned with a most beautiful blue, equal to the ultramarine, which tinged all his claws and joints, while the under part was white and highly polished; the other was marked with ultramarine, more sparingly, on his joints and toes, and on his back were three brown spots of a singular appearance. Lieutenant Cook finding a passage between the islands, sailed to the northward, and anchored at about two miles distance from the main. A great number of islands were within sight. Here Mr. Cook observing that the tide ebbed and flowed considerably, when the ship had anchored within the inlet, concluded that it was a river that might run pretty far up into the land. Our voyagers having gratified their curiosity with a variety of objects, but being disappointed in their wishes of obtaining fresh water, determined to make a short stay in this place. Before they left it, however, they were desirous of more particularly examining the inlet, in which the ship lay; its breadth was found to be from two to five miles, upon a direction S. W. by S.; but here it opened every way, and formed a large lake, which to the N.W. communicated with the sea. On the south side of the lake was a ridge of hills; and various appearances indicated that the country was inhabited. The country, in general, in this part of New South Wales, appeared sandy and barren, and destitute of the accommodations which would fit it for being possessed by settled inhabitants. This inlet, from its want of fresh water, was called by Mr. Cook "Thirly Sound." S. lat. $22^{\circ} 20'$. W. long. $210^{\circ} 18'$. On the 31st our voyagers left the place and proceeded, till on the 7th of June they perceived on one of the islands, which they were passing, the appearance of cocoa-nut trees; but upon examination, these were mistaken for a small kind of cabbage-palm. On the 8th, when the Endeavour was in the middle of a cluster of small islands, our navigators discerned, with their glasses, upon one of the nearest of them, about 30 of the natives, men, women, and

children, standing together and attentively looking at the ship. This was the first instance of curiosity that had been observed among the people of the country. They were wholly naked; their hair was short, and their complexion resembled that of the other inhabitants that had been before observed. In navigating the coast of New South Wales, for an extent of 22 degrees of latitude, or more than 1000 miles, lieutenant Cook had conducted his vessel in safety; but on the 10th of June, as he was pursuing his course from a bay, which he had called "Trinity bay," the Endeavour fell into a situation peculiarly critical and dangerous; having been lifted over a ledge of rock, and lying in a hollow within it. Her sheathing boards were observed by the light of the moon to be floating away from her, and at last her false keel, so that every moment it was expected the whole company would be swallowed up by the rushing in of the sea. The ship was expeditiously lightened as much as possible, and every exertion was made without murmur and with the greatest alacrity to escape the imminent peril to which their lives were exposed. So sensible were the sailors of the awfulness of their situation, that not an oath was heard among them. When morning dawned upon them they had a clearer view of their danger. Providentially, however, it became a dead calm, and high water came on at eleven in the morning; but it was necessary still further to lighten the ship, and two pumps were instantly worked to discharge the water that rushed in. For the tide at midnight they waited with anxious and awful expectation: in the mean while the leak increased to a very alarming degree; and though the ship righted, it was expected that she must go to the bottom as soon as she ceased to be supported by the rock. The floating of the ship, which in other circumstances, would have been the means of their salvation, was in their situation, a ground of serious alarm; because it might precipitate their destruction. Their possibility of escape was precarious, if the ship sunk; and the coast on which they were to be thrown, if any of them escaped, was inhabited by naked savages, from whose compassion they might derive no relief. The decisive moment at length arrived; and the ship was heaved into deep water, without admitting more water than when she lay upon the rock. The men had experienced long anxiety and were sinking with fatigue, and in an exhausted state they threw themselves upon the deck, and after short intervals and pauses of rest, renewed their laborious and almost fruitless exertion; for the leak gained upon the pumps. In this state of anxiety and labour, an accident occurred, which had almost terminated, at once, all their efforts. The planking which lines the ship's bottom is called the ceiling; between which and the outside planking there is a space of about eighteen inches. From this ceiling only, the man who had attended the well had taken the depth of the water, and had given the measure accordingly. But the person, who relieved him, measured the depth to the outside planking, which had the appearance of the leak's having gained upon the pumps eighteen inches in a few minutes. The mistake, however, was soon detected; and this accident, at first so alarming, became, in the event, highly advantageous. New hopes, from a discovery that their situation was not so dangerous as they apprehended, inspired new vigour; and before eight in the morning the pumps gained considerably on the leak. At eleven o'clock the Endeavour was once more under sail, and stood for the land. They wished, however, to stop the leak; and Mr. Monkhouse, one of the midshipmen, proposed to the commander an expedient which had preserved a merchant ship, which had sprung a leak that admitted more than four feet water

in an hour. This was called *fulbering* the ship. (See FOTHERING.)

The expedient succeeded; and it was owing partly to a fragment of rock, which had filled up one of the holes of the ship, that she did not sink and involve her whole company in inevitable destruction. In consequence of the distress experienced by the whole crew on this occasion, lieutenant Cook called a point in sight, which lay to the northward, in S. lat. $16^{\circ} 6'$. W. long. $214^{\circ} 39'$, "Cape Tribulation." On the 14th a small harbour was discovered, excellently adapted for repairing the damage which the ship had sustained. Another alarming circumstance, which occurred at this time, was the access of the scurvy, that began to make its appearance among the ship's company, and that rendered it still more necessary to get on shore. On the 17th the ship put in for the harbour, the entrance of which was a narrow channel. Tents were erected for the accommodation of the sick; and all of them, except Mr. Green, manifested symptoms of recovery. On the 29th of June an emission of Jupiter's first satellite was observed, from which they obtained the longitude of the place $214^{\circ} 42' 30''$ W., its latitude being $15^{\circ} 26'$ S. A plan of the harbour was taken; and Mr. Cook ascended a hill, from which he observed, to his great concern, innumerable sandbanks and shoals, lying in every direction of the coast. To the northward there was the appearance of a passage, by which lieutenant Cook had the only chance of getting clear, in the prosecution of his voyage. By a large supply of fish, he was able to distribute 2½ pounds to each man; a quantity of greens, being procured, were boiled with the peas: and by these means the ship's company obtained a very considerable refreshment. On the 2d of July our lieutenant sent the master out of the harbour, to sound about the shores, and to search for a passage to the northward. In a subsequent investigation, a passage to the sea was discovered between the shoals, which consisted of coral rocks, and which had furnished cockles of an enormous size, inasmuch that one of them was more than sufficient for two men. Other shell-fish were also found in great abundance. At high water the ship floated; but a leak having been discovered, it was necessary to lay her ashore a second time. The several damages being repaired, the ship was again floated at high water, and preparations were made for proceeding on the voyage. To this harbour Mr. Cook gave the name of "Endeavour river." The master, having been dispatched to re-examine the passage, which he had before discovered, reported that he had been mistaken. In the mean while, the inhabitants of the country, who had been very reserved in holding any intercourse with the navigators, became more familiar, in consequence of the commander's prudent management. Here they discovered an animal, called by the natives *kangaroo*, which, being dressed, proved to be excellent meat; and they were also furnished with great plenty of turtle, superior to any which the gentlemen ever tasted in England. The turtle was of the species called green turtle, and they weighed from two to three hundred pounds. The inland country was agreeably diversified by hills, valleys, and large plains, which in many places were richly covered with wood. The longitude of their station, determined by an observation of the emission of Jupiter's first satellite, July the 16th, was $214^{\circ} 53' 45''$; that on the 29th of June had given $214^{\circ} 48' 30''$, the mean of which was $214^{\circ} 48' 7\frac{1}{2}''$ W. The Indians were very hostile and fraudulent; and so daring and insolent, that nothing would disperse them but small shot repeatedly fired from the muskets. In order to incommode our navigators, they set fire to the grass, which blazed in various directions. On the

4th of August, after frequent unsuccessful attempts to disengage the ship from the harbour, she got under sail; but many difficulties occurred; and on the 5th, the lieutenant had not kept his course long before shoals were discovered in every quarter, which obliged him, at the approach of night, to come to an anchor. On the morning of the 10th, the weather, which had been boisterous, became more moderate, and the commander weighed anchor, and stood in for the land; determining to seek a passage along the shore to the northward. In pursuance of this resolution, the Endeavour proceeded in her course, and at noon came between the farthestmost head-land that lay in sight, and three islands which were four or five leagues to the north of it, out at sea. Here they thought there was a clear opening before them, and began to hope that they were once more out of danger. In this hope, however, they were soon disappointed, and therefore the lieutenant gave to the head-land, in S. lat. $14^{\circ} 56'$. W. long. $214^{\circ} 43'$, the name of "Cape Flattery." After steering for some time along the shore, for what was believed to be the open channel, an officer at the mast-head cried aloud that he saw land ahead, which extended quite round to the three islands; and that between the ship and them there was a large reef. Mr. Cook himself discerned the reef, but was of opinion that the supposed land was a cluster of small islands. In this state of uncertainty, however, he thought it most prudent to come to anchor, under a high point, from which he could have an extensive view of the sea and country. This eminence he called "Point Look-out." In the process of investigating the shoals and channel between them, the lieutenant, accompanied by Mr. Banks, discovered an island on which were no animals except lizards; and he therefore called it "Lizard island." In their return to the ship, they landed on a low sandy island, abounding with an incredible number of birds; and as they here found the nest of an eagle, they called it "Eagle island." At length, after much deliberation, it was resolved to quit the coast entirely, till they could approach it with less danger; and in pursuance of this resolution, the Endeavour, on the 13th, got under sail, and successfully passed through one of the channels or openings in the outer reef, which Mr. Cook had previously observed. The situation of our navigators was now happily changed; and after three months' anxiety and suspense, they found themselves in an open sea, with deep water. The passage or channel, through which the Endeavour passed into the open sea beyond the reef, lies in S. lat. $14^{\circ} 32'$. It is distinguished by the three high islands within it, to which, on account of the use they may be of in guiding the way of future voyagers, our commander gave the appellation of "Islands of Direction." New dangers, which created alarm and required fresh exertions, occurred; but every man did his duty with as much calmness and regularity as if no danger had been near. It was indeed the high and magnanimous spirit of the commander, which inspired his people with such resolution and vigour. On the coast of a new and unknown country he braved all perils, and determined to ascertain whether this country did, or did not, join to New Guinea: a question which he had fixed upon resolving, from the first moment that he had come within sight of land. To the opening, through which he had passed with so much hazard, the commander, under a proper sense of gratitude to the Supreme Being, gave the name of "Providential channel." In the prosecution of the voyage, the navigators, on the 19th, were encompassed on every side with rocks and shoals; but they were little moved, as perils had been familiar to them. On the 21st, as no land could be seen, they conceived hopes of having at last found a passage into the Indian sea: but to

determine this matter with greater certainty, lieutenant Cook resolved to land upon an island, which lies in the S.E. point of the passage. Accordingly he, accompanied by Mr. Banks and Dr. Solander, ascended a high hill, from which no land could be seen between the S.W. and W.S.W.; so that Mr. Cook had not the least doubt of finding a channel, through which he might pass to New Guinea. As he was now about to quit the coast of New Holland, which he had traced from lat. 38° to this place, and where he was certain no European had ever been before, he once more hoisted English colours, taking possession of the whole eastern coast, with all the bays, harbours, rivers, and islands situated upon it, from lat. 58° to lat. $10\frac{1}{2}^{\circ}$ S. in right of his majesty king George III., and by the name of *New South Wales*. Having performed this ceremony upon the island, hence called "Possession island," they re embarked in their boat; and on the 23d Mr. Cook was confirmed by several circumstances in his opinion, that he had arrived to the northern extremity of New Holland, and that to the westward he had an open sea. These circumstances afforded him peculiar satisfaction, not only because the dangers and fatigues of the voyage were drawing to a conclusion, but because it could no longer be doubted whether New Holland or New Guinea were two separate islands. The N.E. entrance of the third lies in S. lat. $10^{\circ} 39'$. W. long. $218^{\circ} 36'$; and the passage is formed by the main land, and by a congeries of islands to the N.W., called by Mr. Cook the "Prince of Wales's islands," and which may probably extend as far as to New Guinea. To the channel through which he passed, he gave the name of "Endeavour straits."

From the coast of New South Wales, the lieutenant steered, on the 23d of August, for the coast of New Guinea; but in the prosecution of his voyage he fell upon a dangerous shoal, which exposed him to great danger; but he fortunately escaped; and on the 3d of September arrived within sight of New Guinea, and brought to within three or four miles of land. Some of the ship's company went on shore, but they were suddenly attacked by the natives, who had for some time concealed themselves in the woods. See NEW GUINEA. Our voyagers leaving this coast, hastened to the westward; and pursuing their course, they discovered on the 6th of September a small island N.N.W.; and another low island, extending from that quarter to N.N.E. Unless these two islands belong to the "Arrou islands," they have no place in the charts; and if they do belong to these, they are laid down at too great a distance from New Guinea. Mr. Cook found the E. part of them in S. lat. $7^{\circ} 6'$. W. long. 225° . On the 7th, when the ship was in S. lat. $9^{\circ} 30'$, and W. long. $229^{\circ} 34'$, our navigators ought to have been in the sight of the Weasel isles, which are laid down in the charts at the distance of 20 or 25 leagues from the coast of New Holland; but Mr. Cook, as he did not see them, concluded that they must have been laid down erroneously. In pursuing their course, our navigators passed the islands of Timor, Timor-lavet, Rotle, and Seman. When they were near these two latter islands they observed a phenomenon in the heavens, in some respects resembling, but in others differing from, the Aurora Borealis. Having passed all the islands between Timor and Java, lieutenant Cook did not expect to meet with any other in that quarter; but on the 17th he observed an island bearing W.S.W., which he thought to be a new discovery. When they came to the N. side of it, they saw houses and cocoa-nut trees, and numerous flocks of sheep. Here they landed; the commander thinking he might thus supply the necessities of the ship's company, and remove both the sickness and the discontent which had spread among them. This proved to be

the island of SAVU; which see. On the 21st of September our navigators left Savu, and on the 11th of October came within sight of the island of Java; and on the 9th they stood in for Batavia road, where the Endeavour was secured from a stroke of lightning by the chain that was attached to it. The injurious effects of this climate were felt by our voyagers within nine days after their arrival; and Mr. Monkhouse, the surgeon of the ship, fell, on the 5th of November, the first sacrifice to this fatal country. Tayeto, Tupia's boy, died the 9th, and Tupia survived him only a few days. The repair of the Endeavour, which had been very much damaged, and which appeared to be in a very alarming state, was an object to which Mr. Cook, though himself affected by the climate, directed his particular attention, and it was performed much to his satisfaction. When this business was accomplished, on the 27th of December, the ship stood out to sea; and on the 5th of January 1771, came to an anchor under the S.E. side of "Prince's island," where the gentlemen of the ship, after having paid their respects to the king, commenced a traffic with the natives for turtles, fowls, fish, monkeys, small deer, and vegetables. On the 15th the commander weighed, and stood out for sea. In the prosecution of the voyage to the Cape of Good Hope, the seeds of disease, which had been received at Batavia, appeared with very threatening symptoms, and reduced the navigators to a very melancholy situation. The ship was a mere hospital; the water taken in at Prince's island was purified with lime; and in order farther to guard against infection, the commander ordered all the parts of the vessel between the decks to be washed with vinegar. So fatal, notwithstanding every precaution, was the disease, that almost every night a dead body was committed to the sea. The loss amounted in all to 23 persons, besides the seven who died at Batavia. Among these were Mr. Green the astronomer, Mr. Parkinson, natural history painter, Mr. Monkhouse the midshipman, another midshipman, &c. &c. These calamitous events contributed most probably to turn the attention of Mr. Cook to those methods of preserving the health of seamen, which he afterwards pursued with such remarkable success. On the 15th of March the Endeavour arrived off the Cape of Good Hope; and a proper place was provided on shore for the accommodation and recovery of the sick. Lieutenant Cook having laid here while the sick of his crew were recovered, necessary stores were procured, and the vessel refitted, till the 14th of April, stood out of the bay, and proceeded on his voyage homeward. In the morning of the 29th, he crossed his first meridian, having circumnavigated the globe in the direction from east to west; the consequence of which was that he had lost a day, an allowance for which had been made at Batavia. On the 11th of May he arrived at St. Helena, and on the 5th he departed from this island, and pursued his course in safety. On the 10th of June, land, which proved to be the Lizard, was discovered; and on the 11th the ship ran up the channel; next morning he passed Beachy head; and in the afternoon of the same day anchored in the Downs, and went on shore at Deal. Thus ended Mr. Cook's first voyage round the world, in which he had gone through so many dangers, explored so many countries, and exhibited the strongest proofs of his possessing an eminently sagacious and active mind; a mind that was equal to every perilous enterprise, and to the boldest and most successful efforts of navigation and discovery.

Mr. Cook having thus recommended himself to the protection of government, and the favour of his sovereign, was promoted in the progressive order of the naval service, to be a commander in his majesty's navy, Aug. 29,

1771; an officer inferior in rank only, but equal in advantage to that of post-captain. On the 21st of May 1772, captain Cook communicated to the Royal Society by a letter to Dr. Maskeyne, "An Account of the flowing of the Tides in the South Sea, &c." (see Phil. Transf. vol. lxii. p. 357-8.) The curiosity of the public was much excited by the reports of lieutenant Cook's voyage; and it was amply gratified by Dr. Hawkefworth's Account, in 3 vols. 4to. Extensive and interesting was the knowledge obtained in consequence of this voyage; but the question concerning a southern continent remained still undecided. The reign of our present sovereign George III. has been favourable to every kind of scientific and literary inquiry; and the earl of Sandwich, who, at the period to which we now refer, was at the head of the admiralty, was eminently capable of comprehending and disposed also to encourage the most enlarged views and schemes with regard to navigation and discovery. By his particular recommendation, it was resolved to appoint a commission for determining the long disputed question relating to the existence of a southern continent. Quiros seems to have been the first person who suggested the idea of such a continent; but though he was sent out to ascertain it, he failed in the attempt. Mr. Dalrymple had now excited the public attention to this object, by his Historical Collection, in 2 vols. 4to. of the several voyages and discoveries in the south Pacific Ocean, 1770, 1771. When the Board of Admiralty determined to take up the business, captain Cook was immediately fixed upon as the person best qualified for conducting an enterprise which was to give the utmost possible extent to the geography of the globe, and the knowledge of navigation. Two ships, similar in construction to the Endeavour, were provided for this purpose; the largest of the two, which consisted of 462 tons burthen, was named the Resolution; and to the other, consisting of 336 tons burthen, was given the name of the Adventure. On the 28th of November 1771, captain Cook was appointed to the command of the former; and, about the same time, Mr. Tobias Furneaux was promoted to the command of the latter. The complement of the Resolution, in officers and men, was fixed at 112 persons, and that of the Adventure at 81. In the equipment of these ships, attention was directed to every circumstance that could contribute to the comfort and success of the voyage. Lord Sandwich was singularly attentive on the occasion; and both the navy and victualling boards took care to procure for the ships the best stores and provisions, together with an ample supply of antiscorbatic articles, such as malt, four krout, salted cabbage, portable broth, soup, mustard, marmalade of carrots, and inspissated juice of wort and beer. Scientific objects were also duly regarded. Mr. William Hodges, an excellent landscape painter, Mr. Reinhold Forster, and his son, well informed in natural history, and Mr. William Wales, and Mr. William Bayley, skilful astronomers, were appointed to accompany the expedition; they were furnished with the best instruments for observation, and particularly with four time-pieces, three of Mr. Arnold's construction, and one of Mr. Kendall's, upon the principles of Mr. Harrison. Captain Cook, on board the Resolution, joined the Adventure in Plymouth Sound, on the 3d of July 1772, and there received his instructions, which comprehended, without entering into a minute detail, the most enlarged plan of discovery that is known in the history of navigation. He was instructed not only to circumnavigate the whole globe, but to circumnavigate it in high southern latitudes, making such traverses, from time to time, into every corner of the Pacific ocean not before examined, as might finally and effectually resolve the much agitated ques-

tion about the existence of a southern continent, in any part of the southern hemisphere, to which access could be had, by the efforts of the boldest and most skilful navigators.

On the 17th of July, captain Cook sailed from Plymouth, and on the 26th anchored in Funchiale road, in the island of Madeira. Having supplied himself with water, wine, and other necessaries, he left the island Aug. 1st, and sailed to the southward. As he proceeded, he made three punchions of beer of the inspissated juice of malt, and the liquor was brisk and drinkable; though on account of the heat of the weather, and the agitation of the ship, the juice was in a high state of fermentation. If it could be kept from fermenting, this would be a most valuable article at sea. At St. Jago, one of the Cape de Verd islands, he stopped to procure a fresh supply of water. On the 20th of the month, they were delayed with rain; but to guard against the pernicious effects of rain on any future occasion, captain Cook took care to well air and dry the ship with fires between the decks, and to smook its damp places; besides, the people were ordered to air their bedding, and to wash and dry their cloaths, whenever they had an opportunity; such was the result of these precautions, that there was not one sick person on board the Resolution. On the 8th of September, the ship crossed the line in W. long. 8°, and proceeded on its voyage. On the 29th, being near the Cape of Good Hope, the whole sea, as far as our voyagers could see, became at once, as it were, illuminated. In order to ascertain the true cause of this phenomenon, which had in the former voyage been attributed to luminous insects, captain Cook examined some buckets of water, and found in them a number of globular insects, about the size of a common pin's head, and quite transparent. Mr. R. Forster was satisfied that these were the cause of the sea's illumination. On the 30th, the Resolution and Adventure anchored in Table bay; and the captains on going a-shore, were received by the governor with great politeness. On the 22d of November, our commander sailed from the Cape, and prosecuted his voyage in search of a southern continent. He directed his course for Cape Circumcision; but, by tempestuous weather, our voyagers were driven far to the eastward of their intended course, being in S. lat. 48° 41'. E. long. 18° 24', so that they had no hopes of reaching this Cape. In this gale, they had the misfortune to lose the principal part of the live stock on board, consisting of sheep, hogs, and geese.

On the 10th of December, in S. lat. 50° 40', and long. 2° E. of the Cape of Good Hope, they began to meet with islands of ice, one of which was judged by captain Cook to be about 50 feet high, and half a mile in circuit. The weather was hazy, and danger was imminent. On the 18th they happily got clear of the field of ice. They were now in S. lat. 55° 8', and long. 24° 3'. An opinion had been entertained, that such ice was formed in bays and rivers; and hence our voyagers were led to conclude, that land was not far distant. But they proceeded without finding it. The whole crew began to complain much of cold, and therefore the captain directed the sleeves of their jackets to be lengthened with baize, and ordered a cap to be made for each, strengthened with canvas. This season, it should be recollected, was with them the middle of summer. As some of the crew appeared to have symptoms of the scurvy, fresh wort was given them every day. By the 29th, the commander was satisfied that the field of ice, along which the ships had sailed, did not join to any land. Determining to run as far W. as the meridian of Cape Circumcision, a gale sprung up on the 31st, which brought with it such a swell

of sea, as rendered a continuance among the ice perilous; our navigators, therefore, hauled to the south. On the 1st of January 1773, the gale abated, and the people had a sight of the moon, which they had observed but once, such was the state of the weather since they had left the Cape of Good Hope. They were now in S. lat. $58^{\circ} 53' 30''$, and E. long. $9^{\circ} 34' 30''$. In this situation, land, if it had existed, might have been at the distance of 14 or 15 leagues; but as it was not visible, captain Cook concluded it to be very probable, that Bouvet had mistaken mountains of ice for land. Upon the whole, there was reason to believe that no land was to be met with under this meridian, between the latitude of 55 and 59 degrees, as some had supposed. From the ice, however, captain Cook derived the advantage of procuring a supply of fresh water, which was sweet, and well tasted. On the fields of ice, they observed penguins, albatrosses, and other birds; but the prevalent opinion, that such birds never go far from land, was now found to be erroneous. On the 17th of January captain Cook, having reached the latitude of $67^{\circ} 15' S.$, could advance no farther; and as the ice towards the south exhibited no appearance of any opening, he thought it prudent not to persevere in sailing farther southward, more especially as the summer was already half spent, and there was no prospect of being able to get round the ice. He, therefore, determined to search for the land which had lately been discovered by the French, and separated the ships at an interval of four miles, the weather being occasionally clear, as the best method of investigation. On the 1st of February our voyagers were in S. lat. $48^{\circ} 30'$, and E. long. $58^{\circ} 7'$, nearly in the meridian of the island of St. Mauritius. From the perpetual high sea which had been lately met with, captain Cook inferred that there could be no great extent of land to the west. But whilst he was steering eastward, in S. lat. $40^{\circ} 13'$, captain Furneaux suggested that the land was to the N.W. of them, as he had observed the sea to be smooth when the wind blew in that direction. Captain Cook, in deference to this opinion, pursued the search; and the result was a conviction, that, if any land was near, it could be only an island of inconsiderable extent. In this part of the southern ocean the mean variation of the compass was $29^{\circ} 4' W.$ When the sun was on the starboard of the ship, the variation was the least; and when on the larboard side, the greatest. A separation now took place between the two ships, and the Resolution was under a necessity of pursuing its voyage alone. As they proceeded they were satisfied that the sight of oceanic birds, which frequent high latitudes, are no sure signs of the vicinity of land. In the morning of the 17th, lights were seen in the heavens, similar to those which are known in the northern hemisphere under the appellation of Aurora Borealis. On the 20th our navigators thought they saw land to the south-west; but they found, on endeavouring to approach it, that they had been deceived by clouds, and nothing could be discerned but ice islands. At night the Aurora Australis was again seen, assuming a very brilliant and luminous appearance, discovering itself first in the east, and soon spreading over the whole heavens. On the 23d, in S. lat. $61^{\circ} 52'$, E. long. $95^{\circ} 2'$, our navigators, in the midst of mountains of ice, were on every side surrounded with danger; and hence captain Cook was led to alter his purpose of once more crossing the Antarctic circle; and on the 24th he stood to the north, exposed to the hazard of injury from large pieces of broken ice, in very thick and hazy weather. In sailing from the 25th to the 28th captain Cook was convinced to a certainty, that no land, of any considerable extent, could lie within 100 or 150

leagues from east to south-west. As he proceeded on his voyage from the 28th of February to the 11th of March, he had ample reason for concluding, from the swell of the sea and other circumstances, that there could be no land to the south, that did not lie at a great distance. By observation of the sun and moon on the 13th and 14th they were in S. lat. $58^{\circ} 22'$, E. long. $136^{\circ} 22'$. Mr. Kendall's and Mr. Arnold's watches gave each of them $134^{\circ} 42'$; and this was the first and only time, in which they had pointed out the same longitude since the ships had left England: the greatest difference, however, between them, since our navigators had left the Cape, had not much exceeded two degrees. Farther evidence occurred to our commander, as he advanced in his course, that he had left no land behind him, in the direction of W. S. W., and that no land lay to the S. on this side of 60 degrees of latitude. On the 17th he therefore determined to quit the high northern latitudes, being now in S. lat. $59^{\circ} 7'$, and E. long. $146^{\circ} 53'$, and to proceed to New Zealand, in search of the Adventure, and for the refreshment of his people. He had also a desire of visiting the east coast of Van Diemen's land, in order to gain satisfaction whether it joined the coast of New South Wales. But the wind preventing his accomplishing this object; he shaped his course for New Zealand, and came to anchor on the 26th in "Dusky bay." He had now been 117 days at sea, in which time he had sailed 3660 leagues, without once coming within sight of land. So salutary had been the effects of sweet wort and several articles of provision, and especially of the frequent airing and sweetening of the ship, that there was only one man on board who could be said to be afflicted with the scurvy; and his disorder was occasioned by a bad habit of body and a complication of other diseases. On the 27th the ship entered "Peckerfkill Harbour," so called from the name of the gentleman by whom it had been first discovered, and situated in S. lat. $45^{\circ} 47' 26'' S.$ and E. long. $166^{\circ} 18'$. Here wood for fuel and other purposes was immediately at hand: and a fine stream of fresh water was not above 100 yards from the stern of the vessel. Having selected a suitable place on the shore for future operations, captain Cook employed some of the crew in the brewing of beer from the branches or leaves of a tree resembling the American black spruce, which, with the addition of the inspissated juice of wort and melasses, would make, as he knew, a very wholesome liquor, and supply the want of vegetables of which the country was destitute. While captain Cook continued in this situation, he took every opportunity of examining the bay. See *Dusky Bay*.

On the 11th of May, captain Cook left Dusky bay, and directed his course for Queen Charlotte's Sound, where he expected to find the Adventure; but on the 17th, the wind flattened to a calm, the sky became suddenly obscured by dark dense clouds, and there was every prognostication of a tempest. Soon after six water spouts were seen, four of which rose and spent themselves between the ship and the land; but they all spent themselves without doing any injury. On the next day the Resolution came within sight of Queen Charlotte's Sound, and there capt. Cook had the satisfaction of finding the Adventure; after a separation of fourteen weeks, captain Furneaux had an opportunity of examining Van Diemen's land; and it was his opinion that there are no straits between this land and New Holland, but a very deep bay. He met likewise, with farther proofs, that the New Zealanders are eaters of human flesh. On the morning after captain Cook's arrival in Queen Charlotte's Sound, he went on shore and returned with a boat-load of scurvy-grass, celery, and other vegetables; and he

gave orders that they should be boiled, with wheat and portable broth, every day for breakfast, and with pease and broth for dinner. Experience had taught him that these vegetables, thus dressed, are very beneficial to seamen, in removing various scorbutic complaints. The intercourse with the natives of the country was of a friendly nature; and proved advantageous in a variety of respects, particularly in supplying a quantity of fish. On the 2d of June, when the ships were almost ready to put to sea, captain Cook sent on shore a male and female goat; and captain Furneaux left at Cannibal cove, two breeding fows, and a boar. It is a remarkable circumstance, that during captain Cook's second visit to Charlotte Sound, he could not recollect the face of any one person he had seen three years before, nor did it appear that a single Indian had any knowledge of him. Hence he infers, that in the interval the natives had either been driven away, or had removed, of their own accord, to some other situation. Not one-third of the inhabitants, formerly observed, seemed to be now there; their strong hold on the point of Motuara was deserted, and in every part of the Sound many forsaken habitations were discovered.

In the captain's opinion, the place had never been very populous. From comparing the two voyages, it appears that the Indians of Eabei-nomaue are in somewhat of a more improved state of society than those of Tavai-poanamo. During captain Cook's stay in the Sound, he had observed that the second visit to this country had not mended the morals of the natives of either sex. He had always looked upon the females of New Zealand as more chaste than the generality of Indian women. But he was now told, that the male Indians were the chief promoters of a shameful traffic, and that, for a spike-nail, or any other thing they valued, they would oblige the women to prostitute themselves, whether it was agreeable or contrary to their inclinations. At the same time, no regard was paid to the privacy which decency required. The account of this fact must be read with concern by every well-wisher to the good order and happiness of society, even without adverting to considerations of a higher nature. On the 7th of June captain Cook put to sea from Queen Charlotte's Sound together with the Adventure; and on the 11th of August, when they were in S. lat. $25^{\circ} 1'$, and W. long. $134^{\circ} 6'$, they were nearly in the situation assigned by captain Carteret for "Pitcairn's island," discovered by him in 1767; but they did not observe it. As our commander advanced in his course, every circumstance concurred to convince him that between the meridian of America and New Zealand there is no southern continent; and that there is no continent farther to the south unless in a very high latitude. But the investigation and decision of the fact were reserved for the employment of the ensuing summer. It was the 6th of August before the ships had the advantage of the trade wind; which they got at S.E. in S. lat. $19^{\circ} 36'$, W. long. $131^{\circ} 32'$. Having obtained this wind, captain Cook directed his course to the W.N.W. and proceeded in the track pursued by M. de Bougainville. To four of the islands which he passed, he gave the names of "Resolution island," "Doubtful island," "Furneaux island," and "Adventure island," which see respectively. These are supposed to be the same that were seen by M. de Bougainville; and they, with several others, constitute a cluster of low and half-drowned isles, which that gentleman distinguished by the name of the Dangerous Archipelago. On the 15th of August the ships came within sight of "Ofnaburg island," or Maitea, which had been discovered by captain Wallis. Having escaped being

wrecked on the coast of Otahite, they anchored, on the 17th, in Oaitipha bay, near the S.E. end of the island; and they were immediately crowded with the inhabitants of the country, who brought with them cocoa-nuts, plaitains, bananas, apples, yams, and other roots, which were exchanged for nails and beads. On the 24th the ships put to sea, and arrived the next evening in Matavai-bay; but before they could come to anchor, the decks were crowded by the natives, many of whom were known to captain Cook or by most of whom he was well remembered. At Oparree the tents and astronomer's observatories remained, on the same spot from which the transit of Venus had been observed in 1769. As soon as the sick were recovered, the water completed, and the necessary repairs of the ships finished, captain Cook determined to put to sea, and on the 1st of September he ordered the vessels to be unmoored. In the mean while lieutenant Pickersgill returned from Attahourou, where he had been to procure hogs; and in this expedition he had seen Oherea, in a very humble situation, compared with that which she had formerly occupied. In the evening of this day a favourable wind having sprung up, the commander put to sea; on which occasion he dismissed his Otahite friends sooner than they wished to depart; but well satisfied with his kind and liberal treatment. From Matavai captain Cook directed his course for the island Huahine; this he reached the next day, and on the 3d of September anchored in the harbour of Owharre. Both the captains landed upon the island, and being cordially received by the natives, commenced a trade with them. Every thing was conducted with mutual confidence and harmony till the 6th, when several circumstances occurred on the part of the natives, which interrupted the friendly intercourse. Captain Cook at length complained to Orco, the king, of their insolence and frauds, who was much concerned on the occasion; and exerted himself to obtain redress and to punish the delinquents. It was from the island Huahine that captain Furneaux received into his ship a young man named Omai, a native of Uliteta, of whom so much hath since been known and written. This choice was at first disapproved by captain Cook, who thought that this youth was not a proper sample of the inhabitants of the Society islands; being inferior to many of them in birth and acquired rank, and not having any peculiar advantage with respect to shape, figure, or complexion. The captain afterwards found reason to be better satisfied with Omai's having accompanied our navigators to England. At Huahine the vessels, though their stay was short, obtained very plentiful supplies of provisions. Not less than 300 hogs, besides fowls and fruit, were procured. From Huahine our navigators sailed for Uliteta, where trade was carried on in the usual manner, and a most friendly intercourse renewed between captain Cook and Orco, the chief of the island. An interruption took place in the intercourse between the ships and the natives, which was occasioned by a misapprehension on the part of the latter, and which upon proper explanation, was soon rectified. So that provisions were furnished at Uliteta no less plentifully than at Huahine. Captain Cook estimated that the number of hogs, which had been obtained, amounted to 400 or upwards. Our commander, by his second visit to the Society islands, gained a farther knowledge of their general state and of the custom of the inhabitants. With regard to a certain disorder, captain Cook was not able to determine whether it was known to the islanders before they were visited by the Europeans; but he found upon inquiry that the introduction of it, if of recent origin, was unanimously ascribed to the voyage of M. de Bougainville.

ville. Captain Cook wished to satisfy himself, whether human sacrifices constituted a part of the religious customs of these people. From Omai he afterwards learned that the inhabitants of the Society islands offer human sacrifices to the Supreme Being. The knowledge he was able to obtain concerning their religion was very defective. With regard to the character of their women, he was enabled to rectify a prevailing error; and he does them justice by informing us, that the favours both of the married women and of the unmarried, of the better sort, were as difficult to be obtained in the Society islands as in any other country. And as to the unmarried females of the lower class, there were many who would not admit of any indecent familiarities. This voyage enabled our commander to gain some further knowledge concerning the geography of the Society isles; and he found it highly probable, that Otaheite is of greater extent than he had computed it in his former estimation. On the 17th of September captain Cook sailed from Ulieeta, directing his course to the west, with an inclination to the south. Land was discovered on the 23d, to which he gave the name of "Harvey's island." S. lat. $19^{\circ} 18'$. W. long. $158^{\circ} 54'$. On the 1st of October he reached the "island of Middleburg." From Middleburg the ship sailed to "Amsterdam," the natives of which island were no less disposed than those of the former to maintain a friendly intercourse with the English. A few old rags at this island were sufficient for the purchase of a pig or a fowl.

Although the natives of Amsterdam were of a friendly disposition, they were not entirely free from the thievish propensity which pertained to the islanders of the Southern Ocean. The two islands of Middleburg and Amsterdam are guarded from the sea by a reef of coral rocks, extending from the shore about 100 fathoms. Similar to this, in a great measure, is the situation of all the tropical isles which our commander had seen in that part of the globe; and hence arises an evidence of the wisdom and goodness of Providence; as by such a provision nature has effectually secured them from the encroachments of the sea, though many of them are mere points, when compared with the vast ocean by which they are surrounded. The two islands above-mentioned are situated between the lat. of $21^{\circ} 29'$ and $21^{\circ} 3'$ S., and between the long. of $174^{\circ} 40'$ and $175^{\circ} 15'$ W. See AMSTERDAM and MIDDLEBURG.

On the 7th of October captain Cook proceeded on his voyage: next day he passed the "island of Pillstait," discovered by Tanorani, and situated in S. lat. $22^{\circ} 26'$. W. long. $175^{\circ} 59'$. On the 21st he made the land of New Zealand, at the distance of 8 or 10 leagues from Table cape. To a chief, who came off in a canoe, he gave two boars, two fows, four hens, and two cocks, and a quantity of seeds, of wheat, French and kidney beans, pease, cabbage, turnips, onions, carrots, parsnips, and yams. On the 3d of November the Resolution was brought into Ship Cove, in Queen Charlotte's Sound. After his arrival, the first object of the captain was to provide for the repair of his ship, and the next to examine into the state of his bread, much of which had become unfit for use. To the inhabitants, who resided at the Cove, he gave a boar, a young fow, two cocks, and two hens, which he had brought from the Society Islands; and at the bottom of the west bay he ordered to be landed three fows and a boar, together with two cocks and two hens; together with as much food as would last them 10 or 12 days. In the second visit of our navigators to New Zealand, they met with indubitable evidence that the inhabitants were eaters of human flesh; but it was captain Cook's firm opinion, that the only flesh that was eaten by these people

was that of their enemies who had been slain in battle. Our commander did not leave New Zealand without making such remarks on the coast between Cape Teera-white and Cape Palliser, as may be of use to future navigators. As the Adventure had been separated from the Resolution, and was thought to be no where upon the island, captain Cook gave up all hopes of seeing her any more during the voyage. On the 26th of November the captain sailed from New Zealand, in search of a continent, and steered to the south, inclining to the east. Some days afterwards, our navigators reckoned themselves to be antipodes to their friends in London, and consequently at as great a distance from them as possible. The first ice island which they saw, was on the 12th of December, in S. lat. $6^{\circ} 10'$. W. long. 172° . In the progress of the voyage such islands continually occurred, and the navigation became daily more difficult and dangerous. In S. lat. $67^{\circ} 5'$, our voyagers all at once got within such a cluster of these islands, and of loose pieces, that they found it almost impossible to escape. However, being relieved, the Resolution, on the 22d of the month, was in the highest latitude she had yet reached, viz. $67^{\circ} 31'$. W. long. $142^{\circ} 54'$; and circumstances became so unfavourable, that captain Cook determined to return towards the north. Here was no probability of finding land, or a possibility of getting farther south. As our navigators advanced to the N. E., on the 24th, the ice-islands increased very much upon them; and in the middle of about 100, they spent Christmas day. As captain Cook, agreeably to his late resolution, had traversed a large extent of ocean, without seeing land, he again directed his course towards the south; and by the 30th of January, 1774, after encountering innumerable obstructions, he reached to S. lat. $71^{\circ} 10'$. W. long. $106^{\circ} 54'$. Farther it would have been extreme folly to have proceeded. The captain was of opinion, in which most of the gentlemen on board concurred, that the ice now in sight extended quite to the pole, or might join to some land, to which it might have been fixed from the earliest time. Compelled at last by inevitable necessity to tack, and to stand towards the north, captain Cook formed a resolution of spending the ensuing winter within the tropic. He was well satisfied, that no continent was to be found in this ocean, but that which must lie so far south as to be wholly inaccessible, on account of ice. If a continent existed in the Southern Atlantic Ocean, he was sensible that he must have the whole summer before him, in order to explore it. Upon the supposition, that no land could be found, he might reach the Cape of Good Hope by April: in that case he would have finished the business of finding a continent, which was indeed the first object of the voyage. But this could not satisfy the comprehensive and magnanimous mind of our commander. He had a good ship, expressly sent out on discoveries, a healthy crew, and wanted neither stores nor provisions. In such circumstances, to have quitted this Southern Pacific Ocean would have been betraying, as he thought, not only a want of perseverance, but of judgment, in supposing it to have been so well explored, that nothing farther could be done. Although he had proved that, if there were a continent, it must lie far to the south, there remained room for very large islands, in places as yet unexamined. He was also persuaded, that his continuing for some time longer in this sea would be serviceable to geography and navigation, and other sciences. Thus he reasoned; and accordingly it was his intention first to go in search of the land, said to have been discovered by Juan Fernandez, in the last century, in about the lat. of 38° ; and if he failed in finding this land, he proposed to direct his course in quest of "Easter Island," or "Davis's land." He next intended to go within the tropic, and

and so proceed westward till he arrived at Otaheite, where it was necessary for him to explore the Adventure. It was also in his contemplation to run as far west as the "Terra Australis del Espíritu Santo," discovered by Quiros, and called by M. de Bougainville the "Great Cyclades." Hence he proposed to steer to the south, and to back to the east, between the latitudes of 50° and 60° . In the execution of this plan, it was his purpose to attain the length of Cape Horn, in the ensuing November, when he should have the best part of the summer before him, to explore the southern part of the Atlantic ocean. When he communicated this extensive plan, comprehending hazards and difficulties without number, to his officers, they unanimously and cheerfully concurred. In pursuing his course to the north, captain Cook became well assured that the discovery of Juan Fernandez, if any such was ever made, could be nothing more than a small island. Our captain was at this time confined to his bed by a bilious colic: by the attention of Mr. Patten, the surgeon, he was relieved, and at length the disorder subsided; but his stomach was so weak, that he could taste nothing but the broth and flesh of a favourite dog, belonging to Mr. Forster. On the 11th of March our navigators came within sight of "Earler island," or "Davis's land," in S. lat. $27^{\circ} 5' 30''$, W. long. $169^{\circ} 46' 20''$. On the 6th and 7th of April they came within sight of four islands, which they knew to be the "Marquisas." To one of them captain Cook gave the name of "Hood's island;" and as soon as the ship was brought to an anchor in Madre de Dios, or Resolusion bay, in the island of "Christina," a traffic commenced, in the course of which the natives would frequently keep the goods, without making any return. Theft was so common, that it was impossible to guard against it; and one of the thieves was accidentally killed by a shot, in the act of stealing. After some time the trade was carried on in a better manner; and the ship was supplied with yams, plantains, bread-fruit, a few coco-nuts, fowls, and small pigs. From the Marquesas captain Cook steered for Otaheite, with a view of falling in with some of the islands discovered by former navigators, and especially by the Dutch, the situation of which had not been accurately determined. In the course of the voyage he passed a number of low islets, connected together by reefs of coral rocks. One of these islands was "Tioukea," discovered and visited by Byron. Besides passing by "St. George's islands," so named by captain Byron, captain Cook discovered four others, which he called "Palliser's isles." On the 22d he anchored in Matavai bay, at Otaheite, where he took measures for the repairs of the ship. During his stay at Otaheite, he maintained a most friendly connection with the inhabitants; and a continual interchange of visits took place between him and Otoo, Towka, and other chiefs of the country. On the 15th of May, our captain anchored in O'wharre harbour, in the island of Huahine, where he procured bread-fruit, coco-nuts, and other vegetables in abundance; but there was a scarcity of hogs. When they were leaving the island, the good old chief, Oroo, was the last man that left the vessel. At parting, captain Cook told him that they should meet each other no more: Oroo wept, and said, "let your fous come, we will treat them well." At Uieeta nothing particular occurred. It was the last request of Oroo, the chief, to captain Cook, that he would return; and when he could not obtain a promise to that effect, he asked the name of his burying place. Oroo's anguish at parting was very great: "he looked up at the ship, burst into tears, and then sunk down into the canoe." On the 6th of June, the day after our voyagers left Uieeta, they saw land, which they found to be a low reef island, about four leagues in compass, and

of a circular form, called "Howe island," discovered by captain Wallis, and situated in S. lat. $16^{\circ} 46'$, W. long. $154^{\circ} 8'$. Another reef island was seen on the 16th, to which captain Cook gave the name of "Palmerston island," in S. lat. $18^{\circ} 4'$, W. long. $163^{\circ} 10'$. On the 20th land was again seen, called by captain Cook "Savage island," S. lat. $19^{\circ} 1'$, W. long. $169^{\circ} 37'$. Pursuing his course to the W.S.W., captain Cook sailed by a number of small islands, and on the 26th anchored on the north side of "Anamooka," or "Rotterdam," S. lat. $20^{\circ} 15'$, W. long. $174^{\circ} 31'$. While the captain was on shore at this island, he got the names of 20 islands which lie between the N.W. and N.E.; but two of them are most remarkable on account of their great height, viz. "Amatatafa," and "Oghao." From the N.W. to the S. of Rotterdam, round by the E. and N., it is encompassed by many small isles, sand-banks, and breakers: no termination of them could be seen to the N., and they may possibly reach as far S. as Amsterdam, or Tongataboo. Together with Middleburg or Eaoowe and Piliart, these form a group, containing about three degrees of latitude and two of longitude; and captain Cook called them the "Friendly isles, or Archipelago." Pursuing their course to the west, our navigators discovered land on the 1st of July, which they found to be a small island, to which captain Cook gave the name of "Turtle isle," on account of the number of turtle which were seen on the coast. On the 16th high land was seen to the S.W., which was the Australis del Espíritu Santo of Quiros, or the Great Cyclades of M. de Bougainville. After exploring the coast for some days, the captain anchored in a harbour of the island of "Mallicollo," which he called "Port Sandwich," situated on the N.E. side of the island, not far from the S.E. end, in S. lat. $16^{\circ} 25' 20''$, E. long. $167^{\circ} 57' 23''$. On the 23d of July our navigators, having gotten to sea, discovered three or four small islands; and at this time the Resolusion was not far from the "isle of Ambryu," "the isle of Paoom," and "the isle of Apee;" S.E. of which latter island was discovered a group, which captain Cook called "Shepherd's isles." Amidst the number of islands now observed, one only appeared to be uninhabited: it consisted of a remarkable peaked rock, accessible only to birds, and obtained the name of the "Monument." In the farther course of the ship to the southward, our navigators approached other islands, which they found to consist of one large island, and three or four smaller ones. The two principal of the latter were called "Montagu" and "Hinchinbrook;" and the large island captain Cook named "Sandwich," in honour of his patron, the earl of Sandwich. Pursuing his discoveries, he came to an island, called by the natives "Erromangu," in a bay of which he anchored. As the inhabitants behaved treacherously, captain Cook called a promontory, or peninsula, near which a skirmish happened, "Traitor's Head," in S. lat. $18^{\circ} 43'$, E. long. $169^{\circ} 28'$. From this place the captain sailed for an island, before discovered, on which he proposed to make some stay, for the purpose of obtaining a supply of wood and water. This island was called "Tanna;" and three others near it were distinguished by the names of "Immer," "Errona," or "Footoona," and "Annatou." The harbour in which he anchored was called by him "Port Resolusion," after the name of the ship; it was situated in S. lat. $19^{\circ} 3' 25\frac{1}{2}''$, and E. long. $169^{\circ} 44' 55''$. To this Archipelago, or group of islands, which captain Cook particularly examined, he gave the name of "New Hebrides." The season of the year came on when captain Cook proposed to return towards the south; but he improved the intervening time in exploring any land which he might yet meet with between the New Hebrides

Hebrides and New Zealand, at which place it was his intention to refresh his people, and to renew his stock of wood and water for another southern course. Sailing with this view, September the 1st, he discovered land on the 4th; and the Resolution anchored next day in a harbour belonging to it. The inhabitants behaved to him in a very civil and friendly manner; and he returned their kindness with presents to their chief. Captain Cook gave this island the name of "New Caledonia." On one of the small adjoining islands the captain found a species of spruce pine, of which spars and very good mats might be made, and called it the "isle of Pines." To another, which afforded ample employment to the botanists, he gave the name of "Botany isle." The captain, before he left this island, was enabled so far to survey it as to ascertain, that, excepting New Zealand, it is probably the largest island in the South Pacific ocean. Another island was observed of good height, and five leagues in circuit, to which was given the name of "Norfolk isle," in S. lat. $29^{\circ} 2' 30''$. E. long. $168^{\circ} 16'$. On the 18th of October our captain anchored in Ship Cove, in Queen Charlotte's Sound, on the coast of New Zealand; and his intercourse with the inhabitants was altogether peaceable and friendly. Mr. Wales, on this occasion, accurately ascertained the latitude and longitude of this sound, and found the bottom of Ship Cove to be in S. lat. $41^{\circ} 5' 56\frac{1}{2}''$, and E. long. $174^{\circ} 25' 7\frac{1}{2}''$. The 10th of November captain Cook left New Zealand, in the prosecution of his great object, or the determination of the question concerning the existence of a southern continent. Having sailed in different latitudes, extending from 43° to $55^{\circ} 48'$ S., till the 27th, the ship being in W. long. $138^{\circ} 56'$, he gave up all hopes of finding any more land in this ocean. He therefore resolved to steer directly for the west entrance of the straits of Magalhaens, with a view of coasting the S. side of Terra del Fuego, round Cape Horn, to the strait Le Maire. In the prosecution of this voyage, on the 17th of December, he reached the W. coast of Terra del Fuego, and on the 20th anchored in a place to which he gave the name of "Christmas Sound." The whole coast and country were desolate and uninteresting. Near every harbour, however, fresh water and wood for fuel were obtained. The country also abounds with wild fowl, and particularly geese. See CHRISTMAS SOUND, and Terra del FUEGO. On the 28th, captain Cook left Christmas Sound, and proceeded round Cape Horn, through strait Le Maire, to Staten land. Having passed this famous Cape on the next day, he entered the southern Atlantic ocean. On Staten island he found a port, on the 1st of January, which, from this circumstance, was denominated "New Year's Harbour." In the small islands adjacent to Staten land, and called "New Year's Isles," captain Cook perceived a harmony between the different animals of the place, which he thought deserving of being recorded. It seemed, he says, as if they had entered into a league not to disturb each other's tranquillity. The greater part of the sea coast is occupied by the sea-lions; the sea-bears take up their abode in the isle; the shags are posted on the highest cliffs; the penguins fix their quarter where they have the most ready communication with the sea; and the rest of the birds chuse the most retired places. All these animals were occasionally seen to mix together like domestic cattle and poultry in a farm yard, without any attempt on the part of one to molest the other. Nay, the captain had often observed the eagles and vultures sitting on the hills among the shags, while none of the latter, whether old or young, appeared to be in the least disturbed at their presence. Should it be asked, how do these birds of prey live? The captain answers the question, by supposing, that they

feed on the carcases of seals and birds, which perish by various causes. It is probable, from the immense quantity of animals with which the isle abounds, that such carcases exist in great numbers. On the 4th of January, captain Cook sailed from Staten island, in order to reconnoitre that extensive coast laid down by Mr. Dalrymple in his chart, in which is the gulf of St. Sebastian. As he had some doubt of the existence of such a coast, he determined to make the western point of the gulf; but when he came to the different points of it, he could discover neither land nor any unequivocal signs of it. Proceeding in his voyage, land was seen on the 14th, but being almost wholly covered with snow, it was at first mistaken for an island of ice. This was named from its first observer, "Willis's island," S. lat. 54° . W. long. $38^{\circ} 23'$. Another larger island, on which was a very considerable number of birds, was called "Bird island." On the 17th captain Cook landed in a bay of an extensive tract of country, very desolate in its appearance, which he took possession of in his majesty's name. The bay, situated in S. lat. $54^{\circ} 5'$. W. long. $37^{\circ} 18'$, he called "Possession bay," and the country, which proved to be an island 70 leagues in circuit, was called the "isle of Georgia," situated between $53^{\circ} 57'$, and $54^{\circ} 57'$ S. lat., and $38^{\circ} 13'$, and $35^{\circ} 34'$ W. long. On the 27th captain Cook, having left Georgia the 25th, computed that he was in S. lat. 65° . Here he was satisfied there could be no land in the direction towards the W., from which there was a long hollow swell; and hence he inferred, that the extensive coast laid down in Mr. Dalrymple's chart of the ocean between Africa and America, and the gulf of St. Sebastian, doth not exist. An elevated coast, observed on the 31st, was called the "Southern Thule," S. lat. $59^{\circ} 13' 30''$. W. long. $27^{\circ} 45'$. To the more distinguished tracts of country, discovered from Jan. 31st to Feb. 6th, captain Cook gave the names of "Cape Britol," "Cape Montagu," "Saunders's isle," "Candlemas isles," and "Sandwich's land." The last is either a group of islands, or else a point of the continent; for the captain was firmly of opinion, that a considerable tract of land existed near the pole, which was the source of most of the ice that is spread over this vast southern ocean. He thought it probable that this land must extend farthest to the N., where it is opposite to the southern Atlantic and Indian oceans. Ice had always been found by him farther to the north in these oceans than any where else, and this he judged could not be the case if there were not land of considerable extent to the south. See SOUTHERN CONTINENT.

Captain Cook having accomplished the great object of his navigation round the globe, began to direct his views towards England. Many circumstances relating to the state of his provisions, and the health of his crew, contributed to hasten his return. In his course to the Cape of Good Hope, he searched for the isles of "Denia" and "Mariveen," laid down in Halley's variation chart, in S. lat. $41^{\circ} 30'$, and about 4° of longitude E. of the meridian of the Cape of Good Hope; but after sailing from February 25th to March 13th, no such islands could be discovered. On the 22d of March he anchored in Table bay; having sailed from the time of leaving the Cape of Good Hope, to his return thither, no less than 20,000 leagues, which was an extent of voyage nearly equal to three times the equatorial circumference of the earth. It could not therefore be surprising, that the rigging and sails of the Resolution should be essentially damaged, and even worn out; and yet in the whole of this run, made in every latitude between 9° and 71° , she did not spring either low-mast, top-mast, lower or top-sail yard; nor did she so much as break a lower or top-mast shroud;

shroud; these happy circumstances were owing to the good properties of the vessel, and the singular care and abilities of her officers. Captain Cook having completed the necessary repairs, and supplied himself with requisite stores and provisions, left the Cape on the 27th of April, and reached the island of St. Helena on the 15th of May; on the 28th he anchored on the island of Ascension, and arrived at the island of Fernando de Noronha, on the 9th of June. In the progress of the voyage, he made an experiment upon the skill for procuring fresh water; the result of which was, that the invention is useful upon the whole, but that it would by no means be advisable to trust to it entirely; more especially as captain Cook was convinced, that nothing contributes more to the health of seamen, than a plentiful supply of water. On the 16th of July, the captain anchored in the bay of Fayal, one of the Azores islands; and on the 19th, proceeded with all expedition for England. On the 30th, he anchored at Spithead, and landed at Portsmouth; having been absent from Great Britain three years and 18 days, during which time, and all changes of climate, he had lost but four men, and only one of them by sickness. The able manner in which captain Cook had conducted this voyage, and the discoveries he had made, could not fail to recommend him to the protection and encouragement of those who had patronized the undertaking. The noble lord who had taken a lead in the plans of navigation and discovery, was still at the head of the admiralty-board; and recommended by him to his majesty, our navigator was raised, on the 9th of August, to the rank of a post-captain, and three days after, appointed a captain in Greenwich hospital; a situation which was intended to afford him a pleasing and honourable reward for his illustrious labours and services. Moreover, so important were his discoveries to science in general, that on the 29th of February 1776, he was unanimously chosen a member of the Royal Society; and on the evening of the 7th of March, when he was admitted, a paper was read containing an account of the method he had taken to preserve the health of the seamen. (See *Philos. Transf.* vol. lxxvi. p. 402—406.) Another paper was communicated, at the request of the president, sir John Pringle, on the 18th of April, relative to the tides in the South Sea, *viz.* those in the Endeavour river, on the east coast of New Holland. (See *Phil. Transf. ibid.* p. 447, &c.) It was also resolved by the president and council to bestow on captain Cook sir Godfrey Copley's gold medal. The president, according to his custom, delivered an elaborate discourse on the subject of the paper, which was thus distinguished.

The particulars of this voyage were related by captain Cook himself, in a manner that redounds to his reputation as a writer. His style is natural, clear, and manly; being well adapted to the subject and to his own character. The superintendance of the publication was undertaken by his learned and valuable friend, Dr. Douglas, who lately died in the see of Salisbury, and whose promotion afforded pleasure to persons of literature of every denomination. The history of the voyage was recommended to the public by the accuracy and excellence of his charts, and by a great variety of engravings from the curious and beautiful drawings of Mr. Hodges. It was followed by the publication of the original astronomical observations, which had been made by Mr. Wales in the Revolution, and Mr. Bayley in the Adventure.

The illusion of a "Terra Australis incognita," to any purposes of commerce, colonization, and utility, having been dispelled; another geographical question of very general interest remained to be determined; and that was the

practicability of a northern passage to the Pacific ocean. Many persons had conceived that there was a shorter, a more commodious, and a more profitable course of sailing to Japan and China, and, indeed, to the East Indies in general, than by the tedious circuit of the Cape of Good Hope. To find a western passage round North America had been attempted by several bold adventurers from Frobisher's first voyage, in 1576, to those of James and of Fox, in 1631. By these expeditions a considerable accession was made to the knowledge of the northern extent of America, and Hudson's and Baffin's bays were discovered. But the wished-for passage, on that side, into the Pacific ocean, was still unattained. Nor were the various attempts of our countrymen, and of the Dutch, to find such a passage, by sailing round the north of Asia, in an eastern direction, attended with better success. Wood's failure in 1676, seems to have terminated the long list of unfortunate expeditions in that century. The discovery had ceased for many years to be an object of pursuit. However, the question was revived in the last century. Accordingly captain Middleton was sent out by government in 1741, and captains Smith and Moore in 1749. But, though an act of parliament had been passed, enacting a reward of 20,000*l.* to the discovery of a passage, the accomplishment of their favourite object still remained to be effected. Previously to the full execution of this design, lord Mulgrave failed with two ships, in order to determine how far navigation was practicable towards the north-pole. In this expedition his lordship encountered many difficulties. Nevertheless, the expectation of opening a communication between the Pacific and Atlantic ocean, by a northerly course, was not abandoned; and it was resolved that a voyage should be undertaken for that purpose. Captain Cook was instantly, and unanimously, thought to be in every respect the most proper person to accomplish this difficult and hazardous, but very important and interesting object. He had, however, done so much, and undergone so many trials, that his most zealous friends, and those who were most ardently devoted to the object, could not think of asking him to engage in fresh perils; the undertaking, however, became a subject of conversation at the table of lord Sandwich, when captain Cook was present. The object, with all the interests connected with it, excited the ardour of the captain's mind, and he offered to undertake the direction of the enterprise. The earl of Sandwich lost no time; the matter was laid before the king; and captain Cook was appointed to the command of the expedition, Feb. 10, 1776. At the same time, it was agreed, that, on his return to England, he should be restored to his situation at Greenwich; and, if no vacancy occurred during the interval, the officer who succeeded him was to resign in his favour. All former navigators round the globe had returned to Europe by the Cape of Good Hope; but captain Cook undertook to accomplish the arduous task by reaching the high northern latitudes between Asia and America; and it is thought that the captain's own reflections on the subject suggested this plan. Instead, therefore, of a passage from the Atlantic to the Pacific, one from the latter into the former was to be tried. Accordingly captain Cook was ordered to proceed into the Pacific ocean, through the chain of new islands, which had been visited by him in the southern tropic. After having crossed the equator into the northern parts of that ocean, he was to hold such a course as might probably fix many interesting points in geography, and produce intermediate discoveries, in his progress northward to the principal scene of his discoveries. With regard to his grand object, it was determined, after the most mature deliberation and inquiry, that,

that, upon his arrival on the coast of New Albion, he should proceed northward as far as the latitude of 65° , and not lose any time in exploring rivers or inlets, or upon any other account, till he had gotten into that latitude. In the prosecution of this great design, motives of interest were annexed to obligations of duty. By a new law, passed in 1776, supplying the deficiencies of the act of 1745, it was enacted, "that if any ship belonging to any of his majesty's subjects, or to his majesty, shall find out, and sail through, any passage, by sea, between the Atlantic and Pacific oceans, in any direction, or parallel of the northern hemisphere, to the northward of the fifty-second degree of latitude; the owners of such ships, if belonging to any of his majesty's subjects, or the commander, officers, and seamen of such ship belonging to his majesty, shall receive, as a reward for such discovery, the sum of 20,000*l*." Two vessels were fixed upon by government for the intended service; the *Resolution* and the *Discovery*; the former commanded by captain Cook, and the latter by captain Clerke. To the *Resolution* was assigned the same number of officers and men, which she had during her former voyage; and the only difference in the establishment of the *Discovery* from that of the *Adventure*, was that she had no marine officer on board. Both ships were equipped in the most complete manner, and furnished with such an establishment and apparatus, &c. as might most effectually conduce to the improvement of astronomy and navigation. As the ships were to touch at Otaheite and the Society islands, it was determined to carry Omai back to his native country, who returned with deep impressions of gratitude and respect for the liberal treatment which he had received during his absence, and whilst he continued in England. Captain Cook sailed from the *Nore* to the Downs on the 25th of June, and on the 30th anchored in Plymouth Sound, where the *Discovery* was already arrived. On the 8th of July he received his instructions, with orders to proceed to the Cape of Good Hope. On the 12th he stood off Plymouth Sound, and proceeding in his course, touched at Teneriffe; anchoring on the 1st of August in the road of Santa Cruz. Having procured the necessary articles of refreshment, he sailed from Teneriffe on the 4th; and on the 13th arrived before Port Praya in the island of St. Jago, and then, not finding the *Discovery* there, stood out to the southward. On the 1st of September, our navigator crossed the equator in W. long. $27^{\circ} 38'$; and on the 8th, being near the eastern coast of Brazil, he took pains to settle its longitude, which he concluded to be $35\frac{1}{2}^{\circ}$ or 36° W. On the 18th of October, the *Resolution* came to an anchor in Table bay, at the Cape of Good Hope. On the 10th of November captain Cook had the satisfaction of seeing the *Discovery* arrive in the bay. Besides the attention which our captain manifested to the state of his ship, and the accommodation of his seamen in the further prosecution of his voyage, scientific objects engaged his particular notice. On the 30th of November he weighed from Table bay, and on the 3d of December got clear of the land. On the 12th land was seen, which was found, upon a nearer approach, to consist of two islands. That which lies most to the south, and is the largest, was estimated to be about 15 leagues in circuit; the northerly one was about nine leagues; and the two islands are about the distance of five leagues from each other. The largest lies in S. lat. $46^{\circ} 53'$, and E. long. $37^{\circ} 46'$; and the smaller one in S. lat. $46^{\circ} 4'$, and E. long. $35^{\circ} 8'$. They seemed to have a rocky and bold shore, and their surface is for the most part composed of barren mountains, the summits and sides of which were covered with snow. There were two islands, with four others, which lie from nine to twelve

degrees of longitude more to the east, and nearly in the same latitude, had been discovered by captain Marion du Fresne, and Crozet, French navigators, in January 1774. As no names had been assigned to them in a chart of the Southern ocean, communicated by Crozet to captain Cook in 1773, our commander distinguished the two larger ones by calling them "Prince Edward's islands." To the other four he gave the name of "Marion's" and "Crozet's" islands. Passing southward of these islands, he shaped his course so as to get into the latitude of the land which had been discovered by M. de Kerguelen, a French navigator. On the 24th he observed land, which proved to be an island of considerable height, and about three leagues in circuit. He soon after discovered another island about the same size, and also a third, besides some smaller ones. Another island was seen in S. lat. $48^{\circ} 29'$, E. long. $68^{\circ} 40'$, which was a high round rock, and which was called "Bligh's Cap." This he perceived to be the same with Kerguelen's "isle of Rendezvous." As soon as the weather began to clear up, captain Cook steered in for the land, called "Kerguelen's land." At length a good harbour was discovered, in which the ships anchored on Christmas day. Here the captain displayed the British flag, and named the place "Christmas Harbour." On the 29th he left this harbour, and ranged along the coast, in order to discover its position and extent. In pursuing his course he met with several promontories and bays, together with a peninsula, all of which he has described and named. Another harbour, in which the ships anchored for one night, is situated in S. lat. $49^{\circ} 3'$, and E. long. $69^{\circ} 37'$, and was called "Port Palliser." On the 30th, when this harbour was discovered, he came to a point, which proved to be the very eastern extremity of Kerguelen's land. This point was called "Cape Digby," and is situated in S. lat. $49^{\circ} 23'$, and E. long. $70^{\circ} 34'$. The result of captain Cook's examination of Kerguelen's land was, that it did not occupy an interval much exceeding $1\frac{1}{2}$ degree. From this desolate coast our captain took his departure on the 31st, intending to touch at New Zealand; but on the 3d of January 1777, the wind veered to the north, and on the 12th the northerly winds ended in a calm; the ship being then in S. lat. $45^{\circ} 40'$, E. long. $110^{\circ} 26'$. On the 24th our voyagers discovered the coast of "Van Diemen's" land, and on the 26th came to an anchor in "Adventure bay." While captain Cook was at this country, he neglected no inquiry which could promote the knowledge of navigation, and other branches of science. He settled the latitude and longitude of places, marked the variations of the compass, and recorded the nature of the tides. Adventure bay he found to be situated in S. lat. $43^{\circ} 21' 20''$, and E. long. $147^{\circ} 26'$. On the 30th of January he sailed from this bay, and on the 12th of February came to his old station in Queen Charlotte's Sound, in New Zealand. Here he found that ten men, who had separated from captain Furneaux's crew in the former voyage, had been murdered by the natives, and that their flesh had been consumed as food. The fear of revenge rendered them very averse from approaching the English vessels. On the 27th captain Cook got clear of New Zealand; and having met with unfavourable winds, it was not till the 29th of March that he discovered land, which was found to be an inhabited island, called "Mangee," in S. lat. $21^{\circ} 57'$, E. long. $201^{\circ} 53'$. Pursuing his voyage, on the 30th he again found land, which was an island, called by the natives "Wateoo," in S. lat. $20^{\circ} 1'$, E. long. $201^{\circ} 45'$. The next place which he visited was a small island called "Wennooa-ete," or "Otakootaia," in S. lat. $19^{\circ} 15'$, E. long. $201^{\circ} 37'$. On the 5th he directed his course to "Harvey's island," which

he had discovered in 1773, and which he now found to be well peopled. Having by various adverse circumstances been so much retarded in his progress, that nothing could be done this year in the high latitudes of the northern hemisphere, he determined to bear away for the Friendly islands, where he was sure of being abundantly provided. Accordingly he reached Palmerston island in his course, where he obtained some refreshment; and after leaving this island, he steered to the west, with a view of making the head of his way to "Annamooka." On the 28th of April, he touched at the island of "Komango," and on the 11th of May arrived at Annamooka. The only interruption of the harmony that subsisted between our voyagers and the natives of this island arose from the thievish disposition of many of them. In order to correct and counteract this propensity, captain Clerke invented a mode of treatment which produced some effect, the putting of the thieves into the hands of the barber, who completely shaved their heads. They thus became objects of ridicule to their countrymen, and their rogueries were restrained. Captain Cook having exhausted Annamooka of its articles of food, proposed, on the 11th, to proceed directly for "Tongataboo." But it was recommended to him to touch at another island, or rather a group of islands, called "Hapae," lying to the N.E., where he might be plentifully supplied with every refreshment in the easiest manner. Hapae was therefore chosen for the next station, where our commander arrived on the 17th, and met with a most friendly reception. Here the captain took an opportunity of examining not only Hapae, but "Lefooga," and other neighbouring islands. On the 10th of June he arrived at "Tongataboo;" where he was kindly received, but somewhat molested by the thievish propensity of the inhabitants. On the 10th he left Tongataboo, and two days after came to an anchor in the island of "Middleburg," or "Eooa," as it is called by the inhabitants. Captain Cook remained at the Friendly islands between two and three months; and his intercourse with the natives was little interrupted. This intercourse was productive of many advantages. See FRIENDLY ISLANDS. On the 17th of July, captain Cook resumed his voyage; and on the 8th of August, an island was discovered, called by the natives "Toobouai," and situated in S. lat. 23° 25'. E. long. 210° 37'. Pursuing his course he reached Otaheite on the 12th, and steered for Oheitepcha bay, desirous to anchor there before he went down to Matavai. Omai's reception among his countrymen was not entirely of a flattering nature. Nothing that was peculiarly striking occurred at their first meeting; his interview with his sister, however, was agreeable to the feelings of nature; and his aunt threw herself at his feet, and bedewed them with tears of joy. On the 24th, the captain resumed his old station in Matavai bay. On this visit he was fully satisfied that human sacrifices formed a part of the religious institutions of Otaheite; for he was witness to a solemnity of this kind, which he has particularly described with the just sentiments of indignation and abhorrence. Here the captain was cured of a rheumatic complaint, extending from the hip to the foot in an extraordinary manner. The mother of Otoo, a chief of the island, his three sisters, and eight other women, undertook the cure. Being desired to lay himself down amongst them, as many as could get round him began to squeeze him with both hands, from head to foot, but more particularly in the part where the pain was lodged, till they made his bones crack, and his flesh became a perfect mummy. After undergoing this discipline about a quarter of an hour, he was glad to be received from his female friends. The operation, however, gave him immediate

relief, so that he was encouraged to submit to another rubbing down before he went to bed; the consequence of which was, that he was tolerably easy the whole succeeding night. His female physicians repeated their prescription the next morning, and again in the evening; after which his pains were entirely removed, and the cure was perfected. This operation, which is called "Romee," is universally practised among these islanders: being sometimes performed by the men, but generally by the women. During this visit of our voyagers to Otaheite, such a cordial friendship and confidence subsisted between them and the natives, as never once to be interrupted by any untoward accident. From Otaheite our voyagers sailed on the 30th to Emoo, where they anchored. The transactions on this island were, upon the whole, unpleasent. On the 11th of October, the ship left it, and next day arrived at Owharre harbour, on the west side of Huahine. Here they settled Omai to mutual satisfaction; having procured for him a portion of land and built a house, on the outside of which was this inscription:

Georgius Tertius, Rex. 2 Novembris, 1777.

*Naves, { Resolutio, Jac. Cook, Pr.
 { Discovery, Car. Clerke, Pr.*

After parting with Omai in an affectionate manner, and leaving him comfortably settled among several of his relatives, captain Cook arrived at Bolabola, the last of the Society islands, which he visited on the 8th of December. Upon the whole, it has been observed, that the future felicity of the inhabitants of Otaheite, and the Society islands, will not a little depend on occasional visits from Europe, for it would have been better for these poor people, as captain Cook says, never to have known our superiority in the accommodations and arts which render life comfortable, than, after once knowing it, to be again abandoned to their original incapacity of improvement. On the 8th of December our commander sailed from Bolabola, and in the night between the 22d and 23d, crossed the line in E. long. 203° 15', and on the 24th discovered land, which was called "Christmas island," the west side of it, on which was observed an eclipse of the sun, being in N. lat. 1° 59'. E. long. 202° 30'. On the 2d of January 1778, the ships resumed their course towards the north, and in their progress discovered three islands. On the 22d they touched at one of these islands, called by the natives "Atooi," and where captain Cook found the horrid practice of eating human flesh, which the inhabitants denominated "favoury eating." But it was ascertained that enemies slain in battle, are the sole objects of this abominable custom. Near this was another island, called "Onecheow," where our commander anchored on the 29th. It is observed, that the islands in the Pacific ocean, which European voyagers have discovered, have generally been found to lie in groups, or clusters. This was the case with those that were now visited; and to which captain Cook gave the name of "Sandwich islands," which see. On the 2d of February, our navigators pursued their course to the northward; and on the 7th of March they discovered the coast of "New Albion," the ships being then in N. lat. 44° 33'. E. long. 235° 20'. In ranging on the west side of America, captain Cook gave names to several capes and head lands, which appeared in sight. At length, on the 29th he anchored in a inlet, where the country appeared full of mountains, with snow covering their summits, interspersed with valleys which produced high straight trees, exhibiting a beautiful prospect, as of one vast forest. The ships were now in N. lat. 49° 29'. E. long. 232° 29'. The inhabitants on the coast appeared to be disposed to maintain a friendly intercourse with stran-

ers; and a trade immediately commenced, the articles of which were the skins of various animals, such as bears, wolves, foxes, deer, raccoons, polecats, and martins; and, particularly, sea-otters. Garments made of these were also offered for sale; the most extraordinary articles, however, were human skulls, and hands not quite stripped of their flesh, some of which exhibited marks of having been upon the fire. In exchange the natives took knives, chisels, pieces of iron and tin, nails, looking-glasses, buttons, or any kind of metal. Although commerce was, in general, carried on with mutual honesty, some of these people were no less inclined to theft than the Indians in the Southern ocean. Of all the uncivilized tribes, which our commander met with in his various navigations, he never found any who had such strict notions of their right to the exclusive property of every thing which their country produced, as the inhabitants of the Sound where he was now stationed. With captain Cook, very much to the honour of his character and of his country, it was a sacred rule never to take any part of the property of the people whom he visited, without an ample compensation. Whilst the ships were under repair for the prosecution of the expedition, our captain improved every opportunity that occurred for extending his knowledge of the manners and customs of the inhabitants, who, in general, treated him with great civility. The natives were much addicted to singing; and in some instances, the whole body joined, some in a slow, and others in a quicker time; accompanying their notes with the most regular motions of their hands, or with beating in concert with their paddles, on the sides of the canoes, to which were added other very expressive gestures. At the end of each song, they continued silent for a few moments, and then began again, sometimes pronouncing the word *Hoee!* forcibly as a chorus. At our captain's first arrival in this inlet, he denominated it "King George's Sound;" but he afterwards was informed that the natives called it "Nootka." The entrance of the Sound is situated in the east corner of Hope bay, in N. lat. $49^{\circ} 53'$. E. long. $233^{\circ} 12'$. On the 26th the repairs of the ships being completed, every thing was ready for the captain's departure. In the prosecution of the voyage to the north, and back again to the Sandwich islands, the incidents that occurred were chiefly of a nautical kind. The first place at which captain Cook landed, after his departure from Nootka Sound, was an island which he called "Kaye's island," situated at its S.W. point in N. lat. $59^{\circ} 49'$. E. long. $216^{\circ} 58'$. To an inlet in which the ships anchored on the 12th, he gave the appellation of "Prince William's Sound." Some days after leaving this Sound, our navigators came to an inlet, which they hoped would be found to communicate with the sea to the north, or with Baffin's or Hudson's bay to the east; and therefore they determined particularly to examine it. In consequence of a complete investigation of this inlet, it was discovered to be a river, which was afterwards called "Cook's river." On the 6th of June they got clear of this river, and pursuing their voyage, they failed on the 15th, amidst the group of islands, which had been called by Bering "Schumagin's islands." On the 21st, among some hills, on the main land, that towered above the clouds to a most amazing height, one was discovered to have a volcano, which continually threw up vast columns of smoke. It does not stand far from the coast, and is situated in N. lat. $54^{\circ} 48'$, and long. $195^{\circ} 45'$. The mountain is of a completely conical figure, and the volcano is at its very summit. A canoe, from an island in the neighbourhood, approached the ship, and the single person on board bowed as he came near. From such tokens of politeness, our captain reasonably inferred, that the Ruf-

fians must have some communication and traffic with these people. On the 27th our voyagers reached an island, known by the name of "Oonalafka," the inhabitants of which behaved with a degree of politeness uncommon to savage tribes. The harbour of "Samgamooda," on the north side of the island, in which captain Cook came to an anchor, is situated in N. lat. $53^{\circ} 55'$. E. long. $193^{\circ} 36'$. On the 2d of July our voyagers left Oonalafka, and on the 16th were within sight of a promontory, on which lieutenant Williamson landed; but he found that the land, as far as his view extended, produces neither tree nor shrub, though the lower grounds were not destitute of grass, and of some other plants. To this promontory, in N. lat. $56^{\circ} 42'$. E. long. $197^{\circ} 36'$, was given the name of "Cape Newenham." When our navigators, on the 3d of August, had advanced to the latitude of $62^{\circ} 34'$, they had the misfortune to lose Mr. Anderfon, the surgeon of the Resolution, who had for more than twelve months been lingering under a consumption. Mr. Anderfon, who was a person of a cultivated understanding and agreeable manners; to distinguished skill in his own profession, added a very considerable knowledge in other branches of science. An island, discovered soon after his death, was honoured with the appellation of "Anderfon's island." On the 9th captain Cook anchored under a point of land, to which he gave the name of "Cape Prince of Wales," situated in N. lat. $65^{\circ} 46'$. E. long. $191^{\circ} 45'$, and remarkable for being the most western extremity of America hitherto explored. This extremity is distant from the eastern cape of Siberia only 17 leagues; and there our commander had the glory of ascertaining the vicinity of the two continents, which had only been conjectured from the reports of the neighbouring Asiatic inhabitants, and the imperfect observations of the Russian navigators. Returning his course on the 10th, captain Cook anchored in a bay, the land of which was at first supposed to be a part of the island "Alafchka;" but from the figure of the coast, from the situation of the opposite shore of America, and from the longitude, the captain thought to be more probably the country of the "Tschutski," on the eastern extremity of Asia, which had been explored by Bering in 1728; and this was found to be the fact. From the bay of St. Lawrence, belonging to the country of the Tschutski, our navigators steered, on the 11th, to the east, in order to get nearer to the coast of America. Afterwards, proceeding to the north, they reached, on the 17th, the latitude of $70^{\circ} 33'$, in longitude $197^{\circ} 41'$. On this day a brightness was perceived in the northern horizon, resembling that which is reflected from ice, and which is commonly called the *blink*. In about an hour's time, the sight of a large field of ice removed all doubt in captain Cook's mind with respect to the cause of the brightness of the horizon. The ships were soon close to the edge of the ice, in lat. $70^{\circ} 41'$, and unable to proceed any farther. On the 18th, in lat. $70^{\circ} 44'$, the ice near them was so compact as a wall, and judged to be at least ten or twelve feet high. Farther to the north, it appeared much higher. A prodigious number of sea-horses lay upon the ice; and some of them were procured for food, in order to supply the want of fresh provisions. Our voyagers lived on the sea-horses as long as they lasted; and they were generally preferred to salt provisions. Captain Cook continued, until the 29th, to traverse the icy sea beyond Bering's strait, in various directions, and through numberless obstructions and difficulties. The season, indeed, was now so far advanced, that it would have been highly imprudent to have made any farther attempts, till the next summer, at finding a passage into the Atlantic. Our commander's attention was now directed to the discovery of a proper

proper place for obtaining a supply of wood and water; and to the manner in which he should spend the winter, with some improvements in geography and navigation, and so as to be in a condition to return to the north, for a farther search of a passage, in the ensuing summer. Before he proceeded to the south, he employed a considerable time in examining the fide and coasts in the vicinity of Beering's strait, on the sea both of Asia and America. In this examination, he ascertained the accuracy of Beering, so far as he went; demonstrated the errors with which Stæhlin's map of the new northern Archipelago abounds; and made large additions to the geographical knowledge of this part of the world. "It reflects," as Mr. Coxe justly observes, "the highest honour even on the British name, that our great navigator extended his discoveries much farther in one expedition, and at so great a distance from the point of his departure, than the Russians accomplished in a long series of years, and in parts belonging or contiguous to their own empire."

On the 2d of October, our voyagers came within sight of the island of Ononashka, and anchored again in Samganoodah harbour. Here, whilst the ships were repairing, the seamen collected berries, with which the island abounds, and which, in conjunction with the spruce-beer, contributed effectually to eradicate every seed of the scurvy that might exist in either of the vessels. They also procured an ample supply of fish. Captain Cook, on the 8th, received a very singular present, which was a rye-loaf, or rather a pye in the form of a loaf, for it inclosed some salmon, highly seasoned with pepper. Captain Cerke received also the same kind of present. These presents, it was reasonably supposed, came, by the hands of an Ononashkan, from some Russians in the neighbourhood. On the 10th corporal Lediard of the marines returned from his researches with three Russian seamen, or furriers, who, with several others, resided at "Engoochhar," where they had a dwelling-house, some store-houses, and a floop of about 30 tons burthen. From these persons captain Cook derived every possible degree of information. Afterwards, another Russian was introduced to our captain, whose name was Erasmus Gregoroff Sin Imyloff, and who was the principal person among his countrymen in this and the neighbouring islands. From him he obtained two charts, which he was permitted to copy. The first included the "Penshinkian" sea; the coast of Tartary, down to the latitude of 41°; the Kuril islands; and the peninsula of Kamtschatka. The second chart, which was the most interesting, comprehended all the discoveries made by the Russians to the eastward of Kamtschatka, towards America; which, however, exclusively of the voyages of Beering and Tichirikoff, amounted to little or nothing. Indeed captain Cook was assured, that no Russians had even seen any part of the continent of America to the northward, excepting that which lies opposite to the country of the Tschuktsis. On the 26th, all things being ready for captain Cook's departure, he put to sea, and sailed for the Sandwich islands; it being his intention to spend a few months there, and then to direct his course to Kamtschatka, so as to endeavour to reach that country by the middle of May, in the ensuing summer. On the 26th of November, when the ships had proceeded southward to the latitude of 20° 55', land was discovered, which proved to be the island of "Mowee," one of the group of the Sandwich islands, with the inhabitants of which a friendly intercourse was maintained. Another island was discovered on the 30th, called by the natives "Owhyhee." Among the articles procured from the natives, was a quantity of sugar-cane, a strong decoction of which was found, upon trial, to be a very palatable

beer; more especially when improved with a few hops. On the 16th of January 1779, canoes in great numbers came out from all parts of the island, so that the two ships were surrounded with no fewer than a thousand, crowded with people and laden with hogs, and other productions of the island. Some of them, however, manifested a thievish disposition, and captain Cook, in order to check it, ordered two or three muskets, and as many four pounders, to be fired over one of the canoes, which had carried away a rudder. Into a bay, affording good anchorage and fresh water, captain Cook resolved to take the ships in order to refit, and to obtain every refreshment which the place could afford. The bay in which the ships anchored on the 17th was called by the inhabitants "Karakakooa." The vessels were soon surrounded with a multitude of canoes; and the whole shore of the bay was covered with spectators, whilst many hundreds were swimming round the ships like shoals of fish. Our navigators were much impressed by the singularity of the scene; and few of them lamented their unsuccessful endeavours of getting homeward, the last summer, by a northern passage. "To this disappointment," says the captain, "we owed our having it in our power to revise the Sandwich islands, and to enrich our voyage with a discovery, which, though the last, seemed, in many respects, to be the most important that had hitherto been made by Europeans, throughout the extent of the Pacific ocean." Such, alas! is the concluding sentence of our illustrious commander's journal. Little did he then imagine, that a discovery which promised to annex no small honour to his name, and to be productive of very agreeable consequences, would be so fatal in the result. Little did he think, that the island of Owhyhee was destined to be the last scene of his exploits and the cause of his destruction.

The reception which the captain met with from the natives, on his proceeding to anchor in Karakakooa bay, was in a very high degree encouraging. The natives expressed their joy by singing and shouting, and by exhibiting a variety of wild and extravagant gestures. During the long cruise of our navigators off the island of Owhyhee, the inhabitants had conducted themselves in their dealings, almost universally, with fairness and honesty; but after the arrival of the ships in the bay, they altered their conduct. The immense crowds of islanders that encompassed the ships afforded frequent opportunities of pilfering without the risk of detection, and held out, especially as their number was much superior to that of the English, the prospect of escaping with impunity. Another circumstance to which the alteration in the conduct of the natives may be ascribed, arose from the presence and encouragement of their chiefs, into whose possession the booty might be traced, and who were probably the instigators of the depredations that were committed. Soon after the Resolution had gotten into her station, three chiefs, one of whom named Koah, who was a priest, and in his youth had been a distinguished warrior, visited the ship; and in the evening, captain Cook, accompanied by Mr. Bayley and Mr. King, attended him on shore. The captain was received with great civility and a respect, on the part of the natives, approaching to adoration. The captain was particularly desirous of procuring from the island some salted hogs for sea-store; and, with this view, of renewing former attempts in the operation for this purpose. The event answered his most sanguine expectations. On the 26th captain Cook had his first interview with Terreeboe, the king of the island; which was conducted with a variety of ceremonies, among which, the custom of exchanging names,

which

which among the islands of the Pacific ocean is the strongest pledge of friendship, was observed. The king, attended by several chiefs, was conducted in a pinnace on board the *Resolution*; where they were received, apparently much to their satisfaction, with peculiar attention and respect. In the progress of the intercourse which was carried on between our voyagers and the natives, the quiet and inoffensive behaviour of the latter took away every apprehension of danger and inspired an unsuspecting confidence in the English. A society of priests, in particular, displayed a generosity and munificence, of which there are few examples; for they furnished a constant supply of hogs and vegetables to our navigators, without ever demanding, or even suggesting, a return. Indeed, the conduct of the warrior chiefs, or *Earees*, was always less satisfactory than that of the priests. Although the kind and liberal behaviour of the natives continued without remission, *Terreeboob*, and his chiefs, began at length to be very inquisitive about the time of the departure of the English; but this is not surprising, when we consider the enormous consumption of hogs and vegetables, which had taken place during their abode of 16 days in the bay. When the king was informed that they were to leave the island in a day or two, a proclamation was made through the island, requiring the people to bring their hogs and vegetables, that they might be presented by the king to the *Orono*, the title of respect given to captain Cook, on his quitting the country. Accordingly, on the 3d of February, being the day preceding that which was fixed for leaving the island, *Terreeboob* invited captain Cook and Mr. King to attend him to the place where *Kaoo* resided. On their arrival, they found the adjoining ground covered with parcels of cloth, and at a little distance an immense quantity of vegetables; and near them was a large herd of hogs. At the close of the visit a great part of the cloth, and all the vegetables and hogs were given by *Terreeboob* to captain Cook and Mr. King, who were astonished at the value of the present. Such was the attachment of the inhabitants of *Owhyhee* to Mr. King, that *Terreeboob* and *Kaoo* waited upon captain Cook, whose son they supposed him to be, to solicit his residence in their country. Early on the 4th the ships sailed out of *Karakakooa* bay, being followed by a large number of canoes. It was the captain's design, before he visited the other islands to make a complete survey of *Owhyhee*, in hopes of finding a better sheltered bay than that which he had left; and upon failure of success to take a view of the south-east part of *Mowee*, where, as he was informed, he might find an excellent harbour. After sailing about the island of *Owhyhee* for several days, the weather being stormy, and the foremast of the *Resolution* being damaged, our navigators returned on the 11th to *Karakakooa* bay; but in coming to an anchor, they found their reception to be very different from what it had been on their first arrival. Their anxiety, however, was in some measure relieved, by the return of a boat which had been sent on shore, and which brought information, that *Terreeboob* was absent, and had left the bay under the *Taloo*. The behaviour of the natives, however, appeared mysterious and excited suspicion; the interdiction of intercourse, on pretence of the king's absence, afforded reason for apprehending that he only wished to gain time for consulting with his chiefs. On the next morning *Terreeboob* arrived and immediately visited captain Cook; this circumstance, and the return of the natives to their usual friendly intercourse, were considered as strong proofs, that they neither meant, nor apprehended, any change of conduct. Some other incidents confirmed this opinion. Towards the evening of the 13th

information was received, that several chiefs assembled at the well near the beach and drove away the natives who had been hired to assist the sailors in rolling down the casks to the shore. It was afterwards found, that the islanders had armed themselves with stones and were very tumultuous. Not to mention some instances of theft and subsequent dissensions which occurred, one of a very serious and unpleasant nature happened, which it may not be improper to specify on account of the consequences that ensued. A canoe, belonging to *Pareea*, was seized; and he, protesting his innocence with regard to the theft that had been committed, claimed his property. A scuffle took place between him and the English officer with some of his companions, in which *Pareea* was knocked down by a violent blow on the head, with an oar. The natives, who had been peaceable spectators, immediately attacked the English seamen with a shower of stones, which obliged them precipitately to retreat and to swim off to a rock at some distance from the shore. The pinnace, which was waiting for captain Cook's return, was immediately ransacked by the islanders; and if it had not been for the reasonable interposition of *Pareea*, would have been entirely demolished, *Pareea* interfered further in restoring the pinnace; and being assured that he would be kindly received by the *Orono*, joined noses (according to their custom) with the officers, in token of friendship, and paddled over to the village of *Kowrowa*. Captain Cook, on being informed of this occurrence, expressed much uneasiness: "I am afraid," says he, "that these people will oblige me to use some violent measures; for," he added, "they must not be left to imagine, that they have gained an advantage over us." The confidence of our navigators in the natives gradually abated; and they thought it necessary to be very much upon their guard. At this time the cutter belonging to the *Discovery* was stolen, and captain Cook made the necessary preparations for the recovery of it. On occasions of a similar kind, it had been his practice to get the king, or some of the principal *Earees*, on board, and to detain them as hostages till the article, that had been lost, was restored. This method he meant now to pursue; and he also gave orders to stop all the canoes that should attempt to leave the bay, with an intention of seizing and destroying them, if by peaceable means he could not recover the cutter. Captain Cook and Mr. King, together with Mr. Phillips, and nine marines, left the ship; and when they landed, the captain instructed Mr. King to quiet the minds of the natives, by assuring them they should not be hurt, to keep his people together, and to be on his guard. Whilst Mr. King was employed in executing his commission, captain Cook proceeded to *Kowrowa*, where the king resided, and landed with the lieutenant and nine marines. The people received him with the usual tokens of respect; prostrating themselves before him, and bringing their customary offerings of small hogs. Having gained an interview with *Terreeboob*, he invited him to return in the boat, and spend the day on board the *Resolution*. To this proposal the old king assented, and immediately accompanied him. One of the king's favourite wives, however, besought him, with many tears and intreaties, not to go on board; and two chiefs, who accompanied her, forced him to sit down. The natives, who were collecting in great numbers on the shore, and who had been alarmed by the hostilities that had previously occurred in the bay, thronged round captain Cook and their king. The lieutenant and marines, perceiving that they were much pressed, and thus rendered incapable of using their arms, if occasion should require it, proposed to the captain to draw them up along the rocks, close to the water's edge; and accordingly

they formed a line, at the distance of about 30 yards from the place where the king was sitting. The old king appeared to be much alarmed; and when captain King urged him to proceed, the chiefs interposed, and at first by prayers and intreaties, and afterwards by force and violence, insisted on his slaying where he was. The captain at length desisted; observing to Mr. Philips, that it would be impossible to compel him to go on board, without the risk of killing a great number of the inhabitants. Captain Cook's person had hitherto appeared to be in no danger; but a circumstance accidentally occurred, which gave a fatal turn to his situation. The boats, which had been stationed across the bay to prevent the escape of the canoes, fired at some of them that were endeavouring to go off, and unfortunately killed a chief of the first rank. The news of his death arrived at the village, where captain Cook was, just as he had left the king, and was walking slowly toward the shore. Upon this, the women and children were immediately sent off; and the men put on their war-mats, and armed themselves with spears and stones. One of the natives, having in his hands a stone, and a long iron spike (called a *pabooa*), advanced to the captain, flourishing his weapon in defiance, and threatening to throw the stone. The captain, after having ineffectually desired him to desist, fired a load of small shot, which, as the man had on his war-mat, served only to irritate and encourage the enraged people. Several stones were thrown at the marines; and one of the *Erees* attempted to stab Mr. Philips with his *pabooa*, but failed in the attempt. Captain Cook now fired his second barrel, loaded with ball, and killed one of the foremost of the natives. A general attack with stones immediately followed, which was returned by a discharge of musquetry from the marines, and the people in the boats. The islanders, contrary to expectation, stood the fire with great firmness; and before the marines had time to reload, broke in upon them with dreadful shouts and yells. Four marines were cut off among the rocks, in their retreat; three more were dangerously wounded; and the lieutenant, who had received a stab between the shoulders with a *pabooa*, having fortunately reserved his fire, shot the man who had wounded him, just as he was going to repeat his blow. The unfortunate commander, the last time in which he was distinctly seen, was standing at the water's edge, and calling out to the boats to cease firing, and to pull in. If it be true, as some of those who were present imagined, that the mariners and boatmen had fired without his orders, and that he was desirous of preventing any further bloodshed, it is not improbable that his humanity, on this occasion, proved fatal to him. For it was remarked, that whilst he faced the natives, none of them had offered him any violence; but that having turned about, to give his orders to the boats, he was stabbed in the back, and fell with his face into the water. On seeing him fall, the islanders set up a great shout, and his body was immediately dragged on shore, and surrounded by the enemy, who, snatching the dagger out of each other's hands, shewed a savage eagerness to have a share in his destruction. "Thus fell," says captain King, "our great and excellent commander!" For other particulars, we refer to "Samwell's Narrative of the Death of Captain Cook."

In consequence of the savage disposition of the natives, the whole remains of captain Cook could not be recovered. Although various means, soothing and menacing, were employed for this purpose, little more than the principal part of the bones could be procured. By the possession of these, our navigators were enabled to perform the last offices to their eminent and unfortunate commander. The bones, having been put into a coffin, and the service being read

over them, were committed to the deep, on the 21st, with the usual military honours. What were the feelings of the companies of both the ships, on this occasion, the world must be left to conjecture; for those who were present know, that it is not in the power of any pen to describe them.

Such was the high estimation in which the character and enterprises of captain Cook were held by neighbouring nations, that, when war was declared between France and England, a letter was issued, on the 15th of March, 1779, by Mons. Sartine, secretary of the marine department at Paris, and sent to all the commanders of the French ships, which, after doing honour to the importance and utility of his discoveries, ordered, that the ship of captain Cook should be treated with respect at sea. The adoption of this measure was suggested by Mons. Turgot, who also composed a memorial, in which he proved that honour, reason, and even interest, dictated this act of respect for humanity; and it was in consequence of this memorial, as we learn from M. Condorcet (in his *Life of M. Turgot*), that an order was given not to treat as an enemy the common benefactor of every European nation. The first thought of such a plan of conduct was very probably suggested by Dr. Benjamin Franklin, who, when he was ambassador at Paris from the United States of America, preceded the court of France in issuing a similar requisition.

We shall close this article, as far as it respects the discoveries of captain Cook, with merely mentioning, that the Sandwich islands were further explored; that Kamtschatka was visited, and a very friendly intercourse maintained with the Russian officers of that country; that our navigators experienced the most generous and hospitable treatment from major Behm, in particular, the commander of the garrison at Bolcharetsk; that they proceeded to the north, in pursuit of the grand object of the expedition; that, having passed through Beering's strait, and attained to somewhat more than 69 $\frac{1}{2}$ degrees of northern latitude, they found it absolutely impossible to penetrate through the ice, either on the side of America or on the side of Asia; that every hope being precluded of accomplishing, in this way, a passage into the Atlantic ocean, captain Clerke was obliged to come to the determination of sailing back to the southward; that on the 22d of April (1779) the captain died of a consumption (see his article); that captain Gore succeeded to the command of the *Resolution*, and lieutenant King to that of the *Discovery*; that a second visit was paid to Kamtschatka, which extended our acquaintance with that part of the world; that no small accession of information was acquired, with respect to geographical science in general; that our voyagers pursued their course by the coasts of Japan and China; that they made some stay at Canton; that thence they proceeded to the Cape of Good Hope; that they came to an anchor at Stromness, on the 22d of May, 1780; that both ships arrived at the Nore, on the 4th of October, after an absence of 4 years, 2 months, and 22 days; that, during the whole of the expedition, the *Resolution* lost only five men by sickness, three of whom were in a precarious state of health at their departure from England, while the *Discovery* did not lose a single man; and that the history of the voyage, from the time in which captain Cook's journal ends, was written with great ability by Mr. King. By the decease of captain King, who died at Nice in Italy, in 1784, this country sustained another loss of an able and scientific commander and navigator, who hath left a memorial of his talents and services, which has honourably united his name with that of the immortal Cook.

In sketching the talents and character of captain Cook, strikingly illustrated in the actions and enterprises of his life,

we shall avail ourselves of the assistance that is afforded us by his professed or incidental biographers. Captain Cook possessed, in an eminent degree, an inventive mind, which, by its native vigour, suggested noble objects of pursuit, and the most effectual methods of prosecuting and attaining them. This faculty he exemplified in a great variety of critical and difficult situations. To this kind of genius he added unwearied application. By his genius and unremitting assiduity he acquired an extensive acquaintance, not only with navigation, but with many other sciences. He was so well informed with regard to different branches of the mathematics, and particularly in astronomy, that he was able to take the lead in various observations of an astronomical kind, in the course of his voyages. In general literature, and even the art of composition, he was so great a proficient, that he acquired reputation, not merely as the performer, but as the narrator, of his various interesting enterprises. Perseverance and steadiness in the prosecution of the objects to which his life was devoted, were distinguishing features of his character; and such was the invincible fortitude of his spirit, that no difficulties or dangers intimidated him, or deterred him from accomplishing any purpose which he formed, or which the hazardous services assigned him required. His fortitude was of course accompanied with complete self-possession. This latter quality was eminently useful to him in many critical and trying circumstances. Accordingly it is observed, that the calmness and composure of his mind were such, that, after having given necessary directions, he could take his rest, and sleep during the hours which he allotted to himself with perfect soundness. To the great qualities possessed by captain Cook, he added the most amiable and conciliatory virtues. His humanity is illustrated in the whole course of his conduct, during his successive voyages; with regard to the inhabitants of the countries which he visited, and with respect to the accommodation, health, and comfort of his own seamen. In the private relations of life, he maintained an excellent and exemplary character, as a husband and father, and as a sincere and steady friend; and his sobriety and virtue gave stability and security to every other moral qualification. He was also distinguished by the simplicity of his manners. In conversation he was unaffected and unassuming; and yet, on necessary occasions, obliging and communicative. To this general account of his talents and virtues, we shall subjoin some delineations of his character by those who were in habits of intimate acquaintance with him, and who had an opportunity of marking his temper and conduct in the various trying circumstances that occurred in the course of his life. Captain King, the continuator of the journal of his last voyage, has given us the following sketch of his character: "The constitution of his body was robust, inured to labour, and capable of undergoing the severest hardships. His stomach bore, without difficulty, the coarsest and most ungrateful food. Indeed temperance in him was scarcely a virtue; so great was the indifference with which he submitted to every kind of self-denial. The qualities of his mind were of the same hardy, vigorous kind with those of his body. His understanding was strong and perspicacious; his judgment, in whatever related to the services he was engaged in, quick and sure. His designs were bold and manly; and both in the conception, and in the mode of execution, bore evident marks of a great original genius. His courage was cool and determined, and accompanied with an admirable presence of mind in the moment of danger. His manners were plain and unaffected. His temper might perhaps have been justly blamed, as subject to bitterness and passion, had not these been disarmed by a disposition the most benevolent and hu-

mane. Such were the outlines of captain Cook's character; but its most distinguished feature was that unremitting perseverance in the pursuit of his object, which was not only superior to the opposition of dangers, and the pressure of hardships, but even exempt from the want of ordinary relaxation. During the long and tedious voyages in which he was engaged, his eagerness and activity were never in the least abated. No incidental temptation could detain him for a moment; even those intervals of recreation, which sometimes unavoidably occurred, and were looked for by us with a longing, that persons, who have experienced the fatigues of service, will readily excuse, were submitted to by him with a certain impatience, whenever they could not be employed in making further provision for the more effectual prosecution of his designs." (See King's Voyage, vol. iii. p. 48, 49.) Mr. Samwell has also annexed some particulars, relative to the life and character of captain Cook, to the "Narrative of his Death." Dr. Reinhold Forster has also, with some abatement, passed an eulogium on his character, in his "History of the Voyages and Discoveries made in the North." The following tribute to his memory, — the memory of "the ablest and most renowned navigator this or any country hath produced," is drawn up by one of his own profession, of whom it is said, that he is not more distinguished by the elevation of rank, than by the dignity of private virtues. (See Introduction to Cook's third Voyage, vol. i. p. 85—87, &c.) Captain James Cook, says this writer, "possessed, in an eminent degree, all the qualifications requisite for his profession and great undertakings; together with the amiable and worthy qualities of the best men. Cool and deliberate in judging; sagacious in determining; active in executing; steady and persevering in enterprising from vigilance and unremitting caution; unflinched by labours, difficulties, and disappointments; fertile in expedients; never wanting presence of mind; always possessing himself, and the full use of a sound understanding. Mild, just, but exact in discipline; he was a father to his people, who were attached to him from affection, and obedient from confidence. His knowledge, his experience, his sagacity, rendered him so entirely master of his subject, that the greatest obstacles were surmounted, and the most dangerous navigations became easy, and almost safe, under his direction. He explored the southern hemisphere to a much higher latitude than had been ever reached, and with fewer accidents than frequently befall those who navigate the coasts of this island. By his benevolent and unabating attention to the welfare of his ship's company, he discovered and introduced a system for the preservation of the health of seamen in long voyages, which has proved wonderfully efficacious; for in his second voyage round the world, which continued upwards of three years, he lost only one man by distemper, of 118, of which his company consisted. The death of this eminent and valuable man was a loss to mankind in general; and particularly to be deplored by every nation that respects useful accomplishments, that honours science, and loves the benevolent and amiable affections of the heart. It is still more to be deplored by this country, which may justly boast of having produced a man hitherto unequalled for nautical talents; and that sorrow is farther aggravated by the reflection, that his country was deprived of this ornament by the enmity of a people, from whom, indeed, it might have been dreaded, but, from whom it was not deserved. For, actuated always by the most attentive care and tender compassion for the savages in general, this excellent man was ever assiduously endeavouring, by kind treatment, to dissipate their fears and court their friendship; overlooking their thefts and treacheries, and frequently

frequently interposing, at the hazard of his life, to protect them from the sudden repentment of his own injured people. The object of his last mission was to discover and ascertain the boundaries of Asia and America, and to penetrate into the northern ocean by the N. E. Cape of Asia.

Traveller! contemplate, admire, revere, and emulate this great master in his profession; whose skill and labours have enlarged natural philosophy; have extended nautical science; and have disclosed the long unsealed and admirable arrangement of the Almighty, in the formation of this globe, and, at the same time, the arrogance of mortals, in presuming to account, by their speculations, for the laws by which he was pleased to create it. It is now discovered, beyond all doubt, that the same great being who created the universe by his fiat, by the same great being who created the earth to keep a just poise, without a corresponding southern continent—and it was so! “*He stretches out the north over the empty place, and hangs the earth upon nothing.* Job. xxxvi. 7. If the arduous but exact researches of this extraordinary man have not discovered a new world, they have discovered seas un navigated and unknown before. They have made us acquainted with islands, people, and productions, of which we had no conception. And if he has not been so fortunate as Americus to give his name to a continent, his pretensions to such a distinction remain unrivalled; and he will be revered, while there remains a page of his own modest account of his voyage, and as long as mariners and geographers shall be instructed, by his new map of the southern hemisphere, to trace the various courses and discoveries he has made. If public services merit public acknowledgments; if the man who adorned and raised the fame of his country, is deserving of honour, then captain Cook deserves to have a monument raised to his memory, by a generous and grateful nation.

Virtutis uberimum alimentum est honos.

Val. Max. l. ii. c. 6.

From the numerous poetical tributes, paid to the memory of captain Cook, by our elegant female writers, we must confine ourselves to a single extract from Miss Hannah More's poem on “Slavery.”

“Had those advent'rous spirits who explore
Thro' ocean's trackless wastes, the far-fought shore,
Whether of wealth insatiate, or of power,
Conquerors who waste, or russians who devour:
Had these posses'd, O Cook! thy gentle mind,
Thy love of arts, thy love of human-kind;
Had these pursu'd thy mild and liberal plan,
DISCOVERERS had not been a curse to man!
Then, blest'd Philanthropy! thy social hands
Had link'd dissolv'd worlds in brother's bands;
Careless, if colour, or if clime divide;
Then lov'd, and loving, man had liv'd, and died.”

Miss Seward's admirable poem in celebration of captain Cook's memory would have furnished many pleasing extracts, if our limits allowed our farther enlarging on this interesting article; but we must refer the reader to this lady's elegy on the occasion.

The Royal Society testified their respect for the memory of their illustrious member by medals, struck on this occasion, some of gold, others of silver, and others of bronze; the expense of which was defrayed by subscription. On one side is the head of captain Cook in profile, and round it, JAC. COOK OCCANI INVESTIGATOR ACERRIMUS; and on the other, the exergue, REG. SOC. LOND. SOCIO SUO. On the reverse, VOL. IX.

verse is a representation of Britannia, holding a globe; round her is inscribed, NIL INTENTATUM NOSTRI LIQUERE; and on the exergue, AUSPICIIIS GEORGH III.

Among the numerous testimonies of regard that have been rendered to the merits and memory of captain Cook, the important object of providing for his family hath not been forgotten. Soon after his death was known, the lords of the admiralty presented a memorial to his majesty; and he was pleased, by the advice of his privy council, to order a pension of 200*l.* a year to be settled on the widow, and 25*l.* a year to each of the three sons of the captain. A considerable benefit also redounded to his family from the sale of the charts and plans, belonging to the voyage to the Pacific ocean, which were provided at the expense of government. On September the 3d, 1785, a coat of arms was granted to the family, with an appropriate device. Our navigator had six children. On the subject of this article see the first, second, and third voyages of Cook; the first included in Hawkesworth's Voyages, published in 3 vols. 4to, 1773. The second, written by captain Cook himself, and published in 2 vols. 4to. in 1777; and the third published in 3 vols. 4to. in 1784; the two first being written by captain Cook, and the third by captain King. To the first of these volumes is prefixed an introduction by Dr. Douglas, the late bishop of Salisbury, containing a brief historical account of voyages that had been previously performed with a view to the objects comprehended by those of captain Cook, a concise statement of his discoveries, and a detail of the advantages resulting from them. See also Kippis's Life of Captain Cook, and Biog. Brit. vol. iv.

COOK, Captain HENRY, a choir-man, brought up in the chapel-royal during the reign of Charles I., which he quitted at the commencement of the grand rebellion, and went into the king's army, where he considerably distinguished himself; and in 1642, obtained a captain's commission. At the restoration, he was appointed master of the children of the chapel-royal. He composed the coronation anthem, according to Ant. Wood, for Charles II., and a hymn in four parts, composed by him, is likewise said to have been performed instead of the litaney, in the chapel of St. George at Windsor, by order of the sovereign and knights of the garter, on the 17th of April 1661. None of his church music, however, was printed, nor has Dr. Tudway inserted any of his compositions in the voluminous MS. Harleian collection of English services and anthems. And, indeed, if we may judge of them by the few secular compositions which appear in the collections of the times, he was little fitted for the high office to which he was appointed at the restoration. In the second part of Playford's “Musical Companion,” 1667, there are two or three of his songs which are dry, ill accented, and equally destitute of melody and masterly harmony. However, he had the merit, or at least the good fortune, to be the master of three boys among the children of the chapel, who gave very early testimony of their genius and progress in composition. These were Pelham Humphrey, John Blow, and Michael Wise, who, even while they were choristers in the chapel, produced verse anthems, far superior in melody and design to any that our church could boast, anterior to Purcell. Cook died in 1672, according to Ant. Wood, of grief, at being so far surpassed in composition by his young pupil, Pelham Humphrey.

COOK, Dr. BENJAMIN, an eminent organist and contrapuntist, in the style of our best ecclesiastical composers, whom he had studied from Tallis, to Crofts, Weldon, and Green; a very correct harmonist and good organ player, but with

limited powers of invention. He was organist of Westminster Abbey, and on the death of Kelway elected organist of St. Martin's in the Fields. He long presided at the Crown and Anchor concert, which was originally established for the preservation of the best works of the most eminent masters of old times. It is a curious circumstance, that at this concert of ancient music, Handel was regarded as an innovator, and Geminiani thought it an honour to be allowed to dedicate his last concertos to this society. Dr. Pepusch, who established and directed this concert, to the time of his death, never allowed Handel any other merit than that of a good practical musician. The irreconcilable enmity between the lovers of old and new music, became from the time of this institution, as violent as the rage between the champions of ancient and modern learning. Dr. Cook, a steady votary of the old masters, died September 1797. He was the son of Benjamin Cook, who kept a music shop in New-Street, Covent Garden, and who published by patent, among other things, six concertos for violins, tenor and bass, by Alexander Scarlatti; the chamber symphonies of Porpora, for three instruments; and the two books of lessons by Domenico Scarlatti, in long 4to., of which Rossini gave was the editor. After the decease of Cook, Johnson reprinted Scarlatti's lessons, with the same title page, and the same errors, as had escaped correction in the former edition.

COOK, HENRY, a native of this country, born in 1642. Having a taste for historical painting, he travelled to Italy for the purpose of improving himself in this branch of the art, and studied under Salvator Rosa; but, on his return to England, met with so little encouragement, that for many years he remained in want and obscurity. At length, however, his talents gained him notice, and he was employed by king William to repair his cartoons; he likewise finished the equestrian portrait of Charles II. at Chelsea-college, painted the choir of New-college chapel Oxford, and the staircase at Ranelagh house, besides many other works mentioned by Mr. Walpole. He is also said to have tried portrait painting, but to have given it up, disgusted with the caprices of those who sat to him. He died 18th Nov. 1700. Walpole's Anecdotes.

COOK, in *Icthyology*, a species of fish, which is sometimes taken in great plenty on the coast of Cornwall. It is a scaly fish, and does not grow to any great size: the back is purple, the belly yellow, and the tail rounded.

COOK'S RIVER, in *Geography*, a river of North America, which runs into the northern Pacific ocean, between Cape Elizabeth and Point Banks, *i. e.* between E. long. 207° 5', and 207° 45'; N. lat. 58° 42', and 59° 10'; and which, by its various branches, opens a very considerable inland navigation. This name was given to the river by lord Sandwich, in honour of captain Cook, who, in the year 1778, traced it as high as the latitude of 61° 30', and the longitude of 210°, or about 70 leagues from its entrance, without perceiving the least appearance of its source. "It was a satisfaction to me," says this persevering navigator, (*Third Voyage*, vol. ii. p. 397.) "to reflect, that, if I had not examined this very considerable inlet, it would have been assumed, by speculative fabricators of geography, as a fact, that it communicated with the sea to the north, or with Baffin's or Hudson's bay to the east; and been marked, perhaps, on future maps of the world, with greater precision, and more certain signs of reality than the invisible, because imaginary, Straits of de Fuca, and de Fonte." Mr. King was ordered to land on the northern point of the low land, on the S.E. side of the river, there to display the flag, to take possession of the country and river in the name

of his British majesty, and to bury in the ground a bottle, containing some pieces of English coin, of the year 1772, and a paper, on which were inscribed the names of the ships and the date of the discovery. Near the shore Mr. King observed about twenty of the natives, who appeared with their arms extended, probably to express their peaceable disposition, and to shew that they were without weapons. When their alarm, occasioned by the sight of mulquets, had subsided, they allowed their new visitors to approach them, and appeared to be cheerful and sociable. Their spears and their other hostile weapons, as it was afterwards discovered, were hid in the bushes close behind them. The ground was swampy, and the soil poor, light, and black. It produced a few trees and shrubs, such as pines, alders, birch, and willows; rose and currant bushes, and a little grass, but not so much as a single plant or flower was discovered. On a future day, several large and some small canoes, with natives, came off to the British ships, and bartered their wine; after which, they sold their garments, till many of them were quite naked. Among others, they brought a number of white hare or rabbit skins, and very beautiful reddish ones of foxes; but there were only two or three skins of otters. They also sold pieces of salmon and halibut. They preferred iron to every thing else offered to them in exchange. The lip-ornaments did not seem so frequent among them as at Prince William's Sound; but they had more of those which pass through the nose, and, in general, these were also much larger. They had, however, a greater quantity of a kind of white and red embroidered work on some parts of their garments, and on other things, such as their quivers and knife-cases. On the west side, a volcano was discovered, in lat 60° 23'; and this is the first high mountain N. of mount St. Augustine. The volcano is on that side of it next the river, and not far from the summit. It only emitted a white smoke without fire. Captain Cook observes, that all the people met with near this river, seemed, by every striking token of resemblance, to be of the same nation with those who inhabit Prince William's Sound, but essentially differing from those of Nootka, or King George's Sound, both in their persons and language. The language of these is rather more guttural; but, like the others, they speak strongly and distinctly in words which seem to be sentences. These people are in possession of iron; that is, the points of their spears and their knives are of this metal, and some of the former are also made of copper. Their spears are like our spontoons; and their knives, which they keep in sheaths, are of a considerable length. These, with a few glass beads, were the only things seen among them that were not of their own manufacture.

Their beads and iron they must have received from some civilized nation; and it seems most probable, that they procured them through the intervention of the more inland tribes from Hudson's Bay, or the settlements on the Canadian lakes; unless it can be supposed (which, however, is less likely) that the Russian traders from Kamtschatka, have already extended their traffic so far; or at least that the natives of their most easterly Fox islands, communicate along the coast, with those of *Prince William's Sound*; which see. The Russians themselves, says captain Cook, have never been among them; for if that had been the case, we should hardly have found them clothed in such valuable skins as those of the sea-otter. There is not the least doubt, continues captain Cook, that a very beneficial fur trade might be carried on with the inhabitants of this vast coast. But unless a northern passage should be found practicable, it seems rather too remote for Great Britain to receive any emolument from it. It must, however, be observed, that

the most valuable, or the only valuable, skins which Cook saw on the west side of America, were those of the sea-otter. All their other skins seemed to be of an inferior quality, particularly those of their foxes and martins. Most of the skins that are fit for sale, are those which are made up for outer garments, and this is the chief use for which they kill the animals. By increasing intercourse with purchasers, they would be more assiduous in procuring skins, and thus a plentiful supply might be obtained in this country.

In Cook's river, the tide is very considerable, and much contributes to facilitate the navigation of it. It is high water in the stream, on the days of the new and full moon, between two and three o'clock; and the tide rises perpendicularly, between three and four fathoms. The reason of the tides being greater here than at other parts of this coast, is, that, the mouth of the river being situated in a corner of the coast, the flood from the ocean is forced into it by both shores, and thus swells the tide to a great height. The variation of the compass was $25^{\circ} 45'$ E.

Cook-room, in a *Ship*, is where the cook and his mates dress and deliver out the meat, &c.

Cook's Strait, in *Geography*, so called from its discoverer captain Cook, a strait which separates the two islands that form New Zealand. This strait is about four or five leagues broad; and the islands, thus divided, are situated between the latitudes of 34° and 45° S.; and between the longitudes of 181° and 194° W. See **NEW ZEALAND**.

COOKE, **Sir ANTHONY**, in *Biography*, governor, preceptor, or schoolmaster, to king Edward VI., and great grandson to sir Thomas Cooke, lord-mayor of London in 1462, was born at Giddy-hall in Essex about the year 1506, and educated, probably, at Cambridge. He became eminent in literature and the arts, being a thorough master of the Latin and Greek languages, an excellent critic and philologist, and equally skilled in poetry, history, and the mathematics. He was no less distinguished for his piety and goodness. These qualities recommended him to the office of instructor to king Edward VI., and the royal pupil is well known to have done honour to the talents and character of his preceptor. During queen Mary's reign he was an exile for religion; but upon the accession of queen Elizabeth he returned to his native country, fixing his residence at Giddy-hall, the building of which he completed. He died June 11, 1576, having attained the age of 70 years, and was buried in the chapel of Rumford in Essex, where a monument was erected to his memory. He left four daughters, eminently learned in the Greek and Latin languages; *viz.* Mildred, married to sir William Cecil, baron Burleigh, lord-treasurer of England; Anne, wife of sir Nicholas Bacon, lord keeper of the great seal; Elizabeth, married to John, lord Russell, son and heir of Francis earl of Bedford; and Catherine, wife of Henry Killigrew, esq. He had also two sons.

COOKERY of Meats, in *Domestic Economy*, denotes the application of heat to the several aliments taken both from vegetables and animals. The advantages attending the application of heat to vegetable aliments are such as follow: 1. That the greatest part of vegetable substances are thus rendered more soluble in the human stomach. The only doubt, says Dr. Cullen, that can arise with regard to this, respects vegetables to which in their crude state a boiling heat is immediately applied, so that in many of them a coagulation is produced; in consequence of which they seem to be rendered less soluble in water than they were before:—

but this, he says, does not seem to have any effect on their solution in the stomach. Whether the difficult solution be obtained by some degree of fermentation that necessarily takes place in the stomach, or by the powers of the gastric fluid, it is not necessary to determine, as it is certain that the action of heat separates in some measure the small particles of bodies, and thereby renders them more readily separable by the solvent powers of the stomach. 2. The application of heat separates and dissipates the volatile parts of vegetable substances, which are seldom of a nutritious nature, and, in many cases, have a tendency to prove noxious. 3. The application of heat to a certain degree extricates and dissipates a considerable quantity of air, which, in the natural state of vegetables, is always fixed in their substance; and it is probably, in this way especially, that heat best contributes to the dividing and loosening of the cohesion of the small parts of vegetable substances. It is certainly in this way, by dissipating a large portion of their air, that vegetables are rendered less liable to fermentation, and less liable to produce that flatulence, which is occasionally so troublesome in the stomach and intestines. Dr. Cullen observes further, that, as the heat may be employed in two ways, either in a humid or a dry form; the former is always better suited than the latter to all the purposes above-mentioned. The cookery of animal substances also consists chiefly in the application of heat. Other practices, however, previous to cookery, may be considered as parts of it; particularly salting, drying, and pickling. These practices, however, are merely useful for the purposes of domestic economy, as preserving meat from putrefaction, before it be subjected to heat, for a longer time than it could be preserved without such means. These practices, Dr. Cullen thinks, can never increase the nutritious quality of meat, or render it even of more easy digestion. Drying certainly brings the solid parts of meat more closely together, which must render it of more difficult solution. The addition of salt, which stimulates the stomach, may seem in some cases to promote digestion; but this must be when the salt is added in small quantity, and when the meats preserved by it are taken in moderate quantity only. For when meats have been long salted they are hardened, and rendered in proportion less soluble in the stomach; and a large quantity of salt accompanying them is certainly hurtful to the system. There is one preparation of animal food, which is made without any addition; and that is by its being kept for some time before it is subjected to cookery, for a longer or shorter interval, according to the seasons, and the nature of the meat; but always till it has made some advance towards putrefaction. The tendency to this seems to take place from the moment that life is extinguished in the animal; and the allowing of it to take place to a certain degree renders the meat more easy of solution in the stomach; and if the putrescency be only in a moderate degree, it does not seem to injure the nutritious quality of the meat. The proper degree of putrescency is not easily ascertained; and it is certainly different according to the constitution of the person. Some can use meats tainted in a considerable degree without inconvenience: whilst the digestion of others is much disturbed by the small quantity of putrescent meat. Every advance in meats towards putrescency, renders them, as Dr. Cullen says, more ready to increase the tendency of the animal fluids to that state which we take to be always hurtful to the human constitution, as it both favours the access of diseases, and aggravates their symptoms and danger when they occur.

The cookery of animal substances by the application of heat is of two kinds, as it is applied in a humid form by

boiling and stewing, or in a dry form, by *roasting, broiling, and baking*. For the processes and effects of boiling and stewing; see **BOILING**. The application of heat in a dry form is of two kinds, as it is in close vessels, or as it is exposed to the free air. The first is *baking*; and though commonly in this practice the cover of the meat is merely paité, any considerable exhalation is prevented, and the retention of the juices under the application of heat renders the meat more tender; and in all cases when the heat applied loosens, and, in some measure, extricates the air, without exhaling it, the substance is rendered more tender than when with any other application an exhalation is allowed. In *broiling* an exhalation takes place; but as the heat of a naked fire is more nearly applied, the outer surface is in a degree hardened before the heat penetrates the whole, and thus a great exhalation is prevented, while the whole is rendered sufficiently tender; but this kind of cookery is especially suited to meats that are chosen to be eaten a little raw. *Frying* is a kin to this; but as in this case the meat is cut into thin slices, and laid in a vessel which is interposed between the meat and the naked fire, the heat is more equally applied to the whole substance. But as the part of the meat lying next to the bottom of the vessel would be suddenly hardened by the heat, it is always necessary to interpose some fluid matter. When this, as is most commonly the case, is of an oily matter, a strong heat is apt to render it empyreumatic, or at least less miscible with the fluids of the stomach; and, therefore, all fried meats are less easily digested than those of any other preparation, except that sometimes the same may happen to baked meats, to which an oily matter, and that only, is added to avoid the too drying heat. By *roasting* the heat may be so managed as to be equally applied, and therefore its effect in rendering the meat more tender is certainly obtained; and though a considerable exhalation is made, it is almost only of a watery humidity. This, indeed, would take place to a very great degree, and render the meat again more insoluble, were it not that large masses only are subjected to this operation, and that thereby the outer surface is first condensed, and prevents the exhalation from the interior parts. At the same time, an oily matter is commonly and repeatedly applied to the outer surface, which prevents both much exhalation, and any great hardening of the outer surface, till the heat has penetrated the whole, and rendered it sufficiently tender. Cullen's Mat. Med. vol. i. pt. i. c. 2.

COOK-HOUSE, in *Geography*, a town of America, situated on the Coquoago branch of Delaware river, in the township of Colchester, New-York, 18 miles S. of the mouth of Unadilla river.

COOKIA, in *Botany*, (named by Sonnerat, in honour of our illustrious circumnavigator, captain Cook.) Willd. 844. Juss. 261. Vent. 3. 155. Sonnerat It. 2. 181. tab. 80. Reiz. Obs. 62. Jacq. Hort. Schoenb. 1. 53. tab. 101. (Quinaria Lanflum; Lour. — Wampi of the Chinese.)

Gen. Ch. Cal. very small, five-celled. Cor. Petals five, spreading. Stam. Filaments ten, distinct; anthers roundish. Pist. Germ somewhat pedicelled, hirsute; style one; stigma capitate. Peric. Berry; Juss. (Pome; Willd.) five-celled; three frequently abortive. Seeds one in each cell.

Eff. Ch. Calyx five-celled, inferior. Petals five, equal, inferior. Berry or pome, five-celled. Seeds one in each cell.

Sp. *Cookia punctata*. A tree. Trunk brownish, striated, rugged. Branches, petioles and common peduncles rough, with prominent points. Leaves alternate, petioled, unequally pinnated; leaflets petioled, alternate, egg-shaped, acuminate,

quite entire, smooth, sprinkled with pellucid dots, inner side narrower. Flowers white, in a large divaricated terminal panicle. A native of China and of the South Sea islands.

COOLER, among *Brewers, Distillers, &c.* a large vessel, usually of small depth and large surface, in which liquors are cooled, after having been boiled.

COOLIES, in the East Indies, are those natives who are employed in carrying of burthens, digging of trenches, and such laborious occupations; and who, supplying the place of pioneers, cannot be dispensed with in the operations of military tactics in Hindoostan.

COOLING is the progressive decrease of temperature from a higher to a lower degree. From the highest degree of heat, which human industry has been able to obtain by means of combustion, or by concentrating the solar rays, to the lowest degree of it, which both natural and artificial methods have produced, the scale is very considerable; and different parts of it have obtained diverse denominations, which are derived from the most striking phenomena that take place at particular points of the scale; thus we hear of porcelain heat, white heat, red heat, boiling heat, temperate, freezing, &c. and all these transitions from the first to the last, fall under the denomination of *cooling*; whereas the contrary transition from the lowest to the highest, is called *heating*. In order to preserve perspicuity, and to assign to each of the received denominations, the particulars which belong more immediately to it, we have divided the subject into three articles, under the words *congelation, cooling, and freezing*. Under the first we have stated the phenomena of natural congelation; the last contains whatever relates to artificial freezing, viz. to the production of cold below 32° of Fahrenheit's scale; and under the present, we shall principally state all the methods and the effects of cooling from the actual temperature of the atmosphere to a lower degree; but not below that of melting ice, viz. 32°, which is commonly called the freezing point.

The temperature of the atmosphere in the hottest climates, has hardly ever been known to exceed 130°, and it is but seldom that it reaches that most oppressive degree of heat. In the human species, nature has made ample provision, and has furnished them with industry sufficient for counteracting the effects of a very high or a very low temperature; but without any artificial assistance, few are the degrees of heat in which human beings can live with perfect comfort. Making some allowance for the natives of different climates, the whole range temperature may be said to reach from the 60th to the 70th degree of Fahrenheit's scale. Below 60° most persons have no objection to a gentle fire in their apartments; and above 70° they generally complain of heat. Yet when the natural temperature of the atmosphere is above 50°, cooled liquors are generally preferred for drink; but when the temperature is above 70°; then not only cooled liquors, but cool apartments also, are articles of great luxury; and (it may in great measure be said) of necessity. The languor which is commonly induced by heat, is in great measure relieved by artificial cooling. Patients affected with fevers of the intermittent and putrid kinds, which are so very common and destructive in hot climates, receive great benefit from the use of cooled liquors, and such are plentifully administered to them, whenever they can be obtained. The preservation likewise, of meats, fruit, butter, &c. in warm climates, or in the hot season, is considerably assisted by cooling; and it may be extended to a very remarkable long period by actual freezing.

In order to answer all these purposes, mankind has, from time immemorial, endeavoured to discover and to apply methods

thods of cooling, or of refrigeration. These methods, as far as they are at present known, may be comprised under the following heads; *viz.* 1st, the application of something naturally colder than the actual temperature of the atmosphere; 2^{dly}, ventilation; 3^{dly}, evaporation; and 4^{thly}, the solution of certain saline substances. Sometimes two or three of these means are applied at the same time, to the article which is required to be cooled. In every country of Europe, and especially in the southern part of it, ice is collected during the winter, in proper places, and is used for cooling liquors, &c. in the summer season, or throughout the whole year. And this undoubtedly is the most easy, the most extensive, and the most effectual method of cooling. A little ice taken out of the ice-house, and placed round a bottle of water or wine, in any convenient vessel, soon cools it to the desired degree; and if the effect is to be increased, so as to freeze creams, fruit, &c. by breaking the ice into small pieces, and mixing common salt with it, the desired end will be obtained. The ice-house itself is of very essential use for preserving meat, fish, butter, fruit, &c. which things need only be laid in it, until they are wanted.

When ice cannot be easily procured, well water forms a useful substitute to a certain degree. When the depth of the well is 40 or 50 feet, or upwards, the constant temperature of its water is very nearly equal to the mean temperature of the country, which, of course, is lower than the usual temperature of the summer season in that country; hence, if a pail of water be drawn, and a bottle of wine, or other liquor, be immediately placed in it; a considerable refrigeration may be obtained, and it may be maintained by drawing fresh water at intervals from the well, &c. Thus in London the mean temperature is about 50°, and so is the temperature of pretty deep wells throughout the year. Now in the summer season, the temperature frequently rises above 65°, or 70°; therefore, at those times, by applying fresh-drawn well-water, the liquors we drink may be cooled about 15 or 20 degrees, which will render them incomparably more pleasant. When articles of food are required to be kept some time longer than the heat of the weather would allow, they may be placed in a basket at the end of a rope, and may be let down into the well, until they come within a foot or two of the water. For the like purposes, pretty deep pits, caves, or grottos may be used; since their temperature is nearly equal to the mean temperature of the country, and suffers little or no variation between winter and summer.

Ventilation is nothing more than a constant change of air; but if the air which has just passed by a body, and that which succeeds it are all of the same temperature, no cooling will be produced by the ventilation; but the refrigeration will take place, when the body is hotter than the air which passes by it, or when an increase of evaporation ensues. Expose a thermometer to the open air, but shelter it from the wind, and when the thermometer is become stationary, let the wind fall upon it; and it will be found that the quicksilver is not lowered in it. But when a human being, or other animal is exposed to ventilation, the quick transition of air cools it; first, because it continually removes the air which has been heated by the contact of the animal body, the breath, &c.; and secondly, because the evaporation from the body is increased by the ventilation. So that, upon the whole, the use of ventilation, such as is effected by means of fans, bellows, a particular disposition of apartments, and other machines, is to remove heated or vitiated air from the vicinity of human beings, from close habitations, prisons, ships, &c. The ingenious Dr. Hales fixed a machine of this sort in the old Newgate prison, which, being put in action by means of

sails, like a wind-mill, constantly ventilated the inside of that prison; and this machine remained in use until the rebuilding of that prison upon a better plan rendered it superfluous. See VENTILATOR.

Hitherto we have supposed, that the air is colder than the human beings who are exposed to it; but should the contrary be the case, then ventilation will produce a different effect; *viz.* it will heat, instead of cooling, as may be easily conceived by considering what has been said above. And such is the case with the hot winds, which sometimes blow in Arabia, Africa, India, and other places.

One of the most useful and efficacious modes of cooling, especially in those countries where it may be most wanted, is performed by means of evaporation. The principle upon which the cooling power of evaporation depends, is, that whenever a body is expanded, *viz.* its volume is increased, its capacity for containing heat is increased at the same time; hence the expanding body absorbs the heat of the surrounding bodies, which, of course, are cooled by it.—A short experimental illustration of this theory will easily explain the effect we are treating of. Take three common mercurial thermometers; keep one in its natural state; place the second in a bottle of water, and close its aperture; wrap some cotton moistened with water round the bulb of the third; then expose all the three thermometers thus prepared to the ambient air, especially when the wind blows in the summer season; and after a few minutes observe their progress. It will be found that the naked thermometer, and that which stands in the bottle, indicate the same degree of temperature; but the third thermometer, which is wrapped in moistened cotton, will be found to indicate a temperature lower by a few degrees, than the former. The effect in this experiment is produced by the evaporation of the water from the cotton, and not from the water as water; for if that were the case, the thermometer in the bottle of water would likewise be cooled like the one involved in moistened cotton. Evaporation is the conversion of water into steam, or vapour; and the bulk of steam has been found to be many hundred times larger than the bulk of the water from which it originated. Now in that expanded state, steam is capable of holding a vast deal more of the element of heat, than in its form of water, and that without manifesting any higher degree of temperature. Or, in other words, if a thermometer be placed in a bottle full of vapour of water, and another thermometer be placed in the water from which that vapour was just produced, their temperatures will be found to be nearly the same; yet the vapour contains a vast deal more of the element of heat than an equal weight of water, which quantity of heat is essentially necessary for maintaining its elastic or vapourous existence; and this is proved by observing, that vapour cannot be converted into water without depositing its heat upon (and of course elevating the temperature of) the surrounding bodies; and on the other hand, that water cannot be converted into vapour, without absorbing heat from (and consequently cooling) the surrounding bodies. Mr. Watt of Birmingham says, that he has observed as exact a coincidence between the heat rendered latent in the vapour, and that which emerges from it, as can be desired; and that the heat obtainable from steam, capable of sustaining the ordinary pressure of the atmosphere, is not less than 900°; and that it does not exceed 950° of Fahrenheit's scale.

The cooling action of evaporation is counteracted by the influx of heat from the surrounding bodies, since heat always tends to equalize the temperature of contiguous bodies. Thus in the above described experiment, the heat of the surrounding air tends to elevate the temperature of the thermometer,

thermometer, at the same time that the evaporation from the cotton tends to lower it. And according as the one or the other of these opposite actions predominates, so the cooling effect is more or less conspicuous. From these observations it naturally follows, that the cooling, occasioned by evaporation, is greater when the evaporation is quicker, and contrarywise; also, that when different fluids are used for the evaporation, in similar circumstances, that fluid which evaporates quickest, produces the greatest refrigeration. Mr. Cavallo says, "in order to try the degree of refrigeration produced by the evaporation of different fluids, I held up a naked thermometer, (*viz.* a thermometer, the bulb of which was not in contact with the metal of the scale) and poured upon its bulb a stream of some particular fluid, which issued out of the capillary aperture of a tube; taking care to throw just fluid enough to supply the waste by evaporation. By this means, when the temperature of the air was 64°, I found that the evaporation of water cooled the thermometer 8°; *viz.* brought it down to 56°; the evaporation of spirit of wine cooled it 16°; *viz.* brought it down to 48°; and the evaporation of ether cooled it 54°; *viz.* brought it down to 10°. But, by the use of the best purified sulphuric ether, when the temperature of the air was about 56°, I brought the thermometer down to 3°. The cooling produced by the evaporation of other fluids needs not be mentioned; their effect being generally intermediate between the effect of water, and that of spirit of wine." (Phil. Trans. vol. lxxi.) Whatever promotes the evaporation, such as a dry air, and especially a dry wind, tends to increase the refrigeration; and when all the favourable circumstances concur, the effect is prodigious; so that in a dry, warm, and brisk wind, by means of the evaporation of the best sulphuric ether, the temperature of any kind of bodies may be lowered many degrees below the freezing point; and animals might be easily frozen to death.

Though several of the above-mentioned particulars, and especially the causes upon which they depend, have been but lately investigated and ascertained; yet the cooling effect of evaporation has been known and used by mankind from time immemorial. Athenæus says, as being related by Protagoras of Cyzicum, that in the time of king Anticleus, it was usual to cool water by evaporation, and to drink it as a luxury. A very easy and familiar experiment to shew the effect of evaporation, may be performed in the following manner. Moisten a small space on the upper part of each hand; cover one of those places with an inverted wine glass, and let a person blow with a pair of bellows upon the other hand. The latter will be sensibly cooled, but not the former. Change the glass and the blowing, from one hand to the other, and the effects will be reversed. Seamen, especially in the night time, frequently employ this natural effect for discovering which way the wind blows. They moisten a finger of their hands by putting it in their mouth; then expose it to the ambient air by elevating it above their head; and justly conclude that the wind blows from that quarter which is opposed to the most cooled side of the finger.

In warm climates, where the dryness of the air generally is very great, the refrigeration arising from evaporation is very considerable, and is of course frequently employed for counteracting the natural heat. The caravans which traverse the parched deserts of Arabia, are obliged to carry their supply of water in earthen jars upon camels; but in order to keep it pleasantly cool, the jars are involved in cloths, which they take care to keep continually moistened with water. It is a pretty common practice in the

southern parts of Europe, as well as in the East and West Indies, in America, &c. to wrap up a bottle of wine, or water, or other liquor, in a wet cloth, and thus to suspend it in a shady place, either under a tree or in a passage, so as to expose it to the briskest current of air that can be obtained; for by this means the liquor will be cooled several degrees; care, however, must be had to sprinkle more water upon the cloth, which surrounds the bottle, in proportion as the former evaporates. Mr. Walker, of Oxford, describes a peculiar method of producing a very considerable degree of cold by means of evaporation. "Having," he says, "in the course of the preceding winter, frequently succeeded in producing ice, by the cold produced from evaporation with water, when the temperature of the air was 38°; it occurred to me, that it might be possible to freeze water in the middle of summer, by a process which depended on this principle, by the use of water only. Accordingly, I procured a tall cylindrical vessel, holding about two gallons, in which is fixed a small spiral tube, as in the worm-tub of a common still; the lower end of this tube comes out through the vessel near the bottom, sufficient to connect the nose of a pair of bellows to it, by the intervention of a bladder, secured air-tight; this spiral tube ends at the top of the cylindrical vessel, where it is somewhat enlarged, like the mouth of a funnel. This vessel, being covered with flannel, was filled with water and hung out in a brisk dry wind, the temperature of the air being 50°; after some time, by repeatedly wetting the flannel on the outside of the vessel, I found the water within was cooled to 40°; air being then forced through the tube (by means of the bellows), surrounded by the cooled water, came out at the upper extremity of the tube at nearly the same temperature.

"A thermometer having its bulb covered with lint, and wetted repeatedly with the cold water in the vessel, placed so as to receive the draught of cold air from the tube, soon sunk to 34°; hence by a series of two or three of these vessels, water might, upon this principle, be frozen at midsummer, recollecting that this experiment may always commence at 50°, the usual temperature of springs; and hence it might be possible upon the same principle, to cause nature upon a small scale, even without the immediate interposition of art, to depart from her usual course, and to assume the hoary garb of winter at midsummer.

"For this purpose a current from the external air might be admitted into the tube, by means of a funnel, communicating with, and receiving, a constant draught of air.

"In an attempt of this kind, it would be necessary (besides some other variation in the vessels, which circumstances might point out.) that the cylindrical vessels be porous, or pierced with small holes; so that the water may be constantly and gently oozing out."

In Spain, in Italy, in Egypt, and probably in other places, certain vessels are made of a porous earth, which, when full of water, will just permit some of that fluid to ooze out on their external surface, whence it evaporates, and thus cools the remainder of the liquor within the vessel. The Spanish vessels for this purpose consist of a reddish brown earth. They are pretty broad, but not very capacious. In Italy they have been made of a pale yellowish material, but much larger. In Egypt they are made somewhat in the shape of a Florence flask, and not much bigger; but their aperture spreads out in the form of a cone, or rather of an ale glass, which is done for the convenience of drinking out of it. Their substance is of the colour of ashes, and it is said to be a scum left on the banks of rivers. But vessels of any degree of porosity may be made by mixing sand and clay in various proportions.

The use of these vessels in Spain, in Italy, and especially in Egypt, is attended with a notable degree of refrigeration, on account of the great dryness of the air in those climates, which enables it to absorb a great deal of moisture in a short time; but the same vessels having been brought over, and having been tried, in this country, have been found to cool the contained liquor in a very trifling degree; evidently owing to the state of the air in this country, which is much less hot, and much less dry than in the above-mentioned places; therefore much less apt to promote evaporation. One of the Egyptian vessels was tried in London at a time when the temperature of the atmosphere was at a mean, and after about half an hour, when almost three quarters of the water had passed through it, and had dropped down, the remaining quantity of water was found barely 3° colder than the surrounding air.

It is but lately that liquor coolers have been manufactured in this country, and they are at present to be found in most of the earthenware shops in and about London. These are cylindrical vessels, about six inches in diameter, and about a foot high. It is directed to keep one of these vessels entirely immersed in water during one hour. The vessel, being then removed, in that moist state, without putting any water in it, a bottle of wine, &c. must be placed in it, and this is said to be cooled by the evaporation of that quantity of water, which the substance of the vessel had imbibed whilst it remained under water. Upon trial, however, it appears that the actual refrigeration which is obtained by means of one of these vessels, seldom amounts to two or three degrees; and that, of course, a bottle of wine may be cooled much more effectually by placing it into a pail of water fresh drawn from a pretty deep well or pump; which may be renewed at intervals. Indeed, considering the form of these coolers, also that the sides of it are at a considerable distance from the surface of the bottle, and the ambient air has a free access to both, it is hardly to be expected that any sensible advantage should be obtained from them.

In India the action of evaporation is used not only for cooling liquors, but likewise for cooling apartments, and the effect, by the testimony of those persons who have experienced it, is said to be very remarkable. The method, (which, however, is practicable only when a dry wind blows,) is as follows. That door of the apartment which is opposed to the wind, and through which the wind enters, is stopped up with a peculiar sort of screen or curtain, which fits it exactly. This screen consists of two surfaces or gratings of bamboo, situated parallel to each other, and about three or four inches apart; then the space between these external surfaces is filled up in a loose manner with the roots of a sweet-scented grass. In short the construction of this screen is calculated to admit the air not in a body, but divided through a vast number of passages. Two men are placed on the outside, each having a goat's skin filled with water, which they keep continually sprinkling upon the screen. A constant and copious evaporation is of course kept up, which presently cools the adjoining room to a very remarkable degree. By this means the temperature of the room has sometimes been lowered upwards of 15°.

Amongst those cooling processes which depend upon the expansion of bodies, that which arises from the expansion of air must not be forgotten; but as this is by no means very practicable, we shall barely mention it in this place. The condensation and expansion of air produce the effects which have been mentioned above; *viz.* the former is attended with an extrication of heat, and the latter with an absorp-

tion of it; hence the contiguous bodies are heated by the former, and are cooled by the latter. When air is suddenly condensed, (see CONDENSER, and CONDENSATION,) the heat which is extricated from it, has been found capable of setting fire to light combustible bodies; and when the air is rarefied either by means of an air-pump, or by liberating it from a vessel, in which it has been condensed; the cold it produces has sometimes been found to lower the thermometer several degrees below the freezing point.

The last method of cooling which remains to be described, is obtained by the solution of salts. That certain saline substances, whilst dissolving in water, or in acids, would generate a considerable degree of refrigeration, and especially that the solution of fat ammoniac would lower the thermometer down to the freezing point, has been long known; but, within these 15 or 20 years, the subject has received wonderful improvements, in consequence of the experiments instituted by various ingenious persons; and especially from the assiduous investigations, and successful experiments of Mr. Walker of Oxford, who has examined the cooling powers of a vast number of saline substances both single and mixed; and has been able to freeze quicksilver at Oxford in the middle of summer, merely by the solution of salts. His interesting experiments, and his various freezing mixtures, will be found described under the article FREEZING.

A vast number of salts and saline mixtures may be used for cooling liquors; but the most advantageous are those which, after solution, may be recovered by means of evaporation, so as to render them useful for a second refrigeration, a third, and so forth. Yet the price of most of those salts in Europe, the trouble of recovering them from the solution, and pounding them in order to render them fit for another cooling operation, have not rendered this method common in this part of the world; especially where other easier methods are practicable. So that in fact the cooling power of saline solutions is mostly used for particular experiments by the European philosophers, especially when a very powerful freezing mixture is required. In India, where nitre is very cheap, and the heat of the climate prompts the inhabitants eagerly to adopt every possible method of cooling, the practice of cooling liquors, by means of the solution of nitre in water, is very common. For this purpose, the wine, the water, or any other liquor, is put into a metallic bottle, generally a pewter one, having a pretty long neck. A tub is partly filled with water, and a quantity of nitre is thrown in it; then the operator holds the bottle by the upper end of its long neck, and gently moves it about the saline solution, and thus cools the liquor in it to a very considerable degree. As salts will produce cold only during their solution, therefore when the first quantity of nitre has been thoroughly dissolved in the above process, more nitre must be added; and when the water is completely saturated, so as not to be capable of dissolving more salt, then the bottle must be removed to another tub with a fresh saline mixture. The nitre might afterwards be easily recovered merely by exposing the solution, in shallow pans, to the hot rays of the sun in that country; this economical plan, however, does not as yet seem to have been adapted.

The salts which might be used for the purpose of cooling liquors in this country, or in long voyages, are nitre and fat ammoniac; the other saline substances being either more expensive or not easily recoverable after solution. Of the effects of nitre alone in water enough may be derived from the above described process. Salt ammoniac by itself gradually

gradually added to a quantity of water, will occasion a considerable refrigeration, so that a bottle of wine, &c. placed in the solution may be cooled even to 32° of Fahrenheit's scale. But a mixture of both salts is much more efficacious, and the best proportion is five parts of nitre, five of salt ammoniac, and 16 of water. During the solution, which will continue a considerable time, this mixture will cool the thermometer several degrees below the freezing point; but it must not be imagined that a small quantity of the same will cool a bottle of wine to an equal degree. The solution of a given quantity of the mixture absorbs a certain quantity of heat, and this quantity abstracted from the small body of the thermometer, will lower its temperature considerably; but the same quantity of heat abstracted from a bottle of wine, will cool it proportionably less than the thermometer. In order to cool a bottle of wine from the usual temperature of spring waters (which in London is about 50° or 51°) down to about 32° ; a pound of nitre with a pound of salt ammoniac, and a proportionate quantity of water, will generally suffice. The salts for this purpose must be finely powdered and as dry as possible. But when a moderate refrigeration is required; half a pound of each salt and about three pints of water will be sufficient.

Glauber salt, (*viz.* sulphate of soda) dissolved in water, likewise produces a very considerable refrigeration; but this salt will not produce that effect unless it be in its crystallized state. In that state, however, it is not easily preserved, since the mere contact of air will render it powdery and opaque, in which case its solution will generate heat rather than cold. On this account, therefore, this salt is not so much to be recommended, as those which have been already mentioned. Nearly the same observations are applicable to the muriate of lime, the solution of which falls subsidence, when properly conducted, has a very powerful cooling property.

Thus we have described all the practicable processes of cooling, which, if not in this country, are undoubtedly of great consequence amongst the inhabitants of warmer climates. We have, likewise, stated the most necessary particulars respecting the quantity of materials proportionate to the effect, whence the intelligent reader may be enabled to make proper choice of a process fit for his purpose, agreeably to the circumstances which the nature of the place, the actual temperature of the atmosphere, and other particulars, may offer.

There are now two other particulars belonging to the present article which deserve to be briefly mentioned. The first is that by cooling, certain bodies acquire electrical properties; and the second is that the law of cooling, or progress of refrigeration, furnishes a method of measuring such high degrees of heat, as exceed the scale of ordinary thermometers.

With respect to the first, it has been observed that sulphur, in cooling after having been melted, becomes electrified, so as to attract and repel small light bodies like any other excited electric. The same thing also takes place with wax, chocolate, and a few other substances. Besides this effect of cooling after fusion, there are certain solids, like the tourmalin, the Brazilian emerald, &c. which are rendered electrical by any alteration of their temperature, be it from cold to heat, or from heat to cold; but for a full and particular account of those facts, which properly belong to the science of electricity, see the articles ELECTRICITY, ELECTRICS, and EXCITATION.

The method of determining high degrees of heat, from the progress of cooling, depends upon the following observation. Sir Isaac Newton, considering the progress of cooling, was led to suppose, that the heat lost by any body originally at a high temperature, in equal small portions of time, is as the heat existing in it; (reckoning the heat in the body, equal to its excess above that of the surrounding atmosphere,) that is, taking the times in arithmetical progression. The portions of heat lost in those times would be in a geometrical one. The truth of this supposition has been sufficiently shown by subsequent experiments, the result of which has not differed much from the theoretical determinations. Hence we have the following practical rule for determining the high temperature to which a body has been exposed, from its subsequent progress of cooling.

Measure the time in minutes that elapses from the hottest state of the body (which is the degree sought,) to such a state of lower temperature as will allow the application of a common thermometer to the body in question, and call this number of degrees A ; then having applied the thermometer, set down the temperature, which is indicated by the same, at the expiration of each successive minute, until you have obtained three or four terms of the series, which, as has been said above, will be found to be a geometrical one (omitting, however, trifling differences.) Now, since from those few terms it is easy to determine any other terms of the same series, by the well known arithmetical rules; find so many terms of the series ascending, as are equal to the number of units in A ; and the last term of the series, thus found, will be the degree of temperature of the body in its hottest state. An example will easily illustrate the application of this rule. Suppose it be required to determine the temperature of a piece of red-hot iron at the time that it came out of the forge. Look at the watch the moment the iron is taken out of the fire, and note the minute. Find by trials when the thermometer may be safely applied to the iron, *viz.* when the heat is not sufficient to rarefy the mercury of the thermometer beyond the limit of its scale, and when this is practicable, observe the temperature of the iron, and the corresponding time as indicated by the watch. Suppose, for instance, that when the temperature of the iron was 250° , four minutes had elapsed since the commencement of the observation; therefore in this experiment A is equal to 4. Let the thermometer continue in contact with the iron, and when one minute more has elapsed, let the temperature be 125° . When another minute has elapsed, let the temperature be $62\frac{1}{2}$ degrees; and after this, the observation needs not be continued. Now we have three successive terms of a geometrical series; *viz.* $62\frac{1}{2}$, 125, and 250; from which four more terms of the series are to be found, (since A was found equal to 4.) and the last of those terms is the number of degrees indicating the temperature sought. By dividing 250 by 125, or the latter by $62\frac{1}{2}$, we have the quotient 2, (or nearly 2) which is the multiplier of the series, and therefore multiplying 250 by 2, we have the term 500, which multiplied by 2, gives the next term 1000, which multiplied by 2, gives 2000; and lastly this term multiplied by 2, gives the fourth term 4000; hence we conclude, that when the iron was taken out of the furnace, its temperature was 4000 degrees. The last term of the series may be found out by other means, but we have chosen the easiest, for the convenience of all readers. The two series are annexed.

Time elapsed in minutes.	Corresponding heat.
0.	4000°.
1.	2000.
2.	1000.
3.	500.
4.	250.
5.	125.
6.	62½.

Instead of minutes, the intervals of time may be half minutes, or hours, or, in short, of any other denomination; provided they be aequal.

COOLING OF LIQUORS in *Domestic Economy*, is a practice of ancient origin, and of general prevalence in warm countries, and, during the heat of summer, even in colder climates. This practice, as some have thought, is referred to by Solomon, in the book of Proverbs (ch. xxv. 13.); but however this be, evidences of it are very numerous in the works of the Greeks and Romans. Ice and snow were generally used for this purpose, and repositories were constructed for keeping these cooling materials. That the snow was preserved in pits or trenches is asserted by many; particularly by Seneca (*Quæst. Natur. iv. 13*.) and Pliny (*H. N. l. xix. 4*.) When Alexander the Great besieged the city of Petra, he caused thirty trenches to be dug, and filled with snow, which was covered with oak-branches, and which was kept in that manner for a long time (*Athenæi Deipnos. iii. p. 124*.) Plutarch says (*Sympos. vi. Quæst. 6*.), that a covering of chaff and coarse cloth is sufficient; and a like method is now practised in Portugal. Where the snow has been collected in a deep gulph, some grass or green fods, covered with dung from the sheep-pens, are thrown over it; and under these it is so well preserved, that it is sent through the whole summer for the distance of 60 Spanish miles to Lisbon. When the ancients wished to have cooling liquors, they either drank the melted snow, or put some of it in their wine, or they placed jars filled with wine in the snow, and suffered it to cool there as long as they thought proper. The dissipated and luxurious Heliogabalus caused whole mounts of snow to be heaped up in summer to cool the air (*Lamprid. Vit. Heliogab. c. 23*.) That ice was also preserved for the like purpose is probable from the testimony of various authors, Pliny, Seneca, &c.; but it appears not to have been used so much in warm countries as in the northern. At present snow is employed in Italy, Spain, Portugal; but in Persia, ice. The art of cooling water without snow or ice was soon suggested to mankind, by observing, that it became cold more speedily when it had been previously boiled, or at least warmed, and then put in a vessel among snow, or in a place much exposed to the air. Pliny (*H. N. l. xxxi. 3. 23*.) seems to ascribe this to the invention of Nero; and aocular expression of Suetonius (*Vit. Ner. e. 4S*.) renders it probable, that he was fond of water thus cooled. But this method was much more ancient than Nero; for it seems to have been known to Hippocrates (*De Morb. Vulgar. lib. vi. 4*.); and Aristotle was acquainted with it; for he says (*Meteorol. l. cap. 12*.) that some were accustomed, when they wished water to become soon cold, to place it first in the sun and suffer it to become warm. He relates also, that the fishermen near the Black Sea poured boiling water over the reeds, which they used in fishing on the ice, to cause them to freeze sooner. See also Galen, in *lib. vi. Hippocrat. de Morb. Vulg. Comment. 4. 10*. Athenæus remarks (*Deipnos. iii.*) that the pitchers filled with water, which had become warm by standing through the whole day in the sun,

were kept continually wet during the night, by servants destined to that office, and in the morning they were bound round with straw. In the island Ciræus, water which had become warm in the day-time was put into earthen jars, and deposited in a cool cellar, where it became as cold as snow. From these facts it appears to have been a general opinion, that water which had been warmed or boiled, was soon it cooled, and acquired a greater degree of refrigeration. The same opinion prevails at present in the southern countries of Asia, and persons there let their water boil before they expose it to the air to cool. The experiments, however, that have been made on this subject, have given different results. Beckmann (*ubi supra*) inclines to the opinion, that the cooling of water in ancient times is not to be ascribed so much to the boiling as to the keeping of the jars continually wet, and to the air to which they were exposed. See CONGELATION and FREEZING, and also the preceding article.

Another method of cooling water seems to have been known to Plutarch. It consisted in throwing into it small pebbles or plates of lead (*Sympos. vi. 5*.)

The practice of cooling liquors, at the tables of the great, was not usual in any country besides Italy and the neighbouring states, before the end of the 16th century. In the middle of that century, there were no ice-cellars in France. Towards the end of this century, under the reign of Henry III., the use of snow must have been well known at the French court, though it appears that it was considered by the people as a mark of excessive and effeminate luxury. Towards the end of the 17th century, this luxury must have been very common in France. At that period there were many who dealt in snow and ice; and that was a free trade which every one might carry on: but soon after government formed out a monopoly of cooling waters.

The method of cooling liquors by placing them in water, in which salt-petre has been dissolved, could not be known to the ancients, because they were unacquainted with that salt. This property of salt-petre was first discovered in the first half of the 16th century; and it was not remarked till a long period afterwards that it belongs also to other salts. The Italians were the first persons by whom it was employed; and about the year 1550, all the water, as well as the wine, drunk at the tables of the great and opulent families at Rome, was cooled in this manner. Towards the end of the 16th century this method of cooling liquors was well known. Mr. Beckmann says, that he cannot determine who first conceived the idea of mixing snow or ice with salt-petre, and other salts, which increase the cold so much, that a vessel filled with water, placed in that mixture, is congealed into a solid mass of ice, that may be used on the table, but the earliest account of it he has been able to find is in a work of Latinus Tancredus, a physician and professor at Naples, who, in his book, "*De Fame et Siti*," published in 1607, speaks of this experiment. In 1626 Sanct. Sanctorius, in his Commentary on the Works of Avicenna, relates, that, in the presence of many spectators, he had converted wine into ice, not by a mixture of snow and salt-petre, but of snow and common salt. When the salt, he says, was equal to a third part of the snow, the cold was three times as strong as when snow was used alone. Lord Bacon, who died in 1626, says, that a new method had been found out of bringing snow and ice to such a degree of cold, by means of salt-petre, as to make water freeze. This, he tells us, can be done also with common salt; and he adds, that in warm countries, where snow was not to be found, people made ice with salt-petre alone; but that he had never tried the experiment. Mr. Boyle, who died in 1691, made experiments with various

kinds of salt; and he describes, how, by means of salt, a piece of ice may be frozen to another solid body. Des Cartes says, that, in his time, this was a well-known phenomenon, but highly worthy of attention. Since that period, the art of making ice has been mentioned in the writings of all philosophers, where they treated on heat and cold. Towards the end of the 17th century, the French began to congeal all kinds of well-tasted juices, which were served up as refreshments at the tables of the great and wealthy. This was a grand invention for the art of cookery, and afterwards it became common, especially in the last century, and since that time the confectioners have universally practised it. Beckmann's Hist. of Inventions, vol. ii. See FREEZING and ICE.

COOLING medicines, those which have a tendency to diminish febrile heat, to allay thirst, and to lessen the activity of the circulation. They consist chiefly of diluents, acids, and neutral salts. With the use of these a cooling regimen is commonly combined, which consists in a free employment of thin watery drinks, and a forbearance from every thing stimulating; such as animal food and fermented or spirituous liquors. Occasional laxatives and gentle diaphoretics contribute to the same purpose. See REFRIGERANTS.

COOLI-POU, in *Geography*, a port of Chinese Tartary; 5 miles N. of Tie-ling-Hotun.

COOLLO, a town of Hindooostan, in the country of Orissa; 39 miles S.W. of Cattaek.

COOLOOME, an Indian town, situated on the W. side of Talapooe river. See TALAPOOSE.

COOM, a term for foot that gathers over an oven's mouth: also for that black greasy substance which works out of the wheels of carriages, and with which the axle-trees and boxes have been daubed or smeared over, in order to lessen friction, and make them run easy.

Coom, or foot, is sometimes used in medicine, infused in wine with other ingredients, as an anti-hysteric, and against palpitations of the heart, &c. The spirit of foot is also used for the same intentions, and in cephalic cases.

COOMB, or *Carnock of wheat*, according to the 9th and 51st Henry III., 12th Henry VII., &c. was, 256 lb troy = 210.6614 lb avoirdupoise = 2 strikes = 16 pecks = 32 gallons = 256 pints or pounds.

COOMB, *Coom*, or *sack of corn*, is = 2 long strikes = 4 Winchester bushels = 16 pecks = 32 dry gallons = 128 dry quarts = 256 dry pints = 8601.6 cubic inches = 4.97 cubic feet = 1.843621 cubic yards = 17.32142 cubic links. In some of the ten districts it consists of 4 bushels, and each bushel of 8 gallons and a quart.

COOMBE HILL Canal, in *Geography*, is a short canal, in Gloucestershire, whose principal trade consists in carrying coals from the pits to the Severn river. See CANAL.

COOMINGS, in *Naval Architecture*. See COAMINGS.

COOMTAH, in *Geography*, a town of Hindooostan, in the country of Berar; 45 miles N.E. of Nagpore.

COOP, in *Rural Economy*, a provincial term, sometimes applied to a tumbrel or cart enclosed with boards, to carry dung, sand, grains, &c. See CART.

COOP, also signifies a pen, or enclosed place, where lambs, poultry, &c. are shut up, to be fed or fattened.

COOP'S Town, in *Geography*, a town of America, in the state of Maryland, and county of Harford; 12 miles N.W. of Harford, and 22 north-easterly of Baltimore.

COOPA, a town of Persia, in the province of Irak; 30 miles E.N.E. of Ispahan.

COOPER, SAMUEL, in *Biography*, a miniature painter, whose works are deservedly held in the highest estimation.

He was born in London in 1699, and was instructed by his uncle, Hoskins, who was himself a limner of considerable merit. The scholar, however, soon surpassed his master in the variety of his tints, the clearness of his carnations, and the beautiful management of his hair. The works of Vandyke were the models upon which he formed his style; and so perfect, yet so bold, is the imitation, that were some of Cooper's pictures magnified to the size of life, they would scarcely lose by their comparison with the finest heads of the great Flemish master. He was the first who gave to his miniatures the freedom and strength of oil painting; and had his skill in drawing the other parts of the body been equal to that which he evinced in the face, his works might have challenged the most scrutinizing eye of criticism. He seems, however, to have been conscious of his defects, and, probably on that account, left many of his finest pictures with the neck and arms unfinished. It would far exceed our present limits to enumerate even the best of Cooper's works. His portrait of Oliver Cromwell, which was lately in the possession of sir Thomas Frankland, a descendant of Oliver, is described as a master-piece of character, and was engraved by Vertue. Mr. Walpole mentions some of his other productions in the closet of queen Caroline, at Kensington; particularly a fine portrait of general Monk, of which the head only is finished. He was employed some time by the court of France, and lived several years in Holland. He died in London, May 5th, 1672, and was buried in Pancras church, where a monument is erected to his memory. Walpole's Anecdotes.

COOPER, ALEXANDER, was the brother of the preceding artist, and, with him, received instruction in miniature painting from their uncle, Hoskins. We learn from Walpole, that Alexander painted landscapes and figures in water colours, as well as portraits. The same author mentions the story of Diana and Actæon by this master, at Burlington. He resided some time at Amsterdam, and ultimately entered into the service of queen Christina. Walpole's Anecdotes.

COOPER, RICHARD, a painter and engraver, a resident of Edinburgh, who flourished in 1730. Amongst other works, he engraved the portrait of William Caritures, and that of Andrea Allen, the painter, after William Robinson.—Mr. Strutt mentions another *Richard Cooper*, who resided at London, and flourished in 1762. Like the former artist, he engraved portraits. One of his best prints represents the five children of Charles I., accompanied by a great dog, from a picture of Vandyke. Other artists of the name of Cooper are mentioned by Heineken. Strutt.

COOPER, or COUPER, THOMAS, a learned prelate of the sixteenth century, was born at Oxford about the year 1517, and educated in grammar learning in the school joining to St. Mary Magdalen College; and afterwards studied in that college, where he took the several degrees, and succeeded to a fellowship. When queen Mary came to the throne, he declined the pursuits of divinity for the study of physic, being a sound protestant in principle. Upon the death of that sovereign, he resumed his former studies, and became a frequent and celebrated preacher. He was made dean of Christ-Church in Oxford, and was for several years vice-chancellor of the university. In 1569, he was inducted to the deanery of Gloucester; and, in the following February, was consecrated bishop of Lincoln. His distinguished merit and great zeal, in the performance of the duties of his high office, recommended him to his sovereign's favour, who caused him to be translated, in 1584, to the rich bishopric of Winchester, where he became celebrated for his learning, and for the exemplariness of his conduct. Soon after his consecration,

consecration, he went and resided in his new diocese; but being apprehensive of danger from the papists, he petitioned the privy council to suppress their boldness. Among other methods proposed by the bishop, were the following, which exhibit the true spirit of the times: "That an hundred or two of obstinate recusants, lusty men, well able to labour, might, by some convenient commission, be taken up, and sent into Flanders, as pioneers and labourers; whereby the country would be disburthened of a company of dangerous people: and the rest that remained be put in some fear." In 1588 he preached at St. Paul's Cross, November 17th, being the day of public thanksgiving, as well for the queen's accession to the throne, as for the signal victory obtained over the Spanish Armada. He died at Winchester, April 29th, 1594, and was buried in the cathedral there, on the fourth side of the choir, a little above the bishop's seat. His publications were numerous, among which are, 1. "The Epitome of Chronicles, from the 17th year after Christ to 1540, and thence afterwards to the year 1560." A part of this work was composed by Thomas Lanquet, a young man of 24 years of age, who died before he could complete what he had taken in hand. 2. "Theaurus Lingue Romanæ et Britannicæ, et Dictionarium Historicum et Poeticum, Lond. 1565." This work was so much esteemed by queen Elizabeth, that she endeavoured to promote the author as high as possible in the church. To these may be added, "An Exposition of certain Parts of the Old Testament;" and "Sermons on various Subjects." Bishop Cooper's character is represented by writers in a very advantageous light. "He was," according to A. Wood, "furnished with all kinds of learning, almost beyond all his contemporaries; and not only adorned the pulpit with his sermons, but also the commonwealth of learning with his writings." Many other testimonies might be adduced, in favour of the high reputation to which he attained with his contemporaries, among these is that of the celebrated sir John Harrington. *Biog. Brit.*

COOPER, ANTHONY ASHLEY, first earl of Shaftesbury, one of the ablest persons, and most distinguished ministers of the 17th century, was son of sir John Cooper of Rockborn, in the county of Southampton, bart., by Anne, daughter and sole heiress of sir Anthony Ashley of Winborne St. Giles, in the county of Dorset, from whom he inherited an estate of 8000*l.* per annum. He was born at Winborne, July 22, 1621, and educated with the greatest care under the eye of his parents, during his infancy, in which he discovered such talents, that extraordinary things were predicted of him, while he was yet a boy. Before he was ten years of age, he had the misfortune to lose his father; at fifteen he became a fellow-commoner of Exeter college Oxford, under the tuition of the celebrated Dr. Prideaux, who was then rector of it. At the university, where he remained but two years, he obtained a character for great assiduity, and extraordinary genius. From Oxford he removed to Lincoln's Inn for the study of the law, and before he had completed his nineteenth year, he was chosen member of parliament for Tewkesbury. This was in the year 1640; and, at the commencement of the civil war, he adhered to the king's side, though he was always a friend to peace, and thought concessions should be made by both parties to attain it. To accomplish this great object, it is said by the great Mr. Locke, that he repaired to the king at Oxford, and proposed a method of putting an end to the war, by treating with the parliamentary garrisons, and promising them amnesty for the past, and full security for liberty in the future. The plan did not succeed; and when sir Ashley found himself suspected by the court, and

that his person was in considerable danger, he went over to the parliament party, by whom he was kindly received, as well on account of his great talents, as for the influence which his property must create. He raised forces in Dorsetshire, and in 1644 he rendered the cause in which he acted some very signal services. He seems even at this period to have been looked up to by the royal party, since he was trusted with private negotiations between the king and Denzil lord Hollis, at the treaty of Uxbridge, for which he was afterwards questioned, and severely threatened, in parliament. After the battle of Naseby, he attempted to check the overgrown power of parliament, by exciting the "Club men," a body of people in several counties, encouraged to take up arms, to declare themselves as a middle party, and to insist upon a sort of treaty by which they might be restored to the benefits of the law, and the protection of the constitution. The plan was in some measure executed; Fairfax received their proposals, and promised to communicate them to parliament, but Cromwell, and other leaders of that party, perceiving that no time was to be lost, attacked the club-men without mercy, killed great numbers of them, and dispersed the rest. The scheme was abandoned, but the author of it contrived so as not only not to involve himself in their fate, but to obtain shortly after the office of high sheriff of the county of Wiltshire. Owing either to his great influence in the country, or to the wariness of his own well-planned schemes, he was elected a member of the convention, which succeeded to the long parliament dissolved by Cromwell; and, in 1754, we find him a member of parliament, and one of those who protested against the tyrannical government of Cromwell. He was on other occasions a strong, though perhaps neither a steady nor uniform, opposer of the protector, as he caused himself to be styled. See CROMWELL. Sir Anthony was nevertheless chosen by the protector to be one of his privy council; and it has been asserted, that he even sought an alliance by marriage with the baronet's daughter. Dr. Kippis, however, who investigated the matter, gives no credit to this part of the charge. When Richard Cromwell was deposed, sir Anthony was appointed by the rump parliament one of the council of state, and a commissioner for the managing army, although, it is now well known, that he was, at the same time, engaged in a plan to restore Charles II. to the throne, notwithstanding the strong protestations which he made of his innocence when questioned on the business, by which he obtained an acquittal. Like other discerning men, he foresaw, from existing circumstances, that a change in favour of monarchy must eventually take place, and therefore he took care to secure a claim of merit in the restoration, which he promoted with great zeal and assiduity, when he perceived an evident tendency to that event. In 1656, he was a member of the healing parliament, and one of twelve who were deputed to invite the return of the king; who, in grateful remembrance of his services, made him a privy counsellor; gave him a commission for the trial of the regicides; and, in the course of a year, raised him to the rank of peer of the realm, by the title of baron Ashley of Winborne St. Giles. He was soon after appointed chancellor and under-treasurer of the exchequer, and, upon the death of lord Southampton, one of the lords commissioners of the treasury. He was a member of the celebrated cabal ministry, in which, from his superior talents and forcible eloquence, he took a decisive lead. He continued in the councils and confidence of the king his master, during the happiest part of his reign, and stood as high in his favour as any of his ministers. He was afterwards appointed to the lord lieutenancy of the county of Dorset, and on the

twenty-third of April 1672, was created baron Cooper of Pawlet, and earl of Shaftesbury. In the following November, he was raised to the highest office of state, viz. that of lord chancellor of England, the duties of which station he executed with equal ability and integrity. In his other capacities, of a minister and privy counsellor, he has been variously described; but he is allowed, on all hands, to have been one of the ablest men, and one of the most accomplished orators that have adorned this country. "The short time," says one of his biographers, "that he was at the helm, was a season of firmness and tempests, and it is but doing him strict justice to say, that they could neither fright nor distract him. Whatever he did, he did with his might, and there was a spirit and dignity in his administration, which that government could never recover after he left it. He was the soul and genius of the ministry while he made a part of it; but whether he did not carry things too high, and out of the reach of all other capacities but his own, it would favour of rashness to determine." Some historians attribute to him the arbitrary counsel of shutting up the exchequer, while others assert that he opposed it with all his power, and drew up a paper of reasons against it. It is certain that he was an earnest promoter of the declaration for liberty of conscience, which, though intended principally to favour the Papists, probably agreed with his own real judgment, as a decided friend to religious toleration. It is generally admitted that he had no concern in the disgraceful treaty with Lewis XIV., of which the main object was to render Charles a pensioner on the French monarch; but he was a strenuous supporter of the Dutch war, and was guilty of advising the illegal measure of issuing writs for the election of members of parliament, during a recess, and abusing the influence of the crown to procure returns in favour of the court. He had not been more than a year in possession of the seals, when he manifested hostility to the principles which governed the Stuart family; so that the duke of York became his enemy, and at length in Nov. 1673 got him removed from his office. After he had quitted the court, he continued to make a great figure in parliament, and for his warmth in maintaining that a prerogation for fifteen months was equal to a dissolution, he was committed to the tower, where he remained a prisoner full thirteen months, when he submitted and was released, and the precedent made in his case was afterwards reversed. Previously to this, he had shewn himself a friend to civil and religious liberty, by opposing the test-bill introduced into the house of peers by lord Danby, and on this business, he is said to have distinguished himself more than he had ever done. He managed the opposition to lord Danby's administration with so much dexterity and vigour, that it was found absolutely impossible to do any thing effectually in parliament, without changing the system which then prevailed. The king accordingly dismissed all the privy council at once, and formed a new one, making lord Shaftesbury the lord president. He had, however, already drawn upon himself the implacable hatred of the duke of York, by readily promoting, if not originally inventing, the project of an "exclusion bill." To him also is imputed the contrivance of the Popish plot in 1678; which, if it were not a fiction of his own, was urged by him with the greatest violence against the court party, so as to be the means of throwing out lord Danby's administration; and there is no doubt that he was the author and promoter of all the persecutions which followed on this business, as well in the inferior courts as in parliament, with a view of quashing the popish party entirely, and of excluding the duke from the succession, which were points he had most at heart, and which he pursued with

an indefensible severity. Amidst many violent and very unjust proceedings, he was the author of a measure of signal national benefit, the passing of the "Habeas Corpus act;" to the protection of which he had occasion to appeal shortly after, for his own personal security. His new employment was short-lived, as he was dismissed after holding it little more than five months; and some of the practices to which he had recourse against the papists, were turned against himself. He was applied to by a man pretending to make discoveries relating to the popish plot, and the murder of sir Edmundbury Godfrey, provided that for this service he might obtain a pardon. The man was conducted to the privy council; but instead of giving the information expected, he charged the noble earl with endeavouring to suborn him. Upon this information his lordship was apprehended on the 2d of July 1681, and after an examination by his majesty in council, he was committed to the tower, where he remained four months, notwithstanding he took every legal method to obtain a trial, or to be admitted to bail, according to the principles of the habeas corpus act. At length, on the 24th of October, a bill was presented to the grand jury at the sessions house in the Old Bailey, against his lordship, for high treason. Witnesses were brought against him, but their characters were too infamous to permit their evidence to have the smallest degree of weight. Considerable sums were laid upon the draught of an association found in his study, which, however, was neither written nor signed by the noble earl; and the jury, after some consideration, threw out the bill, and he was acquitted, amidst the acclamations of the people. A medal was struck on the occasion, which was the cause of a very bitter satirical poem, from the pen of Dryden, who had before persecuted Shaftesbury, as the great counsellor of rebellion, in his "Abalom and Achitophel."

As soon as he was at liberty, lord Shaftesbury endeavoured to vindicate himself by law, and brought an action against a person for speaking of him as a traitor: this he thought proper to discontinue before it came to trial. For many years he had resided at Thanet-house in Aldersgate-street; but finding his health decay, his spirits declining, and the times becoming more serious, he withdrew into Holland, where he arrived in November 1682, and in the following January he died at Amsterdam in the sixty-second year of his age. His body being embalmed was transported to England, and buried with his ancestors, at Winborne St. Giles. Much has been written concerning the character of this nobleman. As a public man, he was, says Dr. Kippis, guilty of manifold inconsistencies, and submitted to shameful compliances. "There were, however," adds the same candid and excellent biographer, "three points in which, through the usual tenor of his life, the earl of Shaftesbury was entitled to applause. These were, his attention to the protection and advancement of trade and commerce; his endeavours to counteract the growing power of France; and his attachment to the cause of religious liberty. He wrote an essay on toleration, still preserved in the family, which was evidently the ground work of Mr. Locke's admirable letters on that subject. Several of the measures, proposed and supported by him, were preparatory to those that were adopted at the Revolution, and he contributed, by his ardour, to raise and animate the spirit, which, in the end, produced the event, so that amidst all his obliquities and faults, he deserves to be celebrated, as having been no small benefactor to the free constitution of England." He left in MS. a history of his own times; and some of his speeches have been published. He was thrice married, but left only one son, who succeeded him

in his estates and titles, and who died in November 1699, and was succeeded by Anthony his son and heir, of whom we are now to give an account.

COOPER, ANTHONY ASHLEY, third earl of Shaftesbury, was born Feb. 26, 1670-71, at Exeter-house, London, which was at that time the town-residence of his grandfather, who undertook the superintendance of his education. He first entrusted him to the care of a learned lady of the name of Birch, under whom he made such rapid advances in the Greek and Latin languages, as to be able to read the common authors in each before he was eleven years old. He was then placed in a private school, where he continued till the death of his grandfather, when he was sent to Winchester; where, on account of the insults which he suffered, through the hatred borne to his grandfather's memory by the friends to arbitrary power, he remained but a short time, and, in 1686, he commenced his travels under the care of a well qualified tutor. With him he spent much time in France and Italy, improving himself in the languages and accomplishments of those countries, and laying the foundation of the knowledge and taste for which his own subsequent writings were justly celebrated. He returned to England in 1689, and was offered a seat in parliament, which for the present he declined, wishing rather to employ all his leisure in the improvement of his mind, and in extending his knowledge on subjects of the greatest importance. In these views he succeeded, and laid a foundation in learning which was accurate, extensive, and truly liberal. After pursuing the studies congenial to his temper, with much ardour and almost unabating diligence, for nearly five years, he was elected member of parliament for Poole. In this high station he shortly had an opportunity of expressing that attachment to liberty, by which he was distinguished through the whole of his life, and of conciliating the house to the object which he had in view. The occasion was the introduction of a bill for granting, among other things, the aid of counsel to persons indicted for high-treason. Lord Ashley had prepared a speech for the purpose, but when the moment came, in which he was to deliver it, he was utterly unable to proceed. After a short pause, he addressed the speaker. "If I, sir, who only rise to give an opinion on the bill now depending, am so confounded, that I am unable to express the least of what I proposed to say, what must be the condition of that man, who, without any assistance, is pleading for his life, and under the apprehension of being deprived of it?" This happy turn of thought, so appropriate to the occasion, is supposed to have contributed more than any of the arguments which were urged in obtaining the justice for which he pleaded. The necessity of this wife and humane law has been of late years amply manifested by the conduct of certain great law officers, who took the very moderate space of seven, nine, and eleven hours in opening cases of *supposed* high-treason. During the remainder of that parliament, lord Ashley was indefatigable in the promotion and support of every measure in favour of liberty, without regard to the person by whom it was introduced, influenced unquestionably by an attention to the public good, without feeling the paltry motives which too frequently actuate political men. At the dissolution in 1698, he resigned his pretensions to a seat in the house, on account of ill health, and with a view also of securing more time for literary pursuits. He went to Holland under the assumed character of a student in physic: here he cultivated an acquaintance with Bayle, Le Clerc, and other men of celebrity, and it was not till a short time before he left the country that he made his name known. Before his lordship's return an imperfect and surreptitious

edition of his "Enquiry concerning Virtue," was published in a most unhandsome manner by Mr. John Toland, who, says Dr. Kippis, in this transaction, repaid with ingratitude a very generous benefactor. His lordship bought up the edition, and set about completing the treatise, which afterwards appeared as the second volume of the "Characteristics." Soon after lord Ashley's return to England, he became, by the decease of his father, the earl of Shaftesbury, but he did not take his seat in the house of peers till the beginning of the year 1700-1, when his friend, lord Somers, sent a messenger to acquaint him that his presence was necessary, on account of the Partition-treaty, which, at that time, was under the consideration of parliament. During the remainder of the session he attended his duty as frequently as the state of his health permitted, zealously supporting the measures of king William, who was, at that period, negotiating the grand alliance. That sovereign regarded the support of lord Shaftesbury so highly, that he wished to appoint him secretary of state. This honour his health did not allow him to accept; but he was nevertheless assiduous in rendering to his majesty advice on every important occasion. Soon after the accession of queen Anne, lord Shaftesbury retired from public life, being no longer a friend to the measures of the court. Ministers now took from him the vice-admiralty of the county of Dorset, which had been held by his family for three successive generations. He went to Holland a second time, where he spent two years among the learned connections, which he had already formed in that country. About this period the French prophets having excited a considerable disturbance, in the nation, by their enthusiastic extravagances; some great men recommended prosecutions and punishments as the only methods of suppressing them; to these lord Shaftesbury was decidedly inimical, thinking that such measures would increase rather than cure the malady. This was the origin of his "Letter on Enthusiasm," which he sent to lord Somers, then president of the council, which, being approved by that nobleman and others, was published in 1703, though without the name of the author, or that of the person to whom it was addressed. In the following year he published his "Moralists," a philosophical rhapsody, being a recital of certain conversations on natural and moral subjects; and in a few months afterwards his "Sensus Communis; an Essay upon the Freedom of Wit and Humour, in a Letter to a Friend." In the same year he married Miss Jane Ewer, the youngest daughter of Thomas Ewer, esq. of Lee, in Hertfordshire. In forming this connection, it should seem that his lordship was principally influenced by the solicitations of his friends, rather than from any inclination of his own, or high expectations of the happiness of that state. Letters to this effect are preserved in the Biographia Britannica. By his lady, to whom he was previously related, he had an only son Anthony, afterwards earl of Shaftesbury. In 1710 the noble lord published his "Sollicitus, or Advice to an Author;" after which his health obliged him to try the effects of a warmer climate. He accordingly, in 1711, passed through France and Piedmont, and fixed his residence at Naples, where he died on the 4th of February, 1712-13, at the early age of forty-two. During his abode at Naples, he finished his "Judgment of Hercules," and the "Letter concerning Design," which have since been added to the "Characteristics." It was in 1711 that the first edition was published of all the Characteristics, in the same order in which they now stand: but this publication not being entirely to his lordship's satisfaction, he chiefly employed his time abroad in preparing his writings for a more elegant edition, which was given to the world soon after

after his decease, in the year 1713. The several engravings, that were then first interposed through the volumes, were all invented by himself, and designed under his immediate inspection. The impression of the "Characteristics of Men, Manners, Opinions, and Times," in 3 vols. 8vo., contains the whole of his works which he intended to submit to the judgment of the public. In the year 1716, some of his private letters upon philosophical and theological subjects were published, under the title of "Several Letters written by a noble Lord to a young Man at the University;" and in 1721, another collection of the same kind appeared, entitled, "Letters from the Right Honourable the late Earl of Shaftesbury to Robert Moleworth, esq. now Lord Viscount of that Name; with two Letters written by the late Sir John Cropley: to which is prefixed, a large Introduction by the Editor." That editor, says the candid biographer already referred to, was Mr. Toland, who, in the present, as well as in the former case, assumed a liberty not very agreeable to the family. In their opinion, as the correspondence was almost entirely of a private nature, it was on that account unfit for public view. It nevertheless set his lordship's integrity in the most amiable point of light. Lord Shaftesbury also wrote a preface to a volume of Dr. Whichcote's sermons, published in 1698; and in his Letters to a young Man at the University, expatiates on the merits of Burnet, Hoadly, Tillotson, Barrow, Chillingworth, and Hammond, as the great pillars of the church against fanaticism. But however highly he might esteem the labours of modern divines, his principal admiration was directed to the writings of antiquity. These were the constant subjects of his study, and on these his philosophy was built. His favourite books were the moral works of Xenophon, Horace, the Commentaries and Enchiridion of Epictetus, as published by Arrian, and Marcus Antoninus. These authors he always carried with him, in his various excursions; and they are still extant, filled with marginal notes, written in his own hand. It remains now to notice more particularly the writings of lord Shaftesbury, which, by one class of critics, have received the most extravagant applause, and, by another, have been the subjects of indiscriminate condemnation. They have been examined with a critical eye, and in rather an elaborate manner, by Dr. Kippis, to whose article, in the Biographia Britannica, we refer the reader, contenting ourselves with a brief outline. Lord Shaftesbury's Letter on Enthusiasm was written from excellent motives: it contains many admirable remarks, delivered in a neat and lively strain; but it wants precision; conveys but little information; and contains some exceptionable passages. The same character may be given, with truth and justice, of "The Essay on the Freedom of Wit and Humour," designed to defend the application of ridicule to subjects of speculative inquiry, and among others to religious opinions. His "Scolloquy, or Advice to an Author," met with more general approbation. It contains a variety of excellent matter; and what the noble lord has advanced in recommendation of self-examination, and in defence of critics and criticism, is particularly valuable: it is evidently the result of the author's knowledge and refined taste in books, in life, and manners. Lord Shaftesbury's "Enquiry concerning Virtue" obtained more general applause. It is ably and finely written, and maintains with great force the important truth, that virtue is the greatest happiness, and vice the greatest misery of men. This work has met with much opposition from those who deduce the principles of virtue from self-love only, and refer the obligation of it solely to the will of God. In this "Enquiry," the noble author appeared in the close, analytical, and the didactic form. But in the "Moralists,"

he assumes a higher tone, and figures in a new character. Here he presents himself in the mode of dialogue, and is the emulator of Plato, in the boldest poetic manner of that eminent philosopher. Bishop Hurd ranks it among the best compositions of the kind in our language. Its matter is highly valuable and important, and presents us with a truly argumentative and eloquent defence of the doctrines of a Deity and a Providence. The "Miscellaneous Reflections on the preceding Treatises, and other critical Subjects," are intended as a sort of defence and explanation of his former works: they contain a variety of just and ingenious remarks, and much fine writing; but they are written in a desultory manner, abounding with many exceptionable passages concerning revelation. With respect to the style of lord Shaftesbury, we may quote the opinion of Dr. Blair, which is at once accurate and judicious. "His language has many beauties; it is firm and supported in an uncommon degree; it is rich and musical. No English author has attended so much to the regular construction of his sentences, both with respect to propriety, and with respect to cadence. All this gives so much elegance and pomp to his language, that there is no wonder it should sometimes be highly admired. It is greatly hurt, however, by perpetual stiffness and affectation. This is its capital fault. His lordship can express nothing with simplicity. He seems to have considered it as vulgar, and beneath the dignity of a man of quality, to speak like other men. Hence he is ever in buskins, full of circumlocutions and artificial elegance. In every sentence we see the marks of labour and art; nothing of that ease which expresses a sentiment coming natural and warm from the heart. Of figures and ornaments of every kind he is exceedingly fond; sometimes happy in them; but his fondness for them is too visible, and having once laid hold of some metaphor or allusion that pleased, he knows not how to part with it. What is most wonderful, he was a professed admirer of simplicity; is always extolling it in the ancients, and censuring the moderns for want of it, though he departs from it himself as far as any one modern whatever. Lord Shaftesbury possessed delicacy and refinement of taste to a degree that we may call excessive and sickly; but he had little warmth of passion; few strong or vigorous feelings; and the coldness of his character led him to that artificial and stately manner which appears in his writings. He is fonder of nothing than of wit and gallery; but he is far from being happy in it. He attempts it often, but always awkwardly: he is stiff even in his pleasantry, and laughs in form like an author, and not like a man." To this Dr. Kippis adds: "On the perusal of the Characteristics, we have been clearly convinced, that the noble author was always excellent in the disposition of his words, but that in the choice of them he is frequently liable to censure." Lord Shaftesbury, in all his works, shews himself a zealous advocate for liberty, the steady friend of virtue, and a true believer in natural religion. He sometimes professed himself a Christian; but his writings, in many parts, render his faith in the divine mission of Christ very questionable. The noble lord left one son, Anthony Ashley Cooper, the fourth earl, of whom the learned Mr. Huntingford says, "there never existed a man of more benevolence, moral worth, and true piety." To this high character Dr. Kippis gives his own testimony, having had the honour of enjoying his acquaintance and correspondence. He was the author of the life of his father, in the great General Dictionary. It may not be improper to add in this place, that the translator of Xenophon's Cyropedia was the honourable Maurice Ashley Cooper, brother to the third earl.

COOPER, JOHN GILBERT, born in 1723, was of an ancient

cient family in Nottinghamshire. He received the early part of his education at Wellminter school, and finished his studies in Trinity College, Cambridge. As an author, his first work was on the "Power of Harmony," formed on the model of the "Pleasures of the Imagination." In 1749 he published "The Life of Socrates, collected from the Memorabilia of Xenophon, and the Dialogues of Plato," &c. Learned notes were added by the Rev. J. Jackson of Leicester. This work was well received, though at present it is in no great estimation. In 1754 he gave to the world "Letters on Taste," which were written in an elegant style, for which, and for the vivacity in the description, they were more admired than for accuracy and depth of thought. Cooper wrote some papers in "The World;" his other works are all poetical, of which the principal are, "The Tomb of Shakspeare, a Vision;" "Epistles to the Great, from Aristippus in Retirement;" "The Call of Aristippus, an Epistle to Dr. Akenfide;" and "A Tranlation of Gresset's Ver Vert." Mr. Cooper was not destitute of fancy, but his fancy was not always under proper regulation, and he sometimes failed in the precision of his ideas. He excelled in the light, easy, and epistolary strain. His sentiments have considerable fameness, being derived from the Shaftesburian school of philosophy, of which he was a disciple. He was an active member of the Society for the Encouragement of Arts, Manufactures, &c.; a diligent and useful magistrate. He died in 1769, of a fit of the stone.

COOPER, on board a *Ship*, the person that looks to the casks and all other vessels, for beer, water, or any other liquors. He has a mate under him.

COOPER, in *Geography*, one of the Bermudas islands. COOPER, a large and navigable river of America, which mingles its waters with Ashley river, below Charleston city, in South Carolina. These form a spacious and convenient harbour, which communicates with the ocean, just below Sullivan's island, leaving it on the N. 7 miles S.E. of the city. Cooper river is a mile wide at the ferry, 9 miles above Charleston.

COOPER'S-BRIDGE, over the Calder river, on the road between Huddersfield and Leeds in Yorkshire, is the place at which sir John Ramsden's canal connects with the Calder and Hibble navigation, which now has become a place of considerable traffic, in consequence of the junction of the Huddersfield canal with the other end of sir John Ramsden's canal. See CANAL.

COOPER'S ISLAND, one of the Virgin islands in the West Indies, S. W. of Ginger island, uninhabited; about five miles long, and from one to two broad. N. lat. 18° 7'. W. long. 63° 5'.

COOPER'S, or DE KUIPER ISLAND, lies on the north coast of the island of Java, near Batavia; about 1620 feet from the island of Onrust, and about one-third less in size. The Dutch company have several warehouses in this island, in which they chiefly lay up coffee. At its south side there are two pier-heads, where vessels may load and discharge. Over the island are interpersed several large tamarind trees, which afford an agreeable shade. The workmen that are employed here in the day-time, are fetched over at night to Onrust, and two are left, as a watch, together with a number of dogs, so remarkably fierce, that no one dares to set his foot on the island at night.

COOPER'S ISLAND, an island in the Southern Pacific ocean, near the E. coast of the ile of Georgia. It is a rock of considerable height, about five miles in circuit, and one mile from the main. At this isle the main coast takes a S.W. direction for the space of four or five leagues to a

point, called by Cook "Cape Disappointment." Off that are three small isles, the southernmost of which is green, low, and flat, and lies one league from the cape. S. lat. 54° 57'. W. long. 36° 4'.

COOPER'S TOWN, a post town, and township of America, in the state of New York and county of Otsego. It is the compact part of the township of Otsego, and the chief town of the country round lake Otsego. It is pleasantly situated at the S.W. end of the lake, on its banks, and those of its outlet; 12 miles N.W. of Cherry valley, and 73 W. of Albany. It has a court-house, gaol, and academy. In 1789 it had only three houses; in 1791 it contained 292 inhabitants; and in 1795, 50 houses had been erected on an improved plan, regularly laid out in squares. N. lat. 42° 44'. W. long. 74° 48'.

COOPER'S TOWN, a town of Pennsylvania, situated on the Susquehanna river. In 1785 this was a wilderness; but in nine years after, it contained 1800 inhabitants, a large and handsome church, a market-house, a library of 1200 volumes, and an academy of 64 scholars. Four hundred and seventy pipes were laid under ground for the purpose of bringing water from West mountain, and conducting it to every house in the town.

CO-OPERATE, TO, in a *Military Sense*, is to carry a well-directed plan into execution in such a manner, that the troops or forces, how much soever divided, may act at one time, on one principle, and towards one end.

CO-OPERATOR, derived from *con*, and *opera*, labour, denotes any cause, natural or supernatural, which concurs with another to the production of an effect. Thus, nature and medicine co-operate in the cure of disorders; and the will of man concurs with the grace of God in the performance of good works.

CO-OPERIE PALLIO. See PALLIO.

COOPERS, *Company of*. See COMPANY. Coopers are enjoined to make their vessels of seasonable wood, and to mark them with their own marks, on pain of forfeiting 3s. 4d.; and the contents of vessels are to be observed under a like penalty, so that the beer barrel shall contain 36 gallons, a kilderkin 18, a firkin 9, &c. The wardens of the Coopers' company in London, with an officer of the mayor, are to search all vessels for ale, beer, and soap to be sold there, and to mark those that are right; and they may burn the others: and if any cooper diminish a vessel by taking out the head, or any one of its staves, it shall be burnt, and the offender forfeit 3s. 4d. Stat. 23 Hen. VIII. c. 4.

CO-OPERATURA, in *Antiquity*, a thicket or covert of wood. Chart. de Forest. cap. 12.

CO-OPERATION, derived from *co-opro*, I choose, signifies the admission of members into any college or society. Thus it was anciently applied to the choice of the augurs and pontiffs; and in modern times, to an extraordinary nomination and election of persons of distinguished merit into a learned society.

CO-ORDINATE, something of equal order, rank, or degree, with another.

CO-ORDINATION, in respect of causes, denotes an order of causes, wherein several of the same kind, order, and tendency, concur to the production of the same effect.

COORNHAERT, or CUERNHERT, in *Biography*. See THEODORE DIRK.

COOROORA, in *Geography*, one of the Pelew isles, the capital of which is called PELEW; which see.

COOS, in *Ancient Geography*, an island of the *Ægean* or *Icarian* sea, near Cnidus (now called *Zia*); in which was a city of the same name, from which Hippocrates, the cele-

brated physician, and Apelles, the famous painter, were called *Cœi*. Here was a large temple of Æsculapius, and another of Juno. It abounded in rich wines, and here were made those "*Cœo vestes*," which were transparent, and are so often mentioned by the ancient poets.

COOS, or COHOS, in *Geography*, a country of America, called *Upper* and *Lower Coos*, which lies on the Connecticut river, between 20 and 40 miles above Dartmouth college. Upper Coos is the country S. of Upper Ammonoosuck river on John and Israel rivers. Lower Coos lies below the town of Haverhill, S. of the lower Ammonoosuck. The distance from Upper Coos to the tide in Kenn-beck river was measured in 1793, and found to be but 90 miles.

COOS-BAYBAR. See COOCH-BABAR.

COOSA, or COOSA-HATCHA, a river which rises in the high lands of the Cherokees' country, and joining Tallapoosie, forms Alabama river. Its course is generally S. through the country of the Natchez, and other tribes of the Upper Creeks. It is rapid, and full of rocks and shoals, so that it is hardly navigable by canoes.

COOSADES, an Indian town on Alabama river, in America, about 60 miles above its mouth, on Mobile river; below McGillivray's town, and opposite the mouth of the Oakesfukee.

COOSA-HATCHEE, or COOSAW, a river of America, in S. Carolina, which rises in Orangeburg district, and after running in a S.S.W. course, discharges itself into Broad river and Whale branch, which separate Beaufort island from the main land.

COOSAWATCHEE, or COOSAHATCHIE, a post town of America, in the state of S. Carolina, and district of Beaufort, situated on the S.W. side of Coosa river, over which a bridge has been erected. The place is flourishing, having about 40 houses, a court-house, and a gaol. The courts formerly held at Beaufort are held here. It is 33 miles distant from Beaufort, and 77 W.S.W. from Charleston.

COOSCOOSOO, a common food among the Moors of Africa, consisting of a paste made of flour in the form of small grains in the manner of Italian pastes. This is dressed by the vapour of broth in a round dish, with holes like a cullender, and that is fixed in the kettle in which they boil their meat. The cooscoosoo, contained in the deep plate or cullender, is slowly softened, and prepared by the vapour of the broth, with which they take care to moisten it occasionally. This is a nourishing and agreeable food, and eaten by the common people either with milk or with butter, but superior persons have it dressed by a rich broth made with mutton, poultry, and pigeons or hedge-hogs, and mix it afterwards with fresh butter.

COOSY, Cosa, or Koss, a river of Asia, which rises in the mountains of Thiber, takes its course through Purneah, and runs into the Ganges, 20 miles E. of Boglipour in the country of Bahar.

COOT, in *Ornithology*. See FULICA atra.

COOTE, Sir CHARLES, in *Biography*, a distinguished military officer in the 17th century, was the eldest son of Sir Charles Coote, who was created baronet in April 1621. He was a gentleman of great consideration in Ireland. Upon the breaking out of the rebellion, in 1641, he had a commission for a regiment of foot, and was made governor of Dublin. From this period, to the year 1652, he was engaged in a great number of important services for his country. In almost all the contests of which he took a part he was successful. After Ireland was reduced to the obedience of the parliament, Sir Charles was one of the court of justice in the province of Connaught, of which he was made president by

act of parliament. Being in England at the time of the deposition of Richard Cromwell, he went post to Ireland, to carry the news to his brother Henry Cromwell, and to concert with him what to do in order to maintain themselves in their posts. When, however, he perceived that King Charles the Second's interest was likely to prevail, he endeavoured to insinuate himself into his favour. For this purpose he sent to the King Sir Arthur Forbes, "to assure his majesty of Sir Charles's affection and duty, and that if his majesty would vouchsafe to come to Ireland, he was confident the whole kingdom would declare for him; that though the present power in England had removed all the able men from the government of the state in Ireland, under the character of presbyterians; and had put Ludlow, Corbet, and others of the King's judges in their places, yet they were generally so odious to the army as well as to the people, that they could seize on their persons, and the castle of Dublin when they should judge it convenient." The King did not think it prudent to accept the invitation. In a short time after Sir Charles Coote, and some others, influenced the whole council of officers, that they prevailed upon them to vote not to receive Colonel Ludlow as commander in chief; they, moreover, made themselves masters of Athlone, Drogheda, Limerick, Dublin, and other important places for the service of the King. He immediately caused Colonel Monk to be made acquainted with the progress of the King's interest in Ireland, who urged them by every means not to restore the suspended commissioners to the exercise of their authority. Soon after, Sir Charles Coote and others sent to the parliament a charge of high treason, against Colonel Ludlow, Corbet, Jones, and Thomlinson. He likewise made himself master of Dublin-castle; and apprehended John Coke, chief justice of Ireland, who had been solicitor-general at the trial of King Charles I. Notwithstanding this, parliament thought themselves so sure of him in their interest, that he received their vote of thanks on the 5th of Jan. 1655—60. On the 16th of the same month he was appointed one of the commissioners for the management of the affairs of Ireland. Before those commissioners declared for King Charles, they insisted upon certain things relating to their interest as members of that nation. On the 6th of September 1660, Sir Charles Coote, on account of his many and very valuable services for the royal cause, was created baron and Viscount Coote, and Earl of Montrath in the Queen's county. He was also appointed one of the lords justices of Ireland, but he did not long enjoy these marks of his sovereign's favour, for he died in December 1661, and was succeeded in his estate and titles by his son Charles, the second earl. Dr. Leland asserts that Coote and his father had engaged in the parliamentary service not from principle, but interest. Dr. Kippis, however, doubts the assertion upon the ground that the Cootes were zealous presbyterians, and therefore he thinks it highly probable that they were influenced, at least in part, by their real sentiments, civil and religious, and especially by their aversion from popery.—*Biog. Britan.*

COOTE-HILL, in *Geography*, a market and post town of the county of Cavan, Ireland, near the borders of Monaghan. It was much neglected by the late proprietor, but the present one is improving its appearance by public buildings, such as a market-house and shambles; and by obliging tenants to build on a plan adopted by him. It contains six houses of worship, besides the parish church. In the sale of its markets it is the most considerable town in the county. The sale of linen alone averages 4000*l.* weekly, principally of sheetings, in which branch no market in Ireland

land can vie with it. It is fifty-three Irish miles N.W. from Dublin, and ten miles N.E. from Cavan. Coote'survey of Cavan, &c.

COOTS-TOWN, a town of America, in the state of Pennsylvania and county of Berks, is situated on a branch of Sauhoeca creek, which is itself a branch of the Schuylkill river. It contains forty houses, and a German Lutheran and Calvinist church. It is distant seventeen miles N.E. from Reading, and seventy-three N.W. by N. from Philadelphia.

COOTWYCK, or **KOOTWYCK**, **JURIAN**, in *Biography*, a goldsmith, born at Amsterdam in 1714, who applied himself after the example of his countryman Ploos Van Amstel, to the imitation of drawings by means of etching and aquatinta. Amongst his works, are several prints from the designs of Backluyfen, Berghem, and other Dutch and Flemish masters; and likewise some, which it is supposed he executed from sketches of his own. One of his prints in imitation of black and white chalk, representing an old woman sitting in a chair, with a paper in her hand, is dated 1748. Heineken.

COP, **WILLIAM**, born at Bale in Switzerland, took his degree of doctor in medicine at Paris, in the year 1495, and soon became so distinguished by his superior knowledge and abilities, that Ramus, no incompetent judge, called him, "*Unica nobilium medicorum gloria.*" He was physician to Lewis the twelfth, and to Francis the first, and ancient to the Faculty of Medicine at Paris. He translated the work of Paulus of Ægina, de Ratione Viæus, which was published at Paris in the year 1510, in 4to.; and the following year at Strasburg; also, Galen's six books, de Locis Affectis, et de Morborum Causis et Differentiis, and the Prognostics of Hippocrates. He died in 1531. His son Nicholas succeeded him as regent of the University of Paris, but giving into the errors, his biographer says, of Calvinism, he was obliged to leave Paris, and to pass the latter part of his life at Bale. Haller Bib. Med. Eloy. Dist. Hist.

COPÆ, in *Ancient Geography*, a town of Greece, in Bœotia, situated on the north banks of the lake Copais, to which it gave name. It is mentioned by Strabo, Ptolemy, and Pliny; the latter of whom says, that cars were invented in this place. It had temples of Ceres, Bacchus, and Serapis.

COPAIBA BALSAM, in the *Materia Medica*. See BALSAM.

COPAIFERA, in *Botany*, (from Copaiwa, the Indian name, and *fero*, to bear.) Linn. Gen. 542. Schreb. 757. Willd. 880. Juss. 355. Vent. 3. 430. Copaiiba; Marg. Pf. Ray. Copaiwa; Jacq. Copaiier; Encyc. Clafs and order, *decandria monogynia*. Nat. Ord. Undetermined by Linnaeus. *Leguminosæ*; Jusseu, with a doubt whether it be not more nearly allied to his next order, *Terebinthaceæ*.

Gen. Ch. Cal. none. Cor. Petals four, oblong, acute, concave, widely spreading. (Calyx with four divisions. Corolla none; or petals numerous, caducous? J. S.) Stam. Filaments ten, filiform, incurved, a little longer than the corolla; anthers oblong, incumbent. *Pist.* Germ. superior, rounded, compressed-flattish, pedicelled; style filiform, curved, the length of the filaments; stigma obtuse. *Peris.* Legume egg-shaped, pointed with part of the style, two-valved. *Seed* single, egg-shaped, involved in a berried aril; (Inclosed in a pulpy envelope; Lam.)

Ess. Ch. Calyx none. Petals four. Legume egg-shaped. Seed single, in a berried aril.

Sp. C. *officinalis*. Balsam of capeivi tree. Linn. Sp. Pl. Jacq. Amer. 133. tab. 86. Picq. 67. 123. Lam. Ill. 342. Woodv. Med. Bot. tab. 137. A lofty tree with a hand-

some head; the smaller branches zig zag, with a nearly smooth, brownish ash-coloured bark. *Leaves* alternate, winged, about four inches long; leaflets six or eight, petioled, lanceolate-egg-shaped, quite entire, ending in a blunt point narrower on one side than on the other, shining, somewhat coriaceous, not exactly opposite, one of the uppermost frequently wanting. *Flowers* white, on short peduncles; in solitary axillary panicles at the summit of the branches, which consist of about eight alternate, spreading racemes. A native of Brazil, Guinea, and New Spain, frequent about Tolu, sixty leagues from Cartagena, growing profusively among the trees which yield balsam of Tolu, Peru, &c. By a deep incision through the bark into the wood of the tree, a fluid balsam or resin is obtained, which gradually thickens when exposed to the air. For its chemical and medical properties, see the article *Copaiba BALSAM*.

COPAIS, in *Ancient Geography*, a lake of Bœotia; Strabo says that it had different names from the towns that were situated near it; thus it was called Copais, from Copæ; Haliartos, from Haliarte. It is also called Leaconis by Steph. Byz., and Cephalis by Pausanias. Its present name is "*Lagordi Topoglia.*" This lake was 380 stadia, or 14½ leagues in circumference, and served as a common receptacle for the rivers which issued from the mountains by which Bœotia was surrounded. As this lake had no apparent outlet, it must have overflowed the country, if nature, or rather the industry of man, had not contrived secret passages for draining off the water. In the part adjoining to the sea, the lake terminates in three bays, which advance to the foot of mount Ptois, situated between the sea and the lake. From the bottom of each of these bays, diverge a number of canals, that traverse the mountain through its whole breadth, some of which are thirty stadia, or more than a league in length, and others of a much greater extent. To excavate or cleanse them, wells had been sunk at stated distances on the mountain, which are of a very great depth. The formation of these wells must be traced to the most remote antiquity, as no traditional or historical account of their origin exists. It requires great labour and expence to maintain them; and as most of them have been choaked up, the lake has proportionally gained on the plain.

It is not improbable that the deluge, or rather the inundation which happened in Bœotia, in the time of Ogyges, was caused merely by the obstruction of the water in these subterraneous conduits.

COPAL. This valuable and singular kind of resin is imported partly from South America, and partly from the East Indies, and like most of the other resins, is a natural exudation from a large tree, which hardens in the air.

The best copal is a hard brittle resin, in rounded lumps of moderate size, easily reducible to fine powder, beautifully transparent, but often, like amber, containing parts of insects and other small extraneous bodies impacted in its substance.

The colour of copal is a light lemon yellow, varying to orange; but when dissolved and thinly spread over any surface, the colour is scarcely perceptible, and it only gives a fine hard, smooth, transparent glazing. It is this union of hardness and transparency, with want of colour, that renders copal so valuable as a varnish.

Copal unquestionably belongs to the class of resins, but it differs from most of these substances in the great difficulty with which it dissolves in alcohol and essential oils, so as to require great purity of these menstrua and particular management.

The three menstrua usually employed in varnishing, are alcohol, oil of turpentine, or any other essential oil, and

drying linseed, or other fixed oil. These are used sometimes separately with the varnish resins, but generally mixed.

We shall give some of the processes by which copal may be dissolved in each of these substances.

Alcohol singly, which so readily dissolves the other resins, has but little action on copal; for if this resin in fine powder be digested with the very purest alcohol, with or without heat, scarcely any of it is dissolved, and the copal coalesces at the bottom of the vessel into a tough cohesive mass. But a solution may be effected by the addition of *camphor*, the action of which, upon the resins, has been partly described under that article. With none is it more striking than with copal. When the two are separately powdered and mixed, the copal absorbs the camphor, swells and softens into a pasty mass, which will remain for months of the same consistence, without hardening. To make an alcoholic solution of copal, dissolve half an ounce of camphor in a pint of highly rectified alcohol; put it in a glass vessel over a lamp, and add four ounces of copal in small pieces, and continue the heat just to that degree at which the bubbles may be counted, till the solution is complete. Part of the copal separates when cold, but most of it remains in permanent solution.

It is necessary first to dissolve the camphor in the alcohol; for, if the pasty mass arising from the mixture of copal and camphor be added to alcohol, the solution will not go on.

A mixture of mastich, elemi, and other resins, will bear a moderate quantity of copal, without being rendered insoluble in alcohol, even without the assistance of camphor.

To dissolve copal in the essential oils, Mr. Sheldrake has given the following process in the Transactions of the Society of Arts.

Reduce two ounces of copal to *coarse* powder; put it into a glass vessel, and pour thereon a pint of the *very best* oil of turpentine, with one eighth of spirit of sal ammoniac, previously well shaken. Cork the glass, leaving a pin-hole through the cork to allow of the escape of vapour, and speedily heat it to that point at which the bubbles may be counted. Continue this till the solution is complete, taking care not to increase the heat, otherwise the copal will coalesce at the bottom of the glass, and the solution will not go on. The vessel should not be opened till quite cold. This liquor is of a rich deep yellow when in quantity, but when applied as a varnish, it is nearly colourless. The spirit of sal ammoniac is not a necessary ingredient.

Mr. Tingry of Geneva (Painter's and Varnisher's Guide, 1804.) finds that copal may be united to oil of turpentine by the intermede of some other of the essential oils, particularly oil of spike and lavender. He gives the following process: Take two ounces of oil of lavender, heat it in a glass matrass, add thereto an ounce of copal grossly powdered, and, at different times, stirring the mixture with a stick of white wood. When the copal is dissolved, add six ounces of oil of turpentine, nearly boiling, and stir the whole thoroughly. This gives a fine gold-coloured liquid, very fit for varnishing.

Camphor also highly assists the solution of copal, in oil of turpentine, as it does in alcohol, and the same precaution is necessary, of dissolving the camphor completely in the oil, before the copal is added. Half an ounce of camphor is sufficient to a quart of the oil, to enable it to take up as much copal as will make a good varnish.

To unite any of the resins with drying linseed oil in the composition of the oil varnishes, it is necessary to expose them to a much greater heat than in the former instances, that is, not less than is sufficient to liquify the resins. This, however, always gives the resin a certain degree of brown colour, which is often injurious to it when used as a varnish. Copal when melted with as little heat as possible, and then dropped into drying linseed oil, dissolves therein with ease, and this solution mixed with clear turpentine, forms a very fine hard varnish. To avoid as much as possible the discolouration of the copal, Mr. Tingry incloses it in a kind of wire-cage suspended in a very slow well-regulated furnace; and, as soon as any portion melts, it falls in drops into the drying oil heated and set beneath it.

When melted copal is dropped into water, a small quantity of oil is separated, and floats at top, and the resin at the bottom is thereby rendered somewhat more soluble in the different menstrua.

Copal is liable to be confounded with gum anime, when the latter is very clear and good. The distinction is of some consequence, as the anime, though valuable in varnishing, is much less so than the finest copal, the varnish with the former being darker coloured, and not so hard. Besides the external appearance of each, which is pretty distinct to a practised eye, the solubility in alcohol furnishes an useful test, the anime being readily soluble in this fluid, but the copal scarcely so.

COPALLI, in *Botany*, Hernand. See RHUS *copallinum*.

COPAR, in *Ancient Geography*, a village of Arabia Felix, according to Ptolemy.—Also, a place of Palestine, in the vicinity of Cæsarea Philippi.

COPARCENARY, the share, or quota, of a coparcener.

COPARCENERS, from *con*, and *particens*, *partner*; or *parceners*; such as have equal portions in the inheritance of their ancestor.

Coparceners are so either by *law*, or *custom*. Coparceners by *common law*, are the issue female; which, in default of a male heir, come equally to the lands of their ancestor: thus, when a person seized in fee-simple or in fee-tail dies, and his next heirs are two or more females, his daughters, sisters, aunts, cousins, or their representatives; in this case they shall all inherit, and these co-heirs are then called coparceners or parceners.

Coparceners by *custom*, are those who, by some peculiar custom of the county, challenge equal parts in such lands; as in Kent, by the custom of gavelkind, according to which lands descend to all the males in equal degree, as sons, brothers, uncles, &c. In either of these cases, all the parceners put together make but one heir, and have but one estate among them. Co. Litt. § 241, 242, 265; and 163. The crown of England is not subject to coparcenary.

COPARTNERSHIP. See PARTNERSHIP.

COPAS, in *Ancient Geography*, a river of Asia Minor, in Caria.

COPATZ, in *Geography*, a town in the island of Cherso; 8 miles N. of Cherso.

COPE, an ecclesiastical ornament, usually worn by chantors and sub-chantors, when they officiate in the church-sollemnity. It is also worn by the Romish bishops, and other ordinaries: it reaches from the shoulders to the feet. The ancients called it *pluviale*.

In the trial of archbishop Laud, one of the charges alleged against him was his introducing the use of copes and church music into divine worship. To this charge he replied,

plied, that the use of copes is prescribed by the 24th canon of 1603, which says, "that in all cathedrals and collegiate churches, the communion shall be administered on principal feast-days, sometimes by the bishop, if present, sometimes by the dean, and sometimes by the canon or prebendary, the principal minister using a decent cope;" so that in this respect he had made no innovation.

To this defence it was replied, that neither the common-prayer book, nor book of ordination, nor homilies confirmed by parliament, nor queen Elizabeth's injunctions in her first year, make any mention of copes, though they are evidently derived from the popish wardrobe; and the last common-prayer book of king Edward VI. expressly prohibits them. The 24th canon of 1603 enjoins only the chief minister to wear a cope at the administration of the sacrament, whereas the archbishop prescribed them to be worn by others besides the chief minister, and as well when the sacrament was not administered as when it was. But these canons not being confirmed in parliament, expired with king James, and therefore could be no warrant for their present use.

COPE, in *Biography*, a Flemish sculptor of the 16th century, who resided at Rome, and is celebrated by Baglione for the beautiful basso-relievos which he modelled, in a small size, from the Fables of Ovid; and which were afterwards cast in gold and silver, for the purpose of ornamenting the magnificent furniture of those times. The above-mentioned author informs us, that impressions from these beautiful models were generally dispersed and much admired at Rome. From Baglione's description of these works, we might be led to conjecture, that many of those small basso-relievos in bronze, which are usually attributed to Benvenuto Cellini, are no other than casts from these models of Cope. He is said to have succeeded in some small productions in ivory; and, ultimately, to have attempted a statue of a larger size in marble, which, however, after a long and fruitless labour, he left unfinished. He was not less remarkable for his talents, than for his morose and unfeeling disposition, and he died miserably at about the age of 80, in the pontificate of Paul V. Baglione.

COPE, *St. Martin's*, was a relic formerly in great esteem among the French kings; and was often carried with them to war as their standard.

COPE, among *Miners*, is a custom or tribute due to the king, or lord of the soil, out of the lead mines in some part of Derbyshire. This duty amounted, according to Manlove, to sixpence a load, nine dishes making one load.

COPECE, in *Commerces*, a Muscovite coin, valued at about a half-penny; so that 100 copecs are equal to a ruble, which is valued at an average at 4s.

COPE-STAKE, a German coin, valued at 12d. sterling.

COPENHAGEN (in Latin *Hafnia*, in Danish *Kiøbenhavn*, originally *Kiøbmansbyen*, the *Merchants' harbour*), in *Geography*, is the capital of the kingdom of Denmark, situated on the eastern shore of the island of Zealand, in a bay of the Baltic sea, about 24 English miles from the Sound. E. long. 12° 35' 15". N. lat. 55° 41' 4", 160 miles N. E. of Hamburg, and 240 S.W. of Stockholm. Its circumference is from 4 to 5 English miles.

In the 11th century Copenhagen was only a mean fishing place. It owed its increase to a castle, which protected its inhabitants against the numerous pirates who infested the Baltic sea. Leyre, or Letlra, of which some remains have been found near Roschild, had been the residence of the Danish kings till the year 950, when that distinction was bestowed on Roschild itself, from whence the seat of empire

was transferred to Copenhagen, in 1445, during the reign of Christopher of Bavaria. From that time the kings of Denmark have constantly resided at Copenhagen.

This city was always well fortified by nature and art, but the strong citadel of Fredericksbavn, between the harbour and the east gate, was only erected in 1663, previous to which time Copenhagen had often been attacked. In the year 1523 it was besieged by Frederick, duke of Gutorp, supported by a fleet from Lubeck, consisting of ten ships of war. Pressed by famine, and cut off from all hopes of relief, the citizens surrendered, after a close siege of seven months. Thirteen years after, when, on the death of Frederick, the inhabitants attempted to replace their old and favourite king Christian II. on the throne, Copenhagen underwent the same fate.

In 1658, Charles Gustavus, king of Sweden, having led his army over the ice, overran Denmark, and in the month of August appeared before Copenhagen, whilst his fleet blockaded the harbour. Bombs and red-hot balls were thrown into the city, but the fire was immediately extinguished by the activity of the inhabitants. However, in the month of October of the same year the Dutch fleet, under the command of admiral Opdam, came to the assistance of the besieged, defeated the Swedish fleet, and threw a large supply of provisions into the town. Charles Gustavus at length ventured a general assault in the night between the 11th and 12th of February 1659, when the ditches about the ramparts were thickly frozen. The chief attack was directed against the western rampart which the citizens and students defended with such obstinacy, that the Swedish monarch, giving up all hopes of taking the city, retired, and the year following concluded a peace. As a reward for their bravery, the citizens and students obtained privileges which they enjoy at this day.

During the reign of Frederick IV. in the year 1700, Copenhagen was again besieged on the land side by a Swedish army under the command of the renowned Charles XII. and on the sea side by the combined fleets of Holland, England, and Sweden. The Danish king was in Holsten, but the queen dowager, Charlotte Amalia, having animated the citizens and students to a brave resistance, neither the numerous Swedish army, nor the combined fleets, could make any impression on the town. The peace of Travendahl put an end to the siege, and Copenhagen enjoyed a complete century of uninterrupted peace.

On the 2d of April, 1801, the English vice-admiral, Nelson, with 11 ships of the line, 7 frigates, and 10 small vessels, attacked the line of defence before the port of Copenhagen, and, after a most obstinate engagement of three hours and a half, unfurled the white flag, took possession of 11 Danish ships, and, by an equally well-timed and skilful negotiation, detached Denmark from the maritime league into which she had entered with Russia and Sweden against England. The harmony between the two countries was restored, but continued only until the month of August 1807, when a strong English fleet encircled the island of Zealand, having previously disembarked an army of nearly 20,000 men, under the command of lord Cathcart, which invested Copenhagen by land. After a vigorous bombardment of five days and nights, during which Copenhagen made a defence worthy of the acknowledged bravery of the Danes, and the citizens and students displayed the most undaunted courage, a capitulation was agreed upon on the 7th of September, by which the English troops were allowed to take possession of the citadel for six weeks, and the whole Danish navy, consisting of 18 sail of the line, 15 frigates, 6 sloops,

and 25 gun-boats, together with all the stores of the naval arsenal of Christiansholm, were surrendered to the disposal of the king of Great Britain.

On this occasion Copenhagen suffered severely. In the night of the 4th of September the grand steeple of St. Mary's, or our lady's church, which was 380 feet high, and stood on the highest spot in the city, was set on fire, and after having blazed for four hours, fell with a most tremendous crash. From six to seven hundred buildings, besides those of the university and one hospital, were burnt to the ground; thousands were damaged, and no more than four hundred houses escaped unhurt. Several valuable libraries fell a prey to the flames, and five or six hundred peaceable inhabitants were killed or maimed.

Anciently, Copenhagen had often been visited by the plague. The last which raged, in 1711, swept away great numbers of the inhabitants. In more recent times, Copenhagen has been frequently exposed to terrible conflagrations. On the evening of the 20th of October 1728, a fire broke out in a low house, not far from the west-gate, which spread with such fury, that in eight-and-forty hours the most elegant part of the city was laid in ashes; 1650 dwelling houses, four churches, the university buildings, and several other public edifices were burnt down to the ground. On the 26th of February 1794, the church of St. Nicholas, and the royal palace of Christiansburg, the gorgeous magnificence of which is sufficiently attested by its stupendous remains, were destroyed by fire, and hardly had the private houses, which suffered in this dreadful calamity, been rebuilt, when another considerable part of the city was reduced to ashes in 1795.

These conflagrations contributed, however, to render Copenhagen one of the finest cities in the north. The houses, though mostly of brick, succeed, exhibit a beautiful and uniform appearance, the streets are furnished with lamps; well paved, with a foot way on each side, and running in a straight line; but some of the streets are rather too narrow.

Copenhagen is divided into the Old and New Town and Christianshafen. The *Kongens nye Torge*, or king's New Market, which connects the Old with the New Town, is a spacious, irregular area, embellished with an equestrian statue in bronze of Christian V., and adorned with several handsome buildings, among which are the palace of Charlottenburg, devoted in part to the Royal Academy of painting, architecture, and sculpture; and the theatre, which, though small, is neat and elegantly decorated within. In the New Town is a beautiful octagon, containing four uniform and elegant buildings, in two of which the royal family resided ever since the palace was burnt down. In the middle of the octagon stands an equestrian statue of Frederick V. in bronze.

Christianshafen is built on the island of Amack, and connected with the Old Town by two bridges. Besides the fine dock-yards, where the men of war are refitted, Christianshafen contains the great West India sugar house and the East India house. The island of Amack itself is considered as the kitchen garden of Copenhagen, and furnishes the same with greens, fruit, milk, butter, and cheese in abundance. It is 9 miles long and about $2\frac{1}{2}$ miles in breadth. It contains above 800 families or 4000 souls, and is divided into two parishes, Taarneby which is inhabited by Danes and Dutchmen, and Hollanderby inhabited only by the descendants of a Dutch colony, which king Christian II. transplanted hither from North Holland, in 1516, at the request of his wife Elizabeth, sister to Charles

V. who was a native of the Low Countries. The language of the inhabitants of Amack is still a mixture of Danish and Low Dutch. They have preserved their particular dress, manners, and customs. The men wear broad brimmed hats, black jackets, full glazed black breeches, loose at the knee; the women black jackets, red petticoats, and a piece of blue glazed cloth bound round their heads. There is a particular market place at Copenhagen for the peasants of Amack, called the Amacker market.

The harbour of Copenhagen, formed by the straits of Kellebos, between the islands of Zealand and Amack, is capable of holding 500 ships. It is protected by several batteries, of which that of the three crowns is the most formidable. The naval arsenal, called Christiansholm, is much superior to that of Venice. The forges, workshops, rope-walks, are upon an admirable construction. Each ship has her separate magazine, containing all the materials for her equipment. The seamen are registered and divided into two classes; those who in time of peace are permitted to serve on board the merchants' ships, or to enter into foreign service, subject to be recalled in case of war, and the stationary sailors who are always in the employ of the crown. The latter, 4000 in number, live in barracks at Copenhagen. The academy of marine cadets forms one of the places in the octagon of the New Town. It was founded in 1701, for the education of fifty young gentlemen, who are boarded and instructed gratis; but more are admitted, on paying, to share in their instruction. They have to pass through several severe examinations before they are entered as midshipmen in the king's ships.

Copenhagen is the chief commercial town of all Denmark. Its principal domestic trade is with Norway, Iceland, the Faro islands, and Greenland. Since the year 1754, the trade to the West Indies is free to all the Danish ports; yet Copenhagen receives, almost exclusively, the return cargoes from St. Croix, St. Thomas, and St. John. Copenhagen is also the seat of an East India Company, a Jiro Bank, an Insurance Company; and its extensive foreign trade is chiefly with Germany, the countries round the Baltic, and the Mediterranean seas, France, Portugal, and Spain. In the year 1792, Copenhagen had only 218 ships of about 24,000 tons, but during the long wars between France and England their number has been nearly doubled.

The most important manufactures of Copenhagen are the woollen cloth and stuff, the calico-printing, silk, and China manufacture. The latter, though in its infancy, is thought to rival those of Dresden and Berlin.

Copenhagen is the seat of an university founded in 1475. It is richly endowed, grants a support of 4 marks Danish, or nearly 3 shillings English, a week to 180 poor students, and since the year 1791 distributes eight premiums annually for the best answer to eight prize questions. There are four colleges, in which 168 students are provided with lodging, fire wood, and pecuniary stipends. The number of students is generally between five and six hundred.

Since the year 1742, several learned associations have been formed at Copenhagen, the oldest and most known of which is the Royal Society, whose researches have thrown great light on northern history. This society superintends also the geographical mensuration of the country, and the publication of new special maps. It proposes four questions annually, and the prize for each is a gold medal worth twenty pounds sterling. But besides the Medical Society, founded in 1772, that of Icelandic literature, founded in

1779, and that of natural history, founded in 1789, the most important is the Royal Economical Society, founded in 1768, whose annual income of 6000 dollars, or 1200*l.* sterling, is expended in promoting the fine arts, fisheries, agriculture, and horticulture, and in encouraging every attempt that tends to benefit the country. It is now endeavouring to establish a regular importation of coals from the Faro islands. There is also a board of longitude and a repository for marine charts, founded in 1784, which has published excellent charts of the entrance of the Sound, of the two Belts, the Sound and the Baltic as far as Bornholm, of the Categat, of part of the western coast of Iceland, of part of the eastern coast of Iceland, of the Faro islands, and six charts of the coast of Norway. Copenhagen has likewise acquired some celebrity from its royal museum or cabinet of curiosities remarkable for Laplandish dresses, implements, and arms; from its excellent theatre of anatomy, founded in 1736, and from its public royal library, which, in 1797, was increased with the celebrated Suhm's library of 50,000 volumes, collected by himself, and relating chiefly to the antiquities of northern Europe.

There is only one theatre at Copenhagen, which is partly supported by the court. During the year 1806, it brought out nine translated pieces, and only one original Danish comedy. The performances of the season amounted to 158. There has been no Italian opera of late; only occasionally, and for a short time, German and French plays are performed by itinerant companies.

Copenhagen is the seat of a supreme tribunal, which is the highest court of justice for all the Danish dominions. Its sittings are opened with great solemnity in the beginning of March, on the ancient *Herredag* or *Daneboev* (meeting of parliament) by the king himself. And besides the inferior courts of justice there are *boards of conciliation*, or rather *conciliatory committees*, whose duty it is to accommodate matters between the parties by all possible means of persuasion. If an accommodation takes place, the expenses are very trifling, and the parties are bound to abide by it. From the 13th of August, 1795, when the first conciliatory committee was established at Copenhagen till the 31st of December 1801, 13,223 litigations were prevented at Copenhagen only in the course of six years and a half.

The bishop of Zealand, who is first in rank among the twelve bishops, of whom the Danish hierarchy is composed, resides at Copenhagen, which, besides the cathedral, counts 20 churches, one French protestant church, and several synagogues for the Jews, whose number amounts to 1500. They are most liberally treated at Copenhagen, and there is even a society established by Christians for the purpose of encouraging the instruction of Jews in arts and handicraft-trades.

In 1714, Frederick IV. established at Copenhagen a board of missions or *Collegium de Curfu evangelii promovendo*, which sends missionaries to Greenland, and to the East Indies. The latter are also supported in part by contributions collected at London. In the beginning of 1807, Copenhagen, with its suburbs, counted 3156 houses, and 104,000 inhabitants. The registers for the year 1806, gave 3440 born, 3109 dead, and 930 couples married. In 1799, Copenhagen counted only 82,608 inhabitants, one-sixteenth, or 5163, of whom were paupers. Yet no beggars are seen in the streets. A board of alms watches over the poor, who are provided for by voluntary contributions. Copenhagen has twenty-two hospitals, and thirty poor-houses. In 1802, the principal infirmary admitted 2349 patients, 1813 of whom were cured, 218 died, and 318 remained in the

house. The naval hospital, or *Quaesch-bouise*, contains 302 invalid sailors.

The police at Copenhagen is vigilant and good. A paper published weekly, under the title of the *Friend of the Police*, has particularly contributed to render the police excellent, by pointing out the most minute objects with regard to which it was thought deficient. Since the year 1804, the prisons have been rendered much more comfortable. They are all wainscotted and boarded, provided with bedsteads, blankets, and mattresses; and no person, whatever may be his crime, is ever confined in a dungeon or cellar. In the Rasp-house, where capital offenders are shut up for life, the male convicts rasp and saw Brazil wood, the females spin, and thus they all contribute towards their support by their labour. There is also a board of health, and a committee for promoting vaccination, under whose superintendance 6489 individuals were inoculated for the cow-pox at Copenhagen, in the course of the year 1802.

Copenhagen is surrounded with country seats, which offer the most enchanting sea-views. Its environs are beautiful, the country being finely varied with small forests of beech and oak. Of the former-palaces in its neighbourhood, *Fredericksberg* is the most remarkable for its delightful situation.

Without the western gate, close to Copenhagen on the high road, stands an interesting monument in commemoration of the emancipation of the peasants, which was effected under the present king. Four figures of white marble, representing peace, plenty, content, and industry, occupy the four corners of a pedestal, from the centre of which rises a pyramid. On one side of the base are these words: "For Christian den syvende de Danikes og Norges Konge af eenige og taknemmelige Borgere." To Christian the Seventh king of the Danes and Norwegians from united and grateful citizens; and on the other, "Grund steenen blev lagt af Frederik kongens son, folkets ven 1792." The foundation stone was laid by Frederic the king's son, the friend of the people.

A. Anderson's Tour in Zealand, in the year 1802. Busching, I. 85. Coxe's Travels, fifth edition, vol. v. p. 97. Cateau's Tableau du Danemarck. Sir John Carr's Northern Summer, p. 42. Fr. Thaarup's Statilik der Dänischen Monarchie. 1796.

COPERARIO, GIOVANNI, or JOHN COOPER, in *Biography*, an English musician, who, having resided for some time in Italy, on returning to his native country, Italianized his name, and became a favourite performer on the lute and viol du gambe, and a voluminous composer of *fantasie*, fancies, for viols, in three, four, five, and six parts. He was appointed music-master to the children of James I.; and prince Charles, under his instruction, made a considerable progress on the viol. Some of his vocal compositions were printed in the musical publications of the times. In conjunction with Nicholas Laniere, and others, he composed the songs in a *Malque*, written by Sir Thomas Campion, on the marriage of Carr, earl of Somerset, and lady Frances Howard, the divorced countess of Essex, which was performed in the Banqueting Room at Whitehall, on St. Stephen's night, in the year 1604. Mr. Fenton, in his notes on Waller, says, that Henry Lawes, having been educated under him (Coperario), "introduced a softer mixture of Italian airs than had before been practised in this country;" from which, and from his giving him the title of *Signor*, he seems to intimate, that he regarded him as an Italian. The following are the titles of his printed works, exclusive of the songs which he composed in conjunction
with

with Lanieri: "Funeral Tears for the Death of the Right Hon. the Earl of Devonshire, figured in seven Songs, whereof six are so set forth that the Wordes may be expressed by a treble Voyce alone to the Late, and base Viol, or else that the meane part may be added, if any shall effect more fullnesse of parts." The seventh is made in forme of a Dialogue, and cannot be sung without two Voyces. Invented by John Coperario." Fol. London, 1606. 2. "Songs of Mourning, bewailing the untimely death of Prince Henry, worded by Thomas Campion, and set forth to be sung with one Voyce to the Lute or Violl, by John Coperario." Fol. Lond. 1613.

COPERNICAN SPHERE. See SPHERE.

COPERNICAN System, is that system of the world, wherein the sun is supposed at rest in the centre; and the planets, with the earth, to move in ellipses round him.

The heavens and stars are here supposed at rest; and that diurnal motion which they appear to have from east to west, is imputed to the earth's motion from west to east.

This system was asserted by many of the ancients; and particularly Ephantus, Seleucus, Aristarchus, Philolaus, Cleantes Samius, Nicetas, Heraclides Ponticus, Plato, and Pythagoras; from the last of whom it was anciently denominated the *Pythagoric system*.

It was also held by Archimedes, in his book *De Granorum Arææ Numero*; but after him it became neglected, and even forgotten, for many ages; till above three hundred years ago, when Copernicus revived it; from whom it took the new name of the *Copernican system*. See COPERNICUS.

COPERNICUS, NICHOLAS, or rather COPERNICK, in *Biography*, the celebrated astronomer, was born at Thorn in Prussia, near the Old Gate, on the 19th of February, 1473, in a house which was still extant in 1797, and shewn to strangers as one of the greatest curiosities of that town. His father was a surgeon; his mother's brother, *Lucas Walzelrodt*, or, as he is sometimes called, *Waissbrodt Von Alten*, was, some years after young Copernicus's birth, raised to the dignity of bishop of Ermeland, in Latin, *Episcopus Warmiensis*: which circumstance has betrayed most of the English biographers into a singular mistake. They make Copernicus canon of Worms, in the south of Germany, instead of Frauenburg in Prussia, which is the see of the bishops of Ermeland.

Copernicus received his first instructions in the grammar school of his native city, from whence he was sent to study physic at the university of Cracow, where he gained the academical honour of a doctor's diploma. But he never practised as a physician, though he readily gave his advice, and his medicines, without any fee, to those friends who consulted him. Mathematics were his favourite study; and he took particular delight in the study of perspective; and this induced him to acquire the art of painting, in which he is said to have excelled. From the infant he had heard Albert Brudzewius's mathematical lectures at Cracow, he was fired with the nobleness of emulating the two greatest mathematicians of his time, George Parbach, an Austrian, and John Regiomontanus, a native of Königsberg, in the Newmark of Brandenburg. To accomplish this arduous design, he went to Italy, and was at first the pupil, but soon became the friend and assistant, of Dominicus Maria, of Ferrara, who was then teaching mathematics at Bologna, and whose hypothesis about the variability of the axis of the globe, by exciting universal attention, gave Copernicus the first ideas of the motion of the earth. At Bologna, in the year 1497, Copernicus first observed the occultation of Pallas by the moon.

He left Bologna to teach mathematics at Rome, where he observed an eclipse of the moon in the year 1500; and such was his dawning celebrity, that, even after his return to Prussia, he was consulted by the clergy of Rome, in the year 1515, respecting the improvement of the calendar. In the mean time his uncle, the bishop of Ermeland, had made him a canon of the chapter of Frauenburg; and the town of Thorn had named him to the archdeaconry of the church of St. John: yet he seldom lived in his native city, but made Frauenburg his principal residence. Zealously attached to the tenets of his church, he fulfilled the duties of his clerical offices with punctual care. The glorious Reformation, which he witnessed, had no influence on his religious opinions: his mind pursued a different track. Drawing and painting, the study of perspective, and the making of mathematical instruments, filled his leisure hours; and besides his regular avocations, the construction of some aqueducts absorbed his time. That which feeds the mill of Graudentz with water has been completely preserved; of another, which supplied the mill of Frauenburg, on which the canons reside, nothing remains but the tower on the banks of the Passarge, to the top of which he raised the waters of that river, and which exhibits still the following inscription:

"Hic patiuntur aquæ sursum preparare coactæ,
Ne careat sitiens Incola montis ope,
Quod natura negat tribuit Copernicus arte,
Unum pro cunctis fama loquatur opus."

Whenever the bishop was absent, Copernicus was entrusted with the government of the diocese; and after the death of two prelates, he was appointed general vicar during the vacancy. He was also frequently deputed to the provincial diets. Nothing, however, could divert him from his original purpose. He applied his stores of mathematical knowledge to the improvement of astronomy. The garret of his house at Frauenburg, which is still shewn, and the steeple of the cathedral, were his observatories. The epicycles and eccentrics of Ptolemy embarrassed and perplexed him; but the hypothesis of the earth being the motionless centre of the universe, was generally received: it had been adopted by Plato and Aristotle, whose authority was considered paramount to that of the bible; and Joshua's command to the sun and moon confirmed it. To attack this system was incurring the imputation of heresy; and it required no ordinary courage to advance an opinion, for which Galileo suffered a century after.

In this perplexity, Copernicus assiduously searched the lore of antiquity. He found that the Egyptians taught the revolution of Mercury and Venus about the sun; that Apollonius and Pergæus had assigned the same motion to Mars, Jupiter, and Saturn; that, according to his disciples, Nicetas and Heraclides, Pythagoras, whose learning was derived from the Egyptians, asserted the earth's motion round its own axis; and that Aristarchus and Philolaus went still farther, and maintained that the earth did not only move about its axis, but employed twelve months in revolving round the sun.

On these foundations Copernicus reised a structure, of which his intense and acute study furnished him with the most correct mathematical evidence. According to his system, the sun occupies the centre of the universe; the planets, in their motion round him, describe ellipses proportioned to their size; Mercury moves round the sun within three months, Venus within eight, the earth within twelve, and within four-and-twenty hours it revolves round its own axis; the moon is a satellite of the earth, about which she turns thirteen

thirteen times in a year; Mars takes two, Jupiter almost twelve, and Saturn nearly thirty, years to move about the sun.

It was in the year 1530 that Copernicus laid the last hand to his system, which he had begun to form about the year 1507; but he had not yet ventured to launch it into the learned world, when its fame reached the bishop of Capoua, cardinal Nicholas Schönberg, who, in 1534, by a letter which does honour to his sentiments, invited Copernicus to publish his new system. Other great men, particularly Tindemann Giese, bishop of Culm, assailed him with their in-treaties to the same purpose. But his modesty was still resisting their pressing application, when Rheticus, professor of mathematics at Wittenberg, excited by an ardent thirst of learning, resigned his chair, and visited Copernicus at Frauenburg, in the year 1539. To him Copernicus at last trusted his work, which, in 1543, was printed at Marienburg, at the expense of cardinal Schönberg, under the title of "Nicolai Copernici de Revolutionibus Orbium Cœlestium, Libri vi." But he did not live to read his book in print. A copy of it reached him only a few hours before his death, which happened at Frauenburg, on the 22d of May, 1543, three months and three days after he had entered the seventy-first year of his age. He was probably buried at the foot of the altar before which he used to celebrate mass; for, 38 years after his death, Cromerus, bishop of Ermeland, caused the following inscription to be placed on his tomb-stone, which is now shewn in the chapter's room:

D. O. M.

R. D. Nicolai Copernico Torunenſi,
Artium et Medicinæ Doctõri, Canonico Varmienſi,
Præſtanti Aſtologo et ejus Diſciplinæ inſtauratori,
Martino Cromero Epifcopo Varmienſi,
Honoris et ad Poſteritatem Memoriz Cauſa poſuit,
MDLXXXI.

Others pretend that Copernicus, having requested to be interred near his relations, was buried at Thorn, in the church of St. John, where he is represented in his canonical dress, kneeling before a crucifix, and a globe on his side, with this inscription:

"Non parem Pauli gratiam requiro,
Venian Patri neque poſco, ſed quam
In crucis ligno dederas Latroni, ſedulus oro."

Nicolai Copernico Thorunenſi abſolutæ ſubtilitatis mathematico, ne tanti viri, apud exteros celeberrimus, in ſua patria periret memoria hoc monumentum poſitum. Mort. Varmiz in ſuo Canoniceatu, anno 1543, die 4, ætatis LXXXIII.

This painting was renovated, in the year 1733, by a postmaster of Thorn, named Rubinkowki. A print of it may be ſeen in Hartknock's Ancient and Modern Prussia.

It is ſuppoſed that Copernicus's manuſcripts were depoſited at Braunſberg, in the Jeſuits' library, with the books of which they may have been removed to Sweden by Charles XI. Whether they be ſtill extant in that country is uncertain. Ludwig von Bazcko's Kleine Schriften, 1797, vol. ii. p. 135. Gaſſendi Opera, vol. v. p. 499. Bernoulli's Travels, vol. iii. p. 18.

See the order and diſpoſition of the heavenly bodies, as laid down by him, compared with thoſe in the other ſystems, under the head SYSTEM.

This ſystem has been eſtabliſhed by new arguments advanced by Kepler, Galileo, and Newton, in every ſucceeding age; and notwithstanding the oppoſition it met with, from the prejudices of ſenſe againſt the earth's motion, the au-

thority of Aristotle in the ſchools, the threats of ignorant bigots, and the terror of the inquisition, it has generally prevailed. Galileo, after having demonſtrated the motion of the earth, was obliged, by the rancour of the Jeſuits, to go to Rome, and there ſolemnly renounce it. Beſides which cruel treatment, he was condemned to a year's imprisonment in the inquisition, and the penance of repeating daily ſome penitential plalms. As a ſpecimen of the authority of the Romiſh church in oppoſition to this ſystem, we ſhall only tranſcribe the declaration of the excellent commentators, Le Seur and Jaquier, on the Principia, prefixed to the third volume. "Newtonus in hoc tertio libro telluris motu hypotheſim affumit. Autoris propoſitiones aliter explicari non poterant, niſi eadem quoque facta hypotheſi. Hinc alienam coacti ſunus gerere perſonam. Cæterum lætis a ſummis pontificibus contra telluris motum decretis nos obſequi profitemur."

COPERNICUS is the name of an aſtronomical inſtrument, contrived by Mr. Whiſton, for the calculation and exhibition of eclipses, and of the motions of the planets, both the primary and ſecundary ones, &c.

It was ſo called by the inventor, as being conſtructed on the Copernican ſystem; or as repreſenting the heavenly bodies agreeable to it. It conſiſts of ſeveral concentric circles of wood; upon which are inſcribed numbers, tranſferred hither from the aſtronomical tables: by the various diſpoſitions of theſe circles, which are made fo as to ſlide within each other, queſtions are ſolved; and thus long calculations are ſaved, and the work of many hours brought into a few minutes.

For the exhibition of eclipses there is a peculiar apparatus, conſiſting of a terreſtrial globe, ſo diſpoſed, as that, being turned round its axis, the light of the ſun, or a candle, is projected through a glaſs plane, marked out into concentric circles, expreſſing digits of the eclipse: and thus is the path of the eclipse, with its degree or quantity in any part of its path, agreeably and accurately repreſented.

The inſtrument not being very common, a particular deſcription would be ſuperfluous. The author of it has written a book to explain it.

COPHANTA, in *Ancient Geography*, a port of Carmania.

COPHANTUS, a mountain of Aſia, placed by Pliney in Baſtriana.

COPHENES, a river of India, which ran between Alexandria, and the firſt ſcene of the military operations of Alexander, and which, as major Rennell conjectures, occurred pretty early in his march. In Alexander's arrangement of boundaries, the river Cophenes was the eaſtern limit of the province of Paropamiſus, of which Alexandria was regarded as the capital; and that province, according to the ideas of Ptolemy, lay between thoſe which the moderns name Korafan and Cabul. The major therefore concludes, with ſome degree of confidence, that the river "Cow" of the Turkiſh geography, and the "Cow-mull" of Baber, which paſſes by Nughz, and whole principal branches are the rivers of Ghizni and Gurdaiſ, is the Cophenes; and that we muſt look for Alexandria in the quarter of Bamian, though it is not poſſible to aſſign its particular ſituation. At all events, the proximity of Alexandria to the northern mountains, a fact which Arrian impreſſes very ſtrongly, renders it an impoſſible caſe, that Alexandria and Candahar can be one and the ſame place. Leaving Alexandria, at the foot of Caucasus, Alexander came to the river Cophenes, and paſſed it in the higher part of its courſe. From Cophenes, Hephæſtion and Perdicæus, with a ſtrong

a strong detachment, were sent into the country of Pene-laitis (Arrian) or Pucolaitis (Strabo) near the Indus. Alexander marched from the banks of the Cophenes against the Alpii, Thyraei, and Arafaci, nations, whose situations and modern names are unknown, but supposed by Rennell to be inferior divisions of the modern Cabul, and situated between the rivers of Ghizni and Cabul, at the height of Irjab and Dulkah. In his march to Arigeus, Alexander crossed two rivers, the "Choe" and "Euafla," and defeating the Asprians in a pitched battle, near the latter, passed through the territories of the Gurezi, and crossed the river of the same name (see CUREUS). The Choe and Euafla may be two of the five rivers of the Lumphanat. It is very difficult to determine the length of Alexander's march from the Cophenes to the Gurezi; but it might possibly be 100 road miles. As Alexander had crossed the Indus, probably at Attock, when he came to the bridge (which was completed before his arrival), he made an excursion by land into the country adjacent to the western bank of the Indus, in order to view the city of Nyfa (supposed by M. d'Anville to be Nughz, or Nagaz, the Nagara, or Dionysopolis of Ptolemy); and he is then said to have entered the country, that lay between the two rivers, Cophenes and Indus. Admitting that the Cophenes is the river that runs by Nughz, and falls into the Indus, 30 or 35 miles below the city of Attock, and as the river Cabul joins the Indus in front of the city of Attock, it is clear that, till he came opposite to that city, he could not be between the Cophenes and Indus. And if it be said, that the Cabul river was the Cophenes, he had all along been between the Cophenes and Indus; and Arrian's words could have no meaning. Upon the whole we may conclude that the ancient Cophenes was the same with the modern *Cow*, which see. Rennell's Memoir, p. 170, &c.

COPHOS, a place of Greece, in Attica, situated before Piræa.

COPHOSIS, in *Medical Writers*, is used for deafness, whether beginning, or perfect, or from what cause soever.

The word is derived from κωφω, *I am deaf*.

COPHRANTA, or COPHANTA, an ancient town of Asia, in Carmania. Ptolemy.

COPHSIS, SAMUEL, in *Biography*, a learned Jewish Rabbi of Spain in the eleventh century, was a native of Cordova, and published a commentary on the Pentateuch, the manuscript of which is still extant in the Vatican library. Those who have examined it commend it as an excellent work, except that it too much abounds with allegories. The author died A. D. 1034.

COPHTI, COPTES, or COPTS, a name given to the Christians of Egypt; who are of the sect of Jacobites.

They derive the latter appellation from the learned Jacobus Zanzalus, bishop of Edessa, who, when the Coptic party had sunk in number and credit, appeared in defence of the Monophysite doctrine; and by his writings, as well as indefatigable travels through most parts of the East, succeeded to such a degree in reviving and disseminating it, that he hath been revered and esteemed by the whole sect, which, from respect to him have assumed the name of Jacobites: though the other Christians, as well as the Turks, call them by their old name Copts. By way of contempt some have called them "Kusti" or Girdlers, thus intimating that they are Christians only from the girdle upwards, but bear the fear of Judaism below it.

The critics are extremely divided about the origin and orthography of the word: some write it *Cophiti*, others *Cophitites*, *Cophitite*, *Copti*, &c. Scaliger derives the name

from *Coptos*, an anciently celebrated town of Egypt, the metropolis of the Thebaid, whither they retired from the tyranny of the Greeks. Kircher refutes this opinion, and maintains, that the word originally signifies *cut* and *circum-scribed*; and was given these people by the Mahometans, by way of reproach, because of their practice of circumcising; but P. Sollier, another Jesuit, refutes this opinion. Scaliger afterwards changed his opinion, and derived the word from ΑΙΓΥΠΤΟΣ, the ancient name of Egypt, by retrenching the first syllable; but this opinion, too, P. Sollier disputes. Volney, concurring in opinion with Scaliger, observes, that the Arabic term *Kobti*, a Copt, seems to be an evident abbreviation of the Greek word *Ai-goupti-os*, an Egyptian; for the *y* was pronounced *ou* among the ancient Greeks; and the Arabs, having neither *p* nor *g* before *a*, *o*, *u*, always substitute for those letters *b* and *t*. John de Leo and others say, that the Egyptians anciently called their country *Elebitis*, or *Cibit*, from Cibth their first king, whence *Cophitite*. &c. others say from Cobth second king of Egypt. Vansleb derives the word *Cophi* from Copt, son of Miraim, grandson of Noah. All these etymologies P. Sollier rejects, on this principle, that were they true, the Egyptians ought all equally to be called *Cophiti*; whereas, in effect, none but the Christians, and among those none but the Jacobites, bear the name; the Melchites not being comprehended under it. Hence he chooses to derive the word from the name *Jacobite*, by retrenching the first syllable; whence *Cobite*, *Cobea*, *Copta*, and *Coptita*.

Several families of these Copts are to be found in the Delta; but the greatest number inhabit the Said, where they in some places occupy whole villages. Both history and tradition attest their descent from the people who were conquered by the Arabs, that is, from that mixture of Egyptians, Persians, and, above all, Greeks, who, under the Ptolemies and the Constantines were so long in possession of Egypt. Their name, according to the etymology given of it by Scaliger and by Volney, seems to indicate that they are the remains of the ancient Egyptians; and this is the more probable, since we find them in the Said before the time of Diocletian; and it is certain the Greeks were less numerous in the Said than in the Delta. This opinion of their origin is rendered still more probable, by considering the distinguishing features of this race of people; and they are found to be all characterized by a sort of yellowish dusky complexion, which is neither Grecian nor Arabian; they have all a puffed visage, swollen eyes, flat noses, and thick lips, or, in short, the exact countenance of a Mulatto. Volney, when he saw the figure of the sphinx, and observed its features to be precisely those of a negro, recollected the remarkable passage of Herodotus, in which he says, (lib. ii.) "For my part, I believe the Colchi to be a colony of Egyptians, because, like them, they have black skins and frizzled hair." Hence he concludes, that the ancient Egyptians were real negroes, of the same species with all the natives of Africa; and though, as we might naturally expect, after mixing for so many ages with the Greeks and Romans, they have lost the intensity of their first colour, yet they still retain strong marks of their original conformation. "How are we astonished," says Volney, "when we behold the present barbarism and ignorance of the Copts, descended from the profound genius of the Egyptians, and the brilliant imagination of the Greeks; when we reflect that to the race of negroes, at present our slaves, and the objects of our extreme contempt, we owe our arts, sciences, and even the very use of speech; and when we recollect that, in the midst of those nations who call themselves the friends of liberty and humanity, the most barbarous of slaveries is just-
ned

tified; and that it is even a problem, whether the understanding of negroes be of the same species with that of white men!" The language formerly spoken by the Copts furnishes another argument in favour of the origin above ascribed to them. On the one hand the form of their letters, and the greater part of their words, demonstrate that the Greek nation, during the thousand years it continued in Egypt, has left deep marks of its influence; but, on the other, the Coptic alphabet has five letters, and the language a number of words, which are to be considered as the remains of the ancient Egyptian. These, when critically examined, have a sensible analogy with the dialects of the ancient neighbouring nations, such as the Arabs, Ethiopians, Syrians, and even those who lived on the banks of the Euphrates; nor can it be doubted that all these languages are derived from one common stock. For upwards of three centuries, that of the Copts has fallen into disuse. The Arabs, disdain the language of the nations they subdued, imposed on them, together with their yoke, the necessity of learning that of their conquerors. This obligation became even a law, when, about the end of the first century of the Hegira, the Caliph Waled I. prohibited the Greek tongue throughout his whole empire. From that time the Arabic became universal; and the other languages, confined to books, subsisted only for the learned, who neglected them. Such has been the fate of the Coptic. The priests and monks no longer understand it, in their scriptures and books of devotion in which alone it exists.

Mr. Browne, a late traveller in Africa, (p. 71.) does not admit this hypothesis of Volney; for he observes, that the Copts, or original inhabitants of Egypt, have no resemblance of the negro features or form; though they have some peculiarities of feature common to them all. Their hair and eyes are of a dark hue, and the former is often curled; but not in a greater degree than is occasionally seen among Europeans. The nose is often aquiline; and though the lips be sometimes thick, they are by no means generally so; and on the whole, a strong resemblance may be traced between the form of visage in the modern Copts, and that presented in the ancient monuments, paintings, and statues. Their complexion, like that of the Arabs, is of a dusky brown; it is represented of the same colour in the paintings, seen by Mr. Browne in the tombs of Thebes. The Coptic women have interesting features, large black eyes, and a genteel form.

The Copts differ from the Arabs by their religion, which is Christianity, and which they embraced at an early period; but they are again distinct from other Christians by their opinions, which are those of the Eutychians or Monophysites. Their adherence to these opinions has exposed them to the persecution of the other Greeks, and thus they are rendered irreconcilable enemies. When the Arabs conquered the country, they took advantage of these animosities, to enslave them both. The Copts, however, have at length expelled their rivals; and as they have been always intimately acquainted with the interior of the country, they are become the depositaries of the registers of the lands and tribes. Under the name of "Writers," they are at Cairo the intendants, secretaries, and collectors of government. These writers, despised by the Turks whom they serve, and hated by the peasants whom they oppress, form a kind of separate class, the head of which is the writer to the principal Bey. He disposes of all employments in that department, which, according to the spirit of the Turkish government, he bestows on the best bidder.

The Copts endured many severities, and were reduced

to extreme poverty and distress by the intolerance and persecution of the Greeks; but when Amron invaded Egypt, A. D. 658, the Copts availed themselves of the opportunity which was afforded by their voluntary submission to the conqueror for retaliation on their persecutors. The Saracens were received by them as the deliverers of the Jacobite church; and during the siege of Memphis a secret and effectual treaty was opened between a victorious army and a people reduced to the most abject distress and bondage. "The Greeks," said Mokawkas, a rich and noble Egyptian, connected with the Coptic sect, in his first conference with Amron, "are determined to abide the determination of the sword; but with the Greeks I desire no communion, either in this world or in the next; and I abjure for ever the Byzantine tyrant, his synod of Chalcedon, and his Melchite slaves. For myself and my brethren, we are resolved to live and die in the profession of the gospel and unity of Christians. It is impossible for us to embrace the revelations of your prophet; but we are desirous of peace, and cheerfully submit to pay tribute and obedience to his temporal successors."

The tribute was ascertained at two pieces of gold for the head of every Christian; but old men, monks, women, and children, of both sexes, under 16 years of age, were exempted from this personal assessment; the Copts above and below Memphis swore allegiance to the caliph, and promised an hospitable entertainment of three days to every muselman who should travel through their country. By this charter of security, the Copts obtained a triumph over their enemies, and the sacred edifices, with the patrimony of the church, were restored to the national communion of the Jacobites, who enjoyed without moderation the moment of triumph and revenge. From the superiority thus acquired, and the conduct by which it was obtained, and by which it was succeeded, proceeded that permanent and invincible animosity, which hath subsisted between the Copts and the Greeks ever since their subjection to the Turks; and which the Romish missionaries have endeavoured to terminate, by using every method likely to reconcile both these sects to the church of Rome. In the 17th century attempts were made for uniting the Monophysites of Asia with the Romish church, and they were attended with a partial and temporary success; but the African Monophysites, and more especially the Copts, notwithstanding that poverty and ignorance which exposed them to the seductions of sophistry and gain, maintained their principles with firmness, and made an obstinate resistance to the promises, presents, and attempts, employed by the papal missionaries to bring them under the Roman yoke. The Copts, ever since the Saracenic conquest above-mentioned, have had churches, priests, bishops, and a patriarch, who fixed his seat of residence at Cairo, when that city became the capital. In their worship they blend a number of superstitious customs, which have been transmitted to them from their ancestors and which they obstinately retain. In other respects, says Savary (Letters on Egypt, vol. ii.) the Copts are gentle, humane, and hospitable. Paternal tenderness and filial love constitute the happiness of their families. They honour and cherish all the ties of blood. The internal commerce, the art of hatching chickens, and that of bringing up bees, form almost their only science. They often acquire considerable wealth in the management of the affairs with which they are entrusted, but they are never allowed to enjoy the fruit of their labours in tranquility. The Bey, who sees their opulence, strips them without pity;—happy if they can secure their lives by the sacrifice of their fortune. These vexations, however, never excite them to revolt.

Their want of energy keeps them chained down to servitude and misery, which they endure without murmuring. Mr. Browne represents the Copts as an acute and ingenious people, who get money steadily without ostentation, considering, that, under an arbitrary government, obscurity is safety. In their temperament, he says, they are melancholic, but, if called into action, industrious and laborious. However, they are fond of their distilled liquors, and rather licentious in their amours. They are zealous in their faith, this writer adds, and their ecclesiastics are numerous. The populous city of Cairo, as we have said, affords a residence, or rather a shelter, for their indigent patriarch, and a remnant of 10 (some say 12 or 13) bishops; 40 monasteries have survived the depredations of the Arabs; and the progress of servitude and apostacy has reduced the Coptic nation to the despicable number of twenty-five or thirty thousand families; a race of illiterate beggars, whose only consolation is derived from the superior wretchedness of the Greek patriarch and his diminutive congregation.

The Coptic patriarch, though he resides at Cairo, takes his title from Alexandria; and the body of the inferior clergy, whether secular or regular, is composed of the orders of St. Antony, St. Paul, and St. Macarius, who have each their monasteries.

Besides the orders of priests, deacons, and subdeacons, the Copts have likewise archimandrites, the dignity whereof they confer with all the prayers and ceremonies of a strict ordination. This makes a considerable difference among the priests; and besides the rank and authority it gives them with regard to the religious, it comprehends the degree and functions of archpriests. By a custom of about seven hundred years, if a priest elected bishop be not already archimandrite, that dignity must be conferred on him before episcopal ordination.

The second person among the clergy, after the patriarch, is the titular-patriarch of Jerusalem, who also resides at Cairo, because of the few Copts at Jerusalem; he is, in effect, little more than the bishop of Cairo: only he goes to Jerusalem every Easter, and visits some other places in Palestine near Egypt, which own his jurisdiction.

To him belongs the government of the Coptic church, during the vacancy of the patriarchal see.

To be elected patriarch, it is necessary the person have lived all his life in continence: it is he confers the bishoprics. To be elected bishop, the person must be in the celibate; or, if he have been married, it must not be above once.

The priests and inferior ministers are allowed to be married before ordination; but are not obliged to it, as Ludolphus erroneously observes. They have a great number of deacons, and even confer the dignity frequently on children. None but the lowest rank among the people commence ecclesiastics; whence arises that excessive ignorance found among them: yet the respect of the laity towards the clergy is very extraordinary. Their office is longer than the Roman office, and never changes in any thing: they have three liturgies, which they vary occasionally.

The monastic life is in great esteem among the Copts; to be admitted into it, there is always required the consent of the bishop. The religious Copts make a vow of perpetual chastity; renounce the world, and live with great austerities in deserts: they are obliged to sleep in their cloaths and their girdle, on a mat stretched on the ground; and to prostrate themselves every evening a hundred and fifty times, with their face and breast on the ground.

They are all, both men and women, of the lowest class of the people; and live on alms. The nunneries are properly hospitals; and few enter but widows reduced to beggary.

The present habitation of the Coptic cenobites is situated in the desert of Nitria, called also after the name of a famous saint denominated Macarius, and is distinguished by the appellation of "Zaidi el Baramous," and called by the Arabs, "Kastr Zaidi." It is an enclosure of high walls without any gate, unless that name should be given to a small wicket, which is opened only twice or thrice in the course of a year. Persons entering or leaving it are hoisted up and lowered down by means of a strong rope and a pulley. The building is entirely constructed of soft calcareous stones, several of which contain fossil shells. Within the walls there is a kind of small fort, surrounded by ditches, over which is built a drawbridge. Here the monks retire, when the Arabs succeed in forcing the outer walls. In this little fort are a church, a cistern, and provisions; in short, every thing for enabling the monks to sustain a long siege. Here they also keep their books, written in the Coptic language; which they cannot on any consideration be prevailed on to part with, although they never read them, and suffer them to lie on the ground, eaten by vermin and covered with dust. The cells of the monks are vaulted and very low, and are indeed no better than a sort of dens, not unsuitable to the ignorant and slothful wretches who inhabit them. The church is simple in its construction, and has no other ornament besides a few ostrich's eggs, and bad pictures of saints. It is impossible, says Sonmini, (Travels in Upper and Lower Egypt, p. 354.) to give an idea of the confusion that sometimes prevails in their church: they often know not what they are to sing; one will have a particular anthem or psalm, and another a different one: they then dispute and come to blows; in the mean time a third chants a prayer, which is followed by the choir, and thus the quarrel terminates. Their singing consists of Turkish and Arabic airs, accompanied by cymbals, the noise of which, mixed with their squalling voices, and their discordant music, makes the church re-echo with a medley of jarring sounds. The priest celebrates mass with water. They consecrate common bread; which the priest cuts in pieces and mixes with water, which is likewise consecrated. This makes a kind of soup, of which he eats a few spoonfuls; and afterwards administers the sacrament, also with a spoon, to all that are present. After the communion the priest washes his hands, and standing at the door of the chancel, extends them to stroke the face of every one who passes. During mass, the priest also blesses little loaves which are distributed at the close of the service. The priest who celebrates mass is dressed in a kind of white shirt, made with a cowl, and covered with little crosses. During the other prayers, he only wears a large fillet of white linen, with similar little crosses, half twisted round his head in the form of a turban, with the two ends hanging down before and behind. In this convent there were only three priests and some friars, with a succession of persons who come hither from time to time to do penance, and who bring the monks the means of subsistence. Their fare consists of bread, or rather biscuit, made of flour of lentils, and rice boiled in salt and water, bad cheese, and a little honey; and their only beverage is a brackish and ill-tasted water. Their supplies are conveyed to them from the alms of the rich Copts at Cairo. In these monasteries, several of which are found in this desolate country, the Coptic travellers through the desert are sure of finding necessaries for themselves and their horses; which they obtain by ringing a small

small bell, the cord of which hangs down on the outside.

F. Roderic reduces the errors and opinions of the Copts to the following heads: 1. That they put away their wives, and espouse others while the first are living. 2. That they have seven sacraments; viz. baptism, the eucharist, confirmation, ordination, faith, fasting, and prayer. 3. That they deny the Holy Spirit to proceed from the Son. 4. That they only allow of three œumenical councils; that of Nice, Constantinople, and Ephesus. 5. That they only allow of one nature, will, and operation, in Jesus Christ, after the union of the humanity with the divinity: in other words, they are Monophysites, Monothelites, or Eutychians. Mr. Browne (*ubi supra*) says, that they embrace transubstantiation; in which, and other points, the Catholics of Cairo think they approach their faith nearer than the Greeks. As to their errors in discipline, they may be reduced, 1. To the practice of circumcising their children of both sexes before baptism, which has obtained among them from the twelfth century. 2. To their ordaining deacons at five years of age. 3. To their allowing of marriage in the second degree. 4. To their forbearing to eat blood: to which some add their belief of a baptism by fire, which they confer by applying a hot iron to their forehead or cheeks.

Others palliate these errors, and shew that many of them are rather abuses of particular persons, than doctrines of the sect. This seems to be the case with regard to their polygamy, eating of blood, marrying in the second degree, and the baptism by fire: as for circumcision, it is said not to be practised as a ceremony of religion, nor as of any divine appointment, but merely as a custom which they derive from the Ishmaelites; and which, perhaps, may have had its origin from a view to health and decency in those hot countries.

The Copts have adopted, from the Mahometans, the custom of frequent prostrations during divine service; of ablation after the conjugal rites, &c. In many respects their faith, discipline, and worship, resemble those of the Abyssinians; see that article.

The Copts, at different times, have made several reunions with the Latins; but always in appearance only, and under some necessity of their affairs. In the time of pope Paul IV., a Syrian was dispatched to Rome from the patriarch of Alexandria, with letters to that pope; wherein he acknowledged his authority, and promised obedience; desiring a person to be dispatched to Alexandria, to treat about a re-union of his church to that of Rome: pursuant to which, Pius IV., successor to Paul, chose F. Roderic, a Jesuit, whom he dispatched in 1561, in quality of apostolical nuntio.

But the Jesuit, upon a conference with two Copts deputed for that purpose by the patriarch, was made to know, that the titles of *father of fathers, pastor of pastors, and master of all churches*, which the patriarch had bestowed on the pope in his letters, were no more than mere matters of civility and compliment; and that it was in this manner the patriarch used to write to his friends: they added, that since the council of Chalcedon, and the establishment of several patriarchs independent of one another, each was chief and master of his own church. This was the answer the patriarch gave the pope, after he had received a sum of money remitted to him from Rome, by the hands of the Venetian consul.

COPHTIC, or COPTIC, the language of the Copts, the ancient language of the Egyptians, mixed with a great deal of Greek; its alphabet being manifestly nothing else but Greek, with the addition of some few letters, to express

sounds, which the Grecians had not, and which probably came to be used in Egypt after the time of Alexander; though we know that the Greek language, and perhaps also the Greek letters, were taught there long before, in the reign of Psammetichus. Of this affinity the reader may judge, by the following table of the Coptic alphabet:

Figure.	Name.	Power.	Figure.	Name.	Power.
Αα	Alpha	A.	Ππ	Pi	P.
Ββ	Beta	B. V.	Ρρ	Ro	R.
Γγ	Gamma	G.	Σσ	Simā	S.
Δδ	Dalda	D.	Ττ	Tau	T.
Εε	Ei	E.	Υυ	Ypsilon	Y. U.
Ϛϛ	So	S.	Φφ	Phi	Ph.
Ζζ	Zita	Z.	Χχ	Chi	Ch. Græc.
Ηη	Hita	I. Æ.	Ο	O	O long.
Θθ	Thita	Th.	Ψψ	Shai	Sh.
Ιι	Iauda	I.	Ϝϝ	Fei	F.
Κκ	Kappa	K.	Ϟϟ	Khei	Kh.
Λλ	Lauda	L.	Ϡϡ	Hori	H.
Μμ	Mi	M.	Ϣϣ	Janja	J.
Νν	Ni	N.	Ϥϥ	Shima	Sh.
Ξξ	Xi	X.	Ϧϧ	Dhei	Dh.
Οο	O	O short.	Ϩϩ	Ephi	Pf.

The old Coptic, which Kircher maintains to be a mother-tongue, and independent of all others, had been much altered by the Greek; for besides that it has borrowed all its characters from the Greek, with a very little variation, a great number of the words are pure Greek.

Vossius, indeed, asserts, that there was no Coptic language till after Egypt became subject to the Arabs. The language, according to him, is a mixture of Greek and Arabic: the very name thereof not being in the world till after the Arabs were masters of the country. But this, M. Simon observes, proves nothing; except that what was anciently called Egyptian, has since by the Arabs been called Coptic, by a corruption of speech. There are, it is true, Arabic words in the Coptic; yet this by no means proves but that there was a language before that time, either Coptic or Egyptian. Pietro de la Valle observes, that the Copts have entirely lost their ancient tongue; that it is now no longer understood among them; and that they have nothing extant therein but some sacred books; and that they still say mass in it.

All their other books have been translated into Arabic, which is their vulgar tongue; and this has occasioned the originals to be lost: it is added, that they rehearse the Epistles and Gospels in the mass, twice; once in Arabic, and once in Coptic.

Indeed, if we believe F. Vanl. b, the Copts say the mass in Arabic, all but the Epistles and Gospels, which they rehearse both in that and Coptic.

It sufficiently appears, that, after the conquest by the Saracens, the ancient language so far continued to be that of religion, that it was used in the divine service; and in the country of the Copts, the gospel, according to Niebuhr, is even now read in Coptic: but he observes, that this tongue is not understood even by the priests, and that the service is afterwards read in the Arabic, which is the present language of Egypt. Mr. Browne says, that in the Coptic monasteries, the prayers are read in Arabic, and the epistle

and gospel in Coptic; but the priest is a mere parrot, repeating a dead letter.

The Coptic tongue, at present, consists chiefly of the old Egyptian and Greek, still bearing evident marks of primitive antiquity in its structure and constitution, with regard to which it differs so much from all the Oriental and European languages, that it is impossible to conceive it derived from any of them. For the Copts neither decline their nouns, nor conjugate their verbs, (not even those of foreign extract,) otherwise than by prefixing particles sometimes of one or more syllables, and sometimes of a single letter, which denote the case, gender, number, and person; several of them being often joined together in one word, and the primitive word usually placed last. Hence the difficulty of this tongue consists in the incredible combination of the words and particles, in the change of the vowels, and in transposing the middle part of the word, and in adding superfluous letters: so that it requires great labour and skill to distinguish them.

From numerous and minute researches, Mr. Browne is led to affirm, that the Coptic language may be considered as extinct: although in Upper Egypt, they unknowingly retain some Coptic words.

F. Kircher is the first who published a grammar and vocabulary of the Coptic. There is not known any book extant in the Coptic, except translations of the Holy Scriptures or of ecclesiastical offices; or others that have relation to these, as dictionaries, &c.

Dr. Woide, who began his Coptic studies at Leyden, and was assisted in them by Saholtz, the editor of La Croze's Coptic lexicon, returned his obligations by the services which he rendered to him in that publication. He superintended the impression of the abridgement of it, which was published at Oxford, and there applied himself to the study of the Sahidic dialect, or that of the Upper Egypt. In 1778, he published the celebrated Coptic and Sahidic grammar of Saholtz, under the following title: "CHRIS. SAHOLTZ Grammatica Egypti utriusque Dialecti, quam breviorit, illustravit, edidit C. G. WOIDE." An excellent Coptic grammar was also published at Parma, in 1783, under the title, "*Didymi Taurinensis Liturae Coptica Rudimentum.*"

COPTIC, or COPTIC Bible. See **COPTIC BIBLES.**

COPTIC Liturgies are three; one attributed to Basil; another to St. Gregory, and the third to Cyril: they are translated into Arabic for the use of the priests and people.

COPTOS, in Geography. See **COPTOS.**

COPIA CLAUDIA AUGUSTA COLONIA, a name given to the modern Lyons.

COPIA Cornu. See **CORNUCOPIA.**

COPIA libelli deliberanda, in Law, a writ that lay where a man could not get the copy of a libel at the hand of a judge ecclesiastical, to have the same delivered to him. Reg. Orig. 51.

COPIÆ, in Ancient Geography, a town of Italy, in the gulf of Tarentum; called also *Sylaris*.

COPIÆ Militares, military forces, a military body instituted particularly by Augustus, for the defence of the Roman empire. It was divided into three classes or descriptions. The first, called *copiæ classicae*, was destined to defend the seas and rivers against the incursions of pirates, and to protect navigation; the second, called *copiæ provinciales*, defended the frontiers, and encamped or sojourned in the frontier towns, as necessity or occasion required; and the third, called *copiæ urbanae*, remained at Rome, as a guard for the capital, and also for the emperor, in case of need.

COPIÆ Provinciales. See **COPIÆ Militares.**

COPIÆ Urbanae. See **COPIÆ Militares.**

COPIAPO, in Geography, one of the thirteen provinces into which the kingdom of Chili in South America is divided. It is situated in the most northern part of the kingdom, and is one of the richest metallic countries in the world. In this province are two mountains entirely composed of crystallized sulphur, so pure that there is no occasion for refining it. It has also mines of gold, silver, iron, copper, and lead. The whole soil is impregnated with sal-gem; and salt-petre is common. It furnishes also turquoises, that is, teeth or bone coloured green by metallic vapours. In this province and that of Coquimbo little rain falls; and earthquakes are seldom known in either of them. It has two ports; one of the same name, and another which lies 30 leagues further to the south, and consists only of a few huts.

COPIAPO, a town of Chili, in the fore-mentioned province, to which it gives name; situated about 12 leagues from the sea-coast, very irregularly built, but containing between three and four hundred families. S. lat. 26° 50'. W. long. 70° 18'.

COPIAPO, a river of S. America, in Chili, which runs into the Pacific Ocean, a little to the north of the town of Copiapo.

COPIATA, under the Western Empire, a grave-digger. In the first ages of the church, there were clerks destined for this employment. In the year 357, Constantine made a law in favour of the priests *copiatae*, i. e. of those who had the care of interments; whereby he exempts them from the lustral contribution which all other traders paid.

It was under him also that they first began to be called *copiatae*, q. d. clerks destined for bodily labour, from *κοπος*, of *κοπος*, *scindo, cado, serio, I cut, beat,* &c. Before that time they were called *decani* and *lecticarii*; perhaps, because they were divided by decads or tens, each whereof had a bier or litter for the carriage of the dead bodies. Their place among the clerks was the next in order before the chantors.

COPING OVER, in Carpentry, a sort of hanging over, not square to its upright, but bevelling on its under side till it end in an edge.

COPING, among Builders, signifies the top or covering of a wall. The best copings are of hewn stone, where it can readily be procured; in other situations, where large paving-bricks are made of a good and durable quality, these may with propriety be used flat for coping. Bricks of particular shapes are often made for coping, either to be used singly, or first a course of two bricks in width, to form a projection for shooting the wet off the faces of the wall, and then a half cylindrical brick for completing the coping. Several years ago, Mr. Peter Wych communicated to the Society of Arts in London (Doffie's Memoirs, vol. ii. p. 16.) a method of making a durable coping for garden walls, of a mixture of baked gypsum and coal-ashes. We lately observed on the Grand Junction Canal, that several of their bridges have been repaired, where the coping stones were broken by accidents, with Parker's Roman cement; and that others of their bridges and walls were wholly coped with this composition, which appeared little inferior to stone in hardness, and less brittle than most kinds of coping-stones are. See **CANAL.** In stony districts, where the fields are separated by rough and dry stone walls, the same are usually coped by a row of rough and triangular stones, set edgewise on the top of the wall. The cementing of these together with a little good mortar is a good practice. Where the stone is less hard or durable, these kinds of dry walls are sometimes coped with a circular ridge of good but very coarse mortar, prepared for the purpose. The practice of properly securing and

and attending to the coping of dry-built walls cannot be too much enforced, for want of which the rubbing of cattle and other accidents soon make breaches in such walls, that are very expensive to repair. In some counties, where stone is very scarce, and fuel for burning bricks very dear, garden and other walls are made of mud or tempered clay, with a mixture of chopped straw or flubble to hold them together; and such are sometimes thatched with straw, by way of coping; for both these, and the *pisé* walls, composed of dry earth rammed together in a mould, which have lately been introduced in England, must be carefully preserved from the wet by a secure coping, or they soon moulder into their original dirt.

COPLAND, in *Geography*, the name of a cluster of small islands in the north Channel, nearly opposite to Donaghadee, in the county of Down, Ireland. One of them has a few cabins upon it; and another has a light-house, which is very useful to those going to Belfast, or crossing the Channel between Donaghadee and Portpatrick. That which has the light-house on it is in W. long. $5^{\circ} 24'$. N. lat. $54^{\circ} 39'$.

COPLE, a vicarage in Bedfordshire, in Wixamtree hundred, is remarkable for being formerly the residence of sir Samuel Luke, and of Butler, the author of Hudibras, which celebrated poem is supposed to have been written at Wood-End house, in this parish. The Ouse navigation passes the northern extremity of this parish; and some years ago, a cut was made, a mile or more in length, for conveying barges up to a new house and premises, intended as a wharf, (now the Dog-ale-house;) but for want of previous consent on the part of the owner of this part of the Ouse navigation, it was not permitted to be used. See **CANAL**. The subsoil or strata in this parish is clay throughout, with lime-stone at a considerable depth beneath the surface: for a considerable width next the Ouse the clay is covered with gravel, and produces good turnip land.

COPOS, from *ωπος*, labour, in *Medical Writers*, is used for a weariness of the body, when the muscles, or their fibres rather, are loaded and obstructed with viscous humours, so as to render them unfit for motion.

COPPA, IL CAVALIER, called *Ant. Girola*, in *Biography*, an historical painter, who was born at Verona about the year 1595, and became successively the scholar of the celebrated Bolognese masters; Guido and Albano. He is considered one of the best imitators of the graceful and delicate manner of the former, although in his compositions he is sometimes too crowded; and he was ranked by his second master, Albano, amongst his most favoured disciples. He was some time painter to the court of Mantua, the churches of which city are enriched by many of his principal works. He died in the year 1665. Lanzi. Storia Pitt.

COPPA, in *Law*, a cop or cock of grass, hay, or corn, divided into titheable portions; as the tenth cock, &c. This word in strictness denotes the gathering or laying up the corn in copes or heaps, as the method is for barley or oats, &c. not bound up, that it may be the more fairly and justly tithed: and in Kent they still retain the word, a *cop* or *cop* of hay, straw, &c.

COPPARBERG, in *Geography*, one of the twenty-eight governments into which the kingdom of Sweden is divided, comprizing the province of Dalecarlia, is also called *Fahlun*, and *Gamla Copparberger*, old copper mines. It is a large, populous mine town, situated between two lakes and two mountains; 36 miles W. of Geste, 24 N.E. of Hedemora, in N. lat. $60^{\circ} 36'$. The streets are regular, but the houses are all of wood, except the town's hall and two churches, the roofs of which are covered with copper. It is the six-

teenth among the towns that vote in the Swedish diet. The governor resides at *Noor*, a royal manor near the town. The famous copper mine, which Gultavus Adolphus used to call the Swedish exchequer, lies a little to the west. It has been worked one thousand years, and its copper is still reckoned the best in Europe. From 1633 to 1761 it yielded 1,180,724 Swedish shippounds. Its greatest produce was in the year 1650, when it gave 20,321 shippounds. Since the year 1780, it yields nearly 6000 shippounds annually; but the expences increase in proportion, as the miners must go to a greater depth. In 1801, the mine was said to be 1080 feet deep, and to give employment to 1200 workmen. The copper is found in large masses. *Catteau Tableau de la Suede*. Schlözer's Briefwechsel.

COPPAY, one of the small western islands of Scotland; 2 miles W. from the S.W. extremity of the island of Lewis.

COPEL, **COPEL**, or **CUPPEL**, in *Chemistry*. See **CUPPELL**.

COPELLING. See **CUPPELLATION**.

COPPENBRUGGE, in *Geography*, a town of Germany, in the circle of Westphalia, and county of Spiegelberg; 19 miles S.W. of Hanover.

COPPER, *Kupper*, Germ. *Cuivre*, Fr. *Cuprum*, *Act.* Lat. *Venus*, *Aelchem*.

Copper is a ductile and malleable metal, of a pale yellowish red colour. It is soluble in most acids, and is precipitable from them in the metallic state, by iron or zinc: its oxyd is soluble in ammonia, to which it communicates a bright blue purple colour.

§ 1. Ores of Copper.

Sp. 1. Native copper. *Gedigen Kupper*. *Cuivre natif*. Its colour is a clear copper-red, often tarnished, externally yellowish, blackish, or whitish.

It occurs in mass, disseminated, in leaves and grains, also capillary, moss-like, dendritical and crystallized. The regular forms that it presents, are the cube, the octohedron, and the pyramidal dodecahedron often with a short six-sided prism interposed.

The crystals are small, and generally implanted in each other, forming clustered masses. Its lustre internally is glistening and metallic; its fracture is hacky: when cut or rubbed, it acquires a high metallic lustre. It is not very hard, is malleable and flexible, but not elastic, is tough and difficultly frangible. Sp. gr. 7.72.—8.58.

It is fusible before the blow-pipe, and appears to be pure copper.

It occurs in veins and beds in various primitive and secondary mountains, accompanied by many of the other ores of copper, also by galena, horn silver, native silver, calcareous, heavy, and fluor spars.

It is very extensively, but not very abundantly, diffused; the largest masses appear to be procured from the copper mine river, within the arctic circle in North America; it is also of frequent occurrence in Japan and Brazil, in Siberia, Hungary, Norway, Sweden, Saxony, and Cornwall.

Sp. 2. Vitreous copper. *Kupperglas*. *Cuivre vitreux*.

Its colour is dark lead-grey, passing into blackish-grey; it is often covered superficially by a steel-coloured tawny. It occurs in mass, disseminated or crystallized. The forms of its crystals are the cube, the octohedron, and a hexahedral prism, sometimes terminated by trilateral summits. The crystals are small; externally they are shining, internally they exhibit a glistening metallic lustre. The fracture is fine-grained, uneven, passing into conchoidal. It gives a thin

C O P P E R.

shining streak, is blackish when pulverized; is somewhat brittle, and easily frangible. Sp. gr. 4.1.—5.4.

It effervesces with nitrous acid, and when exposed to the blow-pipe, gives a metallic button of a steel-grey colour, and generally attractible by the magnet.

When pure, it appears to be a simple sulphuret of copper, consisting, according to Chenevix, of

81	Copper
19	Sulphur
<hr/>	
100	

It is generally however mixed with iron in the proportion of iron 3 to 6 per cent. A specimen from Siberia was analyzed by Klaproth, and afforded

78.5	Copper
18.5	Sulphur
2.25	Iron
0.75	Silex
<hr/>	
100.	

It occurs in veins and beds in primitive and secondary mountains, accompanied by copper pyrites, and other ores of this metal. It is not very abundant, but is found in various places, especially Cornwall, Hungary, Saxony, Norway, and Siberia.

Sp. 3. Variegated copper. *Buntkuppererz.*

Its colour is intermediate between copper-red, and Tombac brown; by exposure to the air it acquires a superficial tarnish, which is first reddish, then violet, afterwards blue, and lastly green. It occurs in masses, disseminated, superficial, or crystallized in octohedrons. Internally it is shining, with a metallic lustre. Its fracture is small, and imperfectly conchoidal, passing into fine-grained, uneven. It takes a polish by friction, and gives a reddish coloured streak. It is soft, somewhat brittle, and easily frangible. Sp. gr. 4.9-5.4.

It effervesces with nitrous acid, and melts readily before the blow-pipe, without vapour or odour. Two specimens, the one from Hitterdahl in Norway, and the other from Rudelitadt in Siberia, have been analyzed by Klaproth, with the following results.

Hitt.	Rud.
69.5	58. Copper
19.	19. Sulphur
7.5	18. Iron
4.	5. Oxygen
<hr/>	
100.	100.

This ore occurs in beds, veins, and disseminated through rocks, for the most part belonging to the class of primitive. It is usually accompanied by vitreous copper, and copper pyrites. It is found in Cornwall, in Hungary, Saxony, Norway, and Sweden.

Sp. 4. Copper pyrites. *Kupperkies. Pyrite cuivreuse.*

Its colour is deep brass-yellow, passing into gold-yellow. Its surface is often iridescently tarnished. It occurs in masses, disseminated, superficial, stalactical, clustered, reniform and crystallized in tetrahedrons, and the derivative octohedron, and dodecahedron. The crystals are usually very small and imperfect. The surface of the crystals is smooth and shining; that of the other varieties is rough and glimmering. The fracture is coarse or fine-grained, uneven, passing into conchoidal, and imperfectly foliated. It is

brittle, and with difficulty gives a few feeble sparks with the steel; it may be readily cut by a knife. Sp. gr. 4.—4.1.

When exposed to the blow-pipe on charcoal, it decrepitates, emits a sulphureous vapour, and melts into a black globule, which, by further application of the heat, acquires the colour and lustre of copper. It does not appear that the crystallized varieties of this ore have been regularly analyzed, and the proportion of its constituent parts cannot be estimated from the other varieties, on account of the iron pyrites, with which they are always more or less mixed. A specimen analyzed by Lampadius afforded

41.	Copper
17.1	Iron
45.1	Sulphur
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103.2	

The richer this ore is in copper, the softer it is, and its colour approaches the more to that of gold. It seldom, however, in the large way, affords more than 20 per cent. of copper. It may readily be distinguished from iron pyrites (the only substance with which it is likely to be confounded) by the pale brass yellow colour, and superior hardness of the latter.

Copper pyrites is the most abundant, and most generally diffused of any of the ores of this metal. It occurs in veins and beds in primitive, transition, and secondary rocks, in most countries of the world.

Sp. 5. White copper. *Weiss Kuppererz. Mine de cuivre blanche.*

Its colour is intermediate between silver-white and brass-yellow. It occurs in masses or disseminated. Internally it has a slight metallic lustre. Its fracture is small, and fine-grained uneven. It yields readily to the knife, is brittle, and easily frangible. Sp. gr. 4.5.

Before the blow-pipe it yields a white smoky, and an arsenical odour, and melts into a blackish slag. According to Henckel it yields about 40 per cent. of copper, the rest being iron, arsenic, and sulphur.

It occurs in veins and beds, in primitive mountains, and is generally accompanied by copper pyrites and vitreous copper.

It is found in Cornwall, Saxony, Silesia, Hungary, Siberia, and Chili in South America.

Sp. 6. Grey copper. *Fahlerz. Cuivre gris.*

Its usual colour is steel-grey, which passes into iron-black and lead-grey; some varieties incline towards yellow and others again present superficial iridescent colours. It occurs in masses, disseminated or investing, or crystallized in regular tetrahedrons and their modifications. The crystals are small, with shining surfaces. Internally it is glitening, or shining with a metallic lustre. The fracture is coarse, and small-grained, uneven, inclining to imperfectly conchoidal. It gives a black or reddish-brown powder. It is moderately hard, brittle, and easily frangible. Sp. gr. 4.46.—4.36.

The only necessary ingredients of this species (as appears from an analysis by Chenevix; of the crystallized variety) appear to be copper, iron, and sulphur in the following proportions, viz.

52	Copper
33	Iron
14	Sulphur
<hr/>	
99.	

The uncrystallized varieties, however, generally contain also antimony, silver, and lead, but in very variable proportions.

tions. In several varieties from Germany, Mr. Chenevix found antimony varying in proportion from 5 to 38 per cent. but neither lead nor silver. Two specimens, the one from Andreasberg, and the other from Crannitz, have been analyzed by Klaproth with the following results.

Copper	31.36	16
Iron	3.3	17
Sulphur	11.5	10
Antimony	34.09	16
Silver	14.77	2.25
Lead	0.	34.
Silex	0.	2.5
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	95.02	93.75

Finally, a specimen from Piedmont has been examined by Napione, and found to consist of

Copper	29.3
Iron	12.1
Sulphur	12.7
Antimony	36.9
Silver	0.7
Arsenic	4.
Alumina	1.1
<hr/>	
	96.8

Those specimens that give a reddish-brown streak, are generally the most abundant in silver.

It occurs in veins in slate, and some other of the newest primitive rocks, and in beds in the transition and floetz rocks. It is accompanied by copper pyrites, galena, manganese, spathose iron, and rarely by malachite. When it contains a notable proportion of silver, it is considered and worked as an ore of this metal.

It is found in Cornwall, and in the county of Ayr in Scotland; also in Bohemia, Hungary, Transylvania, Saxony, Hesse, the Hartz, France, Spain, Piedmont, Sweden, Norway, Siberia, and Chili.

Sp. 7. Black copper. *Kupferblauwartz. Cuivre noir.*

Its colour is intermediate, between bluish and brownish black. It occurs in masses, disseminated or inveiling. It is composed of dull moderately cohering particles. It is friable, slightly soils the fingers, is meagre to the feel, and heavy.

Before the blow-pipe it emits a sulphureous odour, and melts into a slag that colours borax green. It has not been regularly analyzed, but is said to contain from 40 to 50 per cent. of copper.

It occurs with other ores of copper, particularly copper pyrites, malachite, mountain green, and vitreous copper.

It is found of remarkable beauty, at Kupperberg, in Sillesia, also in Saxony, Hungary, Norway, and Siberia.

Sp. 8. Ruby copper. *Roth. Kuppererz. Cuivre oxyde rouge.*

Of this species, there are the three following varieties.

Var. 1. Lamellar.

Its colour is dark cochineal red, inclining sometimes to lead grey; when crystallized it is often of a full carmine red. It occurs in masses, disseminated and crystallized in cubes, and aluminiform octohedrons. The crystals are small, and for the most part laterally aggregated: their surfaces are smooth and shining. Its internal lustre is more or less shining, and is intermediate between metallic and adamantine. Its fracture is imperfectly foliated, passing into granular uneven. When in masses it is usually opaque, or at most translucent on the edges; the

crystals are transparent, verging into translucent. It gives a brownish brick-red streak, is moderately hard, brittle, and easily frangible. Sp. gr. 3.95.

By exposure to the blow-pipe on charcoal, it is easily reducible to a metallic bead, without emitting either odour, or smoke. It dissolves in the nitrous and muriatic acids, in the former with, and in the latter without, effervescence. According to Mr. Chenevix, it consists of

88.5	Copper
11.5	Oxygen
<hr/>	
100.	

It is met with chiefly in veins, and appears to be peculiar to primitive mountains. It is accompanied by native copper and other ores of this metal. It is found in Cornwall, in Hungary, Saxony, the Hartz, Siberia, Peru, and Chili.

Var. 2. Capillary.

This variety differs from the preceding in being of a somewhat lighter colour, superior lustre, and being composed of small capillary crystals and thin flakes.

Var. 3. Compact.

It occurs in masses and disseminated, but never crystallized. Its internal lustre is glimmering, semi-metallic: its fracture is even; and it is opaque. In other respects it agrees with var. 1.

Sp. 9. Tile-red copper. *Ziegelerz.*

This species presents two varieties, indurated and earthy.

Var. 1. Indurated.

Its colour is intermediate between hyacinth and brownish-red, passing on the one hand into lead-grey, and on the other into reddish-brown. It occurs massive and disseminated. The reddish kind has a glimmering lustre and flat conchoidal fracture; the browner kind has a somewhat resinous lustre and a small conchoidal fracture. It acquires a lustre by friction, is moderately hard and brittle.

When exposed to the blow-pipe it becomes black, and is infusible without addition. Borax is tinged by it of a dirty green. It appears to be an intimate mixture of compact ruby copper with brown iron ochre, and its produce of copper varies from 10 to 50 per cent.

It occurs in veins with ruby copper, malachite, copper pyrites, and iron ochre.

Var. 2. Earthy.

Its colour is hyacinth-red, passing into reddish or yellowish brown. Its texture is between friable and solid. It occurs in masses, disseminated, and inveiling copper pyrites. It is without lustre, has an earthy fracture, and slightly soils the fingers. In its other characters it agrees with the preceding variety.

Sp. 10. Mountain blue. *Kupperlazar. Cuivre carbonate bleu.*

Of this there are the two following varieties.

Var. 1. Radiated.

Its principal colour is sky-blue, which passes into Prussian and indigo-blue. It occurs in masses, disseminated or inveiling, more frequently botryoidal, stalactitic, and cellular, but most frequently crystallized in oblique rhomboidal prisms or octohedral prisms with dihedral summits. The crystals are generally very small and aggregated into globular masses or bundles. The crystallized varieties are externally shining, but the rest are dull. Internally it is shining or glittering, with a lustre between vitreous and resinous. Its fracture is straight or divergingly radiated, rarely lamellar. The crystals are translucent and semi-transparent; the other varieties are

are opaque, or at most translucent on the edges. When pulverized it is of a sky-blue colour. It is soft, brittle, and easily frangible. Sp. g. 3.2.—3.4.

It is very difficult of fusion before the blow-pipe, *per se*; but with borax it gives a bright green glass, and a metallic globule.

According to Pelletier it consists of

66	to	70	Copper
18	—	20	Carbonic acid
8	—	10	Oxygen
2	—	—	Water

Var. 2. Earthy.

Its colour is small-blue: it occurs rarely in mass, generally disseminated or superficial: it is composed of fine pulverulent cohering dull particles. Its fracture is fine-grained earthy, passing into even and imperfectly conchoidal. It is opaque, slightly stains the fingers, and is easily frangible.

Before the blow-pipe it becomes black, but does not melt. In borax it dissolves with great ebullition, and forms a green glass.

Mountain-green occurs in the newer primitive rocks, but more commonly in floetz mountains. It accompanies other ores of copper, especially malachite, grey copper, and copper pyrites. The most beautiful specimens come from the Bannat in Hungary, and from Siberia. In the Tyrol it is found in sufficient plenty to be manufactured into the pigment called mountain-blue.

Sp. 11. Malachite.

Of this there are the two following varieties.

Var. 1. Fibrous.

Its common colour is grass-green passing into emerald-green, and sometimes into dark leek-green. It seldom occurs massive or disseminated, but generally investing, and often crystallized in short capillary needles, disposed in divergent bundles, or fans. Externally they are shining, but internally only glistening with a silky lustre. Its fracture is delicate, diverging fibrous, passing into coarse fibrous. It is opaque or translucent on the edges; the crystals are for the most part translucent. When pulverized it retains its colour, only the tint is somewhat lighter. It is very soft, brittle, and easily frangible. Sp. gr. 3.5.

It effervesces with acids, and forms a blue solution with ammonia. Before the blow-pipe it blackens and decrepitates, but is infusible, *per se*. With borax it melts into a green glass. Its constituent parts, according to Klaproth, are

58	Copper
18	Oxygen
12.5	Carbonic acid
11.5	Water

100

It occurs usually in the newer primitive and floetz mountains, accompanied by other ores of copper, also by carbonate of lead, calcareous spar, brown spar, and quartz. The finest specimens of this variety of malachite are found in the Siberian and Hungarian mines; it occurs also in Saxony and other mining districts in Germany, in Norway, and in Shetland, and the counties of Cornwall and Derby in Britain.

Var. 2. Compact.

Its colour is emerald-green passing into grass and verdegris-green, the same specimen exhibiting different shades of colour: its external surface is commonly overpread with a greenish-white crust. It occurs massive and disseminated, but most frequently reniform, botryoidal, mammillated, stalactitic, or globular. Externally it is rough and dull; inter-

nally it is, according to the fracture, either dull, glistening, or shining. Its fracture is conchoidal, or fine-granular uneven, or minutely fibrous. It generally occurs in thin lamellar concentric distinct concretions, each of which has usually a different shade of colour. It is opaque, soft, brittle, and easily frangible. Sp. gr. 3.5.—3.6.

Its chemical characters and component parts are nearly the same as those of the preceding variety, with which it also agrees in its geognostic and geographical situation.

Its beautiful colour, lustre, and the high polish that it is capable of receiving, render it much sought after for various ornamental purposes: it would however be much more esteemed if it was harder.

Sp. 12. Mountain-green. *Kuppergrün. Vert de cuivre.*

Its colour is verdegris-green, passing occasionally into emerald-green and sky-blue. It occurs in mass, disseminated or investing. Internally it is shining passing into glittering, with a resinous lustre. Its fracture is small conchoidal. It is translucent and semi-transparent; is soft and easily frangible.

Its chief chemical character is that of giving little or no effervescence, while dissolving in acids. It has not been analyzed. It is found in similar situations with malachite, but is of much rarer occurrence.

Sp. 13. Emerald copper. *Kupperfermaragd. Diopstafel Haüy.*

Its colour is emerald-green. It occurs crystallized in lengthened dodecahedrons. It is shining both externally and internally, and has a vitreous lustre. It is translucent, passing to semi-transparent; scratches glass feebly, and with difficulty; is brittle. Sp. gr. 3.3.

Before the blow-pipe it becomes of a chestnut-brown colour, and is infusible, *per se*. With borax it gives a bead of copper. According to an analysis by Vauquelin it consists of

25.57	Oxyd of copper
42.85	Carbonat of lime
28.57	Silex

96.99

It has hitherto been found only in Daouria on the Russian and Chinese frontiers in a vein accompanied by malachite.

Sp. 14. Micaceous copper. *Kupperglimmer.*

Its colour is deep emerald-green passing to verdegris-green. It occurs massive, disseminated, and crystallized in hexahedral tables. Externally it is smooth and shining with a pearly lustre. Its fracture is foliated. It is translucent passing into semi-transparent. It is softer than calcareous spar. Sp. gr. 2.54.

It decrepitates strongly when suddenly heated, and is composed, according to Chenevix, of

58	Oxyd of copper
21	Arsenic acid
21	Water

100

It is found in Huel Gorland mine in Cornwall, in veins accompanied by vitreous copper, copper pyrites, arsenical pyrites, and iron ochre.

Sp. 15. Octohedral arseniat of copper. *Linsenerz* of Werner.

Its colour is deep sky-blue, passing into Prussian-blue, bluish-white, apple-green, and grass-green. It occurs in obtuse pyramidal octohedrons. The crystals are small and aggregated into clusters; they have a shining vitreous lustre, and

and a lamellar fracture, are semi-transparent passing into transparent. In hardness they are inferior to fluor spar. Sp. gr. 2.88.

It is composed, according to Chenevix, of

49	Oxyd of copper
14	Arsenic acid
35	Water
<hr/>	
98	

It is found in the same mine as the preceding species.

Sp. 16. Foliated arseniat of copper. *Blatriges olivenerz* of Werner.

Its colour is olive-green, passing to oil and leek-green. It occurs rarely massive, and generally crystallized in acute rhomboids and oblique quadrilateral prisms. The surfaces of the crystals are smooth and shining. Internally it is glistening and shining, with a diamond lustre. Its fracture is imperfectly foliated. It is translucent passing into transparent. It is somewhat harder than calcareous spar. Its component parts, according to Chenevix, are,

54	Oxyd of copper
30	Arsenic acid
16	Water

100

It is found in the same mine with Sp. 14.

Sp. 17. Fibrous arseniat of copper. *Fafriges olivenerz*. Werner.

Its colour is brownish, or dark bottle-green, passing into yellowish; when capillary it is of a lighter and brighter colour. It occurs crystallized in an irregular acute octohedron, or a long compressed hexahedral prism, or capillary. Sometimes the crystals are regular at one extremity, and terminate in capillary brushes at the other. The crystals are small and laterally aggregated. It has a considerable lustre between vitreous and resinous, is translucent passing to transparent; is harder than fluor spar, but will not scratch glass. Sp. gr. 4.28. It passes into the two following varieties.

1. Amianthiform.

Its colour varies from blueish-green to grass-green, brown-green, straw-yellow, and white. It occurs in extremely minute parallel, or diverging flexible fibres, or thin dusky flexible laminae, with more or less of a fatty lustre.

2. Hematitiform.

Its colour is brownish or whitish-yellow. It occurs in flat or lamellated layers, either smooth or varied with small rough crystalline points.

Its texture is fibrous but very compact, resembling wood-tin.

The above species, with its varieties, has been analyzed by Mr. Chenevix, with the following result:

Prismatic.	Capillary.	Hematif.	
60.	54.	50.	Oxyd of copper
39.7	29.	29.	Arsenic acid
0.	18.	27.	Water
<hr/>			
99.7	98.	100.	

It is found in Huel Gorland mine, in Cornwall.

Sp. 18. Phosphat of copper.

Its colour is, externally, greyish-black; internally, between emerald and verdegis-green. It occurs in mass, disseminated and crystallized in rhomboids. The crystals are small and very small; their lustre is externally vitreous

and shining. Internally, it is glistening with a silky lustre. Its fracture is fine and diverging fibrous. It is opaque, and moderately hard. It conffils, according to Klaproth, of

68.13	Oxyd of copper
30.95	Phosphoric acid
<hr/>	
99.08	

It has hitherto been found only at Firneberg in Cologne, in white drusy quartz.

Sp. 19. Sandy copper. *Saltzkypererz*. Werner.

Its colour is emerald-green, passing into leek and olive-green. It occurs massive, disseminated, and crystallized in extremely minute six or four-sided prisms. The surface of the crystals is smooth and brilliant, and their fracture lamellar. The massive variety is opaque; the crystals are transparent. It is soft and easily frangible. Sp. gr. 4.43.

Before the blow-pipe on charcoal, it tinges the flame of a bright green and blue colour, and a metallic globule remains behind. It is soluble in nitrous acid, without effervescence. The following are its constituent parts, according to Prout and Klaproth.

Prout.		Klaproth.
From Peru.	Chili.	Chili.
76.595	70.482	73.
10.038	11.416	10.1
12.797	18.072	16.9
<hr/>		
100.	100.	100.

It is found loose in the bed of a river at Kernolinos, in Chili, and elsewhere, though rarely in Spanish South America.

§ 2. Assay and Analysis.

The assay of copper ores, (though by no means so accurate a method of ascertaining their metallic contents as a regular analysis) being the method by which the market price of the ore is always determined, requires the first notice. The best method, upon the whole, of conducting it, is as follows.

First, expose a small piece of the ore, under examination, to the action of the blow-pipe, and by the appearance and odour of the vapour given out, it is easy to discover whether it contains any arsenic or sulphur. It may very probably contain both, in which case, take 300 grains of the ore coarsely pulverized, mix it with half its weight of saw-dust, and keep it at a moderate red heat in an earthen crucible, till the disengagement of arsenical vapour entirely ceases. Then pour the contents of the crucible into an iron mortar, and reduce them carefully to a fine powder. Transfer this powder to a teli, and expose it to a good red heat, with occasional stirring, till both the charcoal and sulphur are burnt off. The residue is then to be accurately mixed with $\frac{1}{2}$ of its weight of lamp-black, half its weight of pulverized glass of borax, and a drop or two of oil; the mass thus formed, is to be put into a found earthen crucible, a cover is to be luted on, and the whole is to be placed in a good wind furnace. The heat should be moderate for the first quarter of an hour, to allow the borax time to combine with the earthy impurities of the ore; then a moderate white heat is to be applied for about twenty minutes. After this, the crucible being withdrawn and cooled, is to be carefully

fully broken, and will be found to contain a button of copper, covered by vitreous scum. The purity of the copper thus procured, is to be estimated from its colour, softness, malleability, and tenacity; after which, a part of it may be cupelled with pure lead, in order to ascertain whether it holds any silver or gold. If the ore contains sulphur, but no arsenic, it may be mixed with half its weight of charcoal, and roasted on a test, without being previously heated in the crucible. If the ore contains neither sulphur nor arsenic, it should be first moderately ignited in a covered crucible, to drive off any moisture, and may then be treated with borax and lamp black, as already described.

The proper analysis, by means of liquid menstrua, is however much more accurate than even the most carefully conducted assay, and the general mode of proceeding with the ores of copper is, upon the whole, very simple. The copper, together with the other metals with which it may happen to be mixed, is to be separated from the flux and sulphur, by means of an acid, the other metals are then to be got rid of by their appropriate reagents, and the copper is then to be procured either in the state of green carbonate, of black oxyd, or of pure metal: of the first, 180 parts are equivalent to 100 of metallic copper; and of the second, 100 parts contain 80 of metal.

Previously to undertaking an analysis, a part of the specimen, under examination, should be subjected to the usual reagents, in order to ascertain not indeed the proportion, but the nature of the ingredients of which it consists; and, in few cases is this more necessary than in the analysis of the ores of copper, both as they are so numerous and so various in their composition. This previous examination being duly performed, the analysis may be conducted in the following manner:

For the analysis of the *pyritical*, and other *sulphurized* ores of copper, provided they contain neither silver nor lead, take 200 grains of the pulverized ore, and digest it at a boiling heat with muriatic acid, (adding occasionally a few drops of nitric acid) till every thing soluble in this menstruum is taken up. Of the insoluble portion, a part, consisting chiefly of sulphur, will be found floating on the liquor; and this being washed, dried, and weighed, is to be ignited on a test, by which the sulphur will be burnt off, and its amount may be estimated from the loss of weight sustained by the process. The incombustible residue is to be digested in a little warm muriatic acid, and what remains insoluble, is to be added to the other insoluble residue. The muriatic solutions being mixed together, the whole is to be decomposed by carbonated potash, and the precipitate, hence resulting, is to be digested in repeated portions of caustic ammonia, as long as this latter acquires any blue tinge. The whole of the copper, and nothing else, will thus be taken up by the ammonia, from which it may be obtained in the state of black oxyd, by the addition of a little caustic potash, and a boiling heat. The residue, insoluble in ammonia, consists of oxyd of iron, with perhaps a little alumine, which may be separated by caustic potash, the alumine alone being soluble in this fluid. Finally, the portion insoluble in muriatic acid, may be considered as little else than flux.

The ores which, besides copper, sulphur, and iron, contain silver, lead, and antimony, may be thus analyzed. The ore, reduced to fine powder, is to be repeatedly digested with moderately diluted nitric acid, as long as any thing continues to be taken up by this menstruum. To the nitric solution as then to be added muriat of soda, which will throw down

the silver in the state of luna cornea; this being separated, the lead is to be precipitated in the form of sulphat, by sulphat of soda; the solution is now to be supersaturated with ammonia, which will dissolve the copper, and save behind the oxyd of iron, with probably a little alumine and flux. The copper is to be procured from the ammoniacal solution, in the manner directed in the preceding paragraph; and the oxyd of iron may be separated from the admixed earths, by caustic potash. That portion of ore, insoluble in nitric acid, is to be digested in muriatic acid, which will take up every thing except the sulphur, flux, and probably a little luna cornea. Of this insoluble residue, the sulphur is to be burnt off by gentle ignition, and the remainder is to be fused with twice its weight of pearl ash, by which the silver in the luna cornea will be reduced to the metallic state. The muriatic solution being concentrated by evaporation, and then poured into a considerable quantity of water, will deposit the antimony in the form of a white oxyd.

The simple oxyds of copper, are best analyzed by digestion in nitric acid, and then supersaturating the solution with ammonia, by which any casual admixture of iron will be separated.

The carbonats of copper are to be thus treated. One portion is to be gently calcined in a covered crucible, and the loss of weight sustained, indicates the united amount of the water and carbonic acid. A second portion is to be thrown into a known quantity of dilute sulphuric acid, and the loss of weight, by the effervescence which ensues, shows the amount of carbonic acid. The sulphat of copper thus obtained, may be subsequently decomposed, either by a stick of zinc, or by liquid ammonia.

The arseniats of copper are most conveniently analyzed by first moderately heating them, in order to drive off and thus estimate the water, and then digesting the residue in dilute nitric acid, by which it will be entirely dissolved; nitrat of lead is then to be dropped in as long as it occasions any precipitate, and this latter being removed, the fluid is to be evaporated nearly to dryness, after which, warm alcohol is to be added, which will take up the whole, except a white powder; this powder, and the precipitate on the addition of nitrated lead, are arseniat of lead. 33.66 per cent. of which is arsenic acid. The alcoholic solution is then to be evaporated nearly to dryness, and then to be digested with ammonia, which will take up the copper, leaving behind any oxyd of iron that may have happened to be contained in the ore. The ammoniuret of copper, being decomposed by caustic potash, gives the copper in the state of black oxyd, which is that in which it exists in the ore.

The analysis of *muriat of copper* is very simple. It was thus effected by Klaproth. The ore, being pulverized, was dissolved in cold nitric acid, with the exception of 1.5 per cent. of oxyd of iron; the solution being then diluted, nitrat of silver was added, till it occasioned no further precipitate; the luna cornea thus obtained, indicated, according to the known proportions of this salt, the amount of muriatic acid in the ore. The nitrous solution was then decomposed, and the copper obtained in the metallic form, by means of a bar of iron.

Phosphat of copper was thus analyzed by Klaproth. On digestion in nitric acid, the whole was taken up except a few grains of quartz; the excess of acid in the solution was then saturated by potash, and acetite of lead was poured in till it had quite ceased to occasion any precipitate; the phosphat of lead, thus obtained, was separated from the solution, and sulphat of soda was added to decompose and precipitate

precipitate the small excess of acetite of lead which had been made use of. A little sulphuric acid was then added to the solution, and the copper was precipitated in the usual way, by means of a bar of iron.

§ 3. Reduction of Ores.

The only ores of copper that are in fact wrought in the large way, and from which the copper of commerce is for the most part supplied, are the sulphureous and arsenical or s of this metal. The method of reducing them, though consisting of a great number of processes, on account of the powerful affinity, both of the arsenic and sulphur, is yet upon the whole very simple, being little more than repeated roastings and fusions, till the metal has acquired the necessary ductility, for it is never brought to a state of absolute purity, and the common sorts contain both arsenic and antimony, in such proportions, as to be wholly unfit for alloying with either gold or silver.

The rough ore, if simply sulphureous, is broken into pieces not larger than an egg, and separated as much as possible from the adhering earthy impurities; after which, it is piled in large kilns, and heat being applied at the bottom, the whole mass becomes gradually heated, and a large portion of the sulphur sublimes out, and may be either collected by proper flues, or allowed to escape; this first process occupies about six months, at the expiration of which time, the evaporation of the sulphur ceases, and when the ore has cooled sufficiently, it is in a fit state to be smelted.

If, however, the ore is largely combined with arsenic, it is not capable of keeping up a long combustion of itself, nor is the heat thus generated adequate to the expulsion of the arsenic; a somewhat different method, therefore, of roasting must be had recourse to. For this purpose the ore is still more carefully dressed than in the former case, and is reduced to pieces not larger than a hazel-nut. It is then spread on the floor of a large reverberatory furnace, and exposed to a dull red heat, with frequent stirring, in order to offer fresh surfaces to the action of the flame. The arsenic and sulphur by this treatment are rapidly driven off, and in about twelve hours the roasting is completed.

The ore is now transferred into the fusing furnace, which is a reverberatory of the common construction; a little bruised lime-stone is generally added by way of flux, and in the course of four or five hours the fusion is usually complete; the slag, now of the consistence of soft dough, is raked off, and the copper is discharged through a plug-hole into water, by which it is reduced into small drops or grains.

The copper, however, though in the metallic state, is still very impure, being largely mixed with sulphur and arsenic, which give it a grey colour, and render it perfectly brittle. In order to separate these impurities, it is re-melted and granulated twice more or oftener, a considerable quantity of slag being separated at each fusion; but as this slag contains some copper it is not thrown away, but worked over again with the next charge of calcined ore. The number of fusions and granulations entirely depend on the quantity of impurities, and the obstinacy with which they combine with the copper; but when these processes have been repeated the requisite number of times, the granulated mass is melted and cast into pigs. These again are broken to pieces, and roasted for one or two days in a low red heat, and again melted and roasted several times, till the metal approaches to the state of malleable copper. It is now cast into oblong masses, about 14 inches in length, and is fit for the refining furnace. In this it is again melted, with the addition of a

little charcoal, till it acquires the necessary degree of malleability, and thus becomes saleable copper.

Sometimes lead is employed with good effect in the refining of copper, as it combines with, and scorifies iron, and the other easily oxydable metals in preference to copper. For this purpose the rough copper is spread on the floor of a furnace, and when it is in complete fusion, about 6 or 8 per cent. of lead is thrown in, and well mixed with the rest. In a short time the surface of the melted metal becomes covered with a semi-viscous blackish brown scoria, consisting of the mixed oxyds of lead, iron, and other impurities, together with a little copper. The first scoria being removed, a second is formed, which is in like manner summed off, and so on successively, till, after ten or twelve hours, the copper is sufficiently purified: this is ascertained by the thinness of the film with which the melted copper is covered, and by its being of a brick-red colour, also by the circumstance that if a rod of polished iron is dipped into the fused mass the portion of copper that adheres to it immediately falls off when the rod is dipped in cold water.

§ 4. Chemical and Physical Properties.

The colour of copper is yel ovi red red; its hardness is superior to that of silver, but somewhat inferior to that of platinum; it is very tough, ductile, and malleable; hence it may be beaten into plates or drawn into wire of great strength and compactness. It breaks with a hackly fracture. When rubbed, it emits a disagreeable odour; to the taste it is nauseous and styptic. The specific gravity of Swedish copper, which is the purest that is met with in commerce, amounts to about 8.89: that of the common sorts does not exceed 8.6; while that of the Japanese copper, on the other hand, amounts, according to Bergmann, to 9.0.

The fusing point of copper is nearly the same as that of gold, namely, a low white heat; before it melts, changeable prismatic colours appear on its surface. When in fusion, or even at a full red heat, if exposed to the air, it is soon covered with a thin brittle plate of brownish oxyd, that readily separates from the metal when cold.

This substance is an imperfect oxyd, and was formerly called *copper ashes*, as *ullum*, or *cinis aris*, and by repeatedly heating and cooling a bar of this metal, the whole may be thus changed. These scales, according to Proust, are composed of about 62 per cent. of perfect or black oxyd, and 38 of copper nearly in the metallic state; hence, when they are digested in cold dilute sulphuric acid, only the former portion is taken up. By subsequent calcination, the scales are wholly converted into black oxyd, the weight of which is one-fourth more than that of the original copper. At a very high heat, this oxyd runs into a bright reddish-brown opaque glass.

Copper, when in high fusion, and in contact with the air, like all the other easily oxydable metals, is actually combustible; it burns with a beautiful light green flame; the same delicate tinge is visible when a little of the oxyd, or of any of the salts of this metal, is strewn on burning coals. The green flame thus produced deposits a small portion of greenish-grey pulverulent oxyd, and hence it gradually collects as a kind of soot in the chimnies of furnaces employed in smelting this metal.

Copper soon rusts in a damp air, and becomes covered with a green crust of carbonated oxyd, but this coating, by its strong adhesion to the metal beneath, long preserves it from further alteration; hence it requires a length of time, and the concurrence of circumstances peculiarly unfavourable to preservation, in order to corrode entirely a thick plate of

this metal. Water is not decomposed by copper even at a white heat.

With the exception of a few cases, that will be mentioned presently, copper appears to unite very uniformly with the same proportion of oxygen, forming (when uncombined with water and every other substance) a brownish-black oxyd, of which one-fifth, or 20 per cent., is oxygen, and the remainder copper. This oxyd is produced, as has been already mentioned, by boiling the precipitate from any of the cupreous salts by an alkali, or the ammoniuret of copper, with caustic potash or soda.

Copper, or rather its oxyd, combines with every acid, forming salts, many of which are both curious and important.

Sulphuric acid acts upon metallic copper only when concentrated and boiling hot. For this purpose take copper filings, or thin sheet copper, put it into a glass vessel with twice its weight of strong sulphuric acid, and heat the mixture. As soon as it begins to boil, much sulphureous acid gas is given out, and at length the whole dissolves into a dark-coloured liquor, which, by dilution with water, becomes of a fine blue. If common copper is used for this purpose, there always remains a black sediment, which consists for the most part of sulphuret of copper. If the pure carbonated oxyds are employed, instead of the metal, they will be found to be soluble even in cold and diluted sulphuric acid. The solution, in whichever way it is formed, deposits, by evaporation and gradual cooling, rhomboidal crystals of a deep sky-blue colour, which are sulphat of copper, the *blue* or *Roman vitriol* of the shops.

The same salt is also met with native in copper mines, partly crystallized, but more generally dissolved in the water which drains more or less into all mines. When native, it appears to be formed in consequence of the iron pyrites being first vitriolized, and the resulting sulphat of iron re-acting on the copper.

Sulphat of copper has a very strong, styptic, somewhat acidulous, and excessively nauseous taste. It is soluble in about four times its weight of water. When dried at a heat not exceeding that of boiling water, it loses, according to Proust, about 36 per cent., which is mere water, after which the residue, which is a white pulverulent mass, is again soluble and crystallizable, as at first. But if it is calcined with a strong white heat, the acid itself is expelled without undergoing decomposition, and at length there only remains black oxyd of copper, in the proportion of 32 per cent. of the original crystallized salt. Hence 100 parts of sulphat of copper consist, according to Proust, of

Copper 25.6	}	forming	}	33
Oxygen 6.4				
		Sulphuric acid	32	
		Water	36	

		100		

Bergmann's analysis of this salt nearly agrees with that of Proust in the proportion of copper (26 per cent.); but of the other ingredients he reckons 28 of water, and 46 of acid.

Besides the common sulphat, Proust describes a *sub-sulphat* of copper. This is prepared by adding to the common sulphat some caustic potash, but not sufficient entirely to decompose it. A green precipitate is in consequence deposited, which is the sub-sulphat in question. This salt loses by distillation only 14 per cent. of water. The residue, boiled

with caustic potash, gives 68 per cent. of black oxyd; hence its component parts are

Copper 54.4	}	68
Oxygen 13.6		
		Sulphuric acid 18
		Water - 14

		100

Sulphat of copper is decomposed by the alkalis, whether pure or carbonated. If either of the fixed alkalis in their caustic state is made use of, the precipitate is not, as might be supposed, a simple oxyd of copper, but that peculiar combination first discovered by Proust, and named by him *hydrat of copper*. It is thus prepared: to a cold solution of sulphat of copper add liquid potash, also cold, to complete saturation; a blue precipitate falls down, which, when thoroughly washed with boiling water, is the pure hydrat. Its consistence, when dried at a heat not exceeding 212° Fahr., is nearly that of Prussian-blue; at a somewhat higher temperature it shrinks, and is gradually converted into black oxyd, by the evaporation of its water. By dry distillation it is found to give out about 24 per cent. of water, and 1 of carbonic acid, which it probably has absorbed from the air while drying: there remain behind 75 parts of black oxyd. If this latter is again moistened with water, it does not return to the state of hydrat. Hence it appears that the hydrat is a true chemical combination of water and oxyd of copper, in the proportion of about one part of the former to three of the latter, and as such enters into the composition of the cupreous salts. The hydrat is decomposable not merely by heat, but also by boiling with either of the fixed alkalis.

Carbonic acid and oxyd of copper unite together without difficulty. This combination is found native, forming the mountain-blue, the malachite, and some of the other ores of copper. It may be prepared artificially by exposing the metal to a damp confined air, in which case it constitutes rust of copper; or more expeditiously by decomposing any of the acid salts of copper by a carbonated alkali. A copious bulky precipitate falls down, which, when well washed and gently dried, is a fine powder, of a beautiful pale apple-green colour. One hundred parts of copper dissolved in any acid, and precipitated by carbonated potash or soda, produce invariably 180 of the green carbonat, dried at a boiling-water heat. This carbonat, when distilled by itself, with a heat gradually increased to redness, gives out 10 parts of water, and 46 of carbonic acid; the black oxyd, remaining behind in the retort, amounts to 125 parts, of which 100 are copper, and 25 oxygen.

When hydrat of copper is gently heated with a solution of super-carbonated potash, a portion is dissolved, forming a greenish-blue liquor, whilst the undissolved residue becomes almost as dark in colour as the black oxyd. The solution, if slowly evaporated, yields a singular salt, consisting of 52 per cent. potash, 43 carbonic acid, and 5 oxyd of copper. It is crystallizable and slightly deliquescent. A similar salt, with a base of soda, is produced, when this latter alkali is employed instead of potash.

Copper is very readily soluble in nitric acid, even when cold and considerably diluted. Much heat is excited, and a torrent of nitrous gas given out, the liquor becoming of a bright blue colour in proportion as the copper is dissolved. The oxyds of copper are equally soluble in this acid as the metal is, but without the evolution of nitrous gas. When this solution is hastily evaporated to a certain point,

C O P P E R.

and then suffered to cool, it congeals into a deep blue saline mass, which deliquesces rapidly when exposed to the air. By a slow and careful evaporation this salt may be obtained in the form of hexahedral prisms, but equally deliquescent as the former amorphous variety. If this blue nitrat be evaporated beyond the point at which it would crystallize when cold, nitrous gas begins to be produced, and a green scaly concretion separates from the thick blue liquor. If the evaporation is here stopped, this green matter may be separated by water, either hot or cold, which dissolves only the undecomposed blue nitrat. This green substance is considered by Proust as a subnitrat of copper; that it still contains nitric acid is proved by its still giving out this acid when mixed with sulphuric acid and heated. By thorough calcination all the acid and water are expelled, and the black oxyd of copper only remains. The proportions of the subnitrat, according to the above-mentioned chemist, are

Black oxyd of copper	67
Nitric acid - -	16
Water - - -	17
	100

The blue or perfect nitrat, on the other hand, contains only 27 per cent. of black oxyd.

Nitrat of copper is very soluble in alcohol, to the flame of which it communicates a very delicate green colour.

The decomposition of this nitrat by tin is so violent as in certain cases to produce actual combustion. This forms an amusing experiment, and was, we believe, first discovered by Dr. Higgins. It is thus performed; spread out a piece of tin-foil four or five inches square, lay in the middle a small heap of the solid blue nitrat, sprinkle the salt with a few drops of water, spread over it a little tow, then double up the tin-foil round it on all sides, twisting it as tight as may be without breaking. In a short time the mass will feel burning hot, small bubbles of blue liquor will be seen oozing through, and will presently be succeeded by a copious eruption of nitrous gas, attended by minute sparks of fire and deflagration.

A fine blue pigment is prepared from nitrated copper, called *verditer* (*cesdres blues, Fr.*) It is made in quantity by the refiners, who, after the process of separating silver from gold by aquafortis, recover the silver from its solution by means of copper, and thus obtain a residue of nitrat of copper. This solution is decomposed by lime (the precise method of doing which is kept secret), and the produce being made into cakes and dried slowly constitutes the best kind of verditer.

This pigment has been analyzed by Pelletier with the following results. It was totally soluble in nitric and muriatic acids, with a copious effervescence of carbonic acid: when distilled by itself 600 hundred grains lost 200, and afforded 2 French pints of carbonic acid together with some water. The calcined residue was a black powder, which, being fused with a reducing flux, yielded a button of pure copper, amounting to about half the weight of the original verditer. A fresh parcel was then treated with sulphuric acid, which afforded sulphat of lime, the earth of which formed about 7 per cent. of the original verditer. Of the 200 grains lost by distillation, Pelletier considers 180 as carbonic acid. Hence 100 parts of verditer contain

Copper	50
Carbonic acid	30
Water -	3½
Lime -	7
	90½
Remains for oxygen	9¾
	100

But in this estimate the amount of carbonic acid is by some oversight greatly overrated. The quantity obtained from 600 grains was about 2 French pints, the weight of which, according to Lavoisier, would be only 66 grains; consequently 100 grains would yield only 11 grains of this acid. The water was obviously only estimated at random, and as the copper was in the state of hydrat, certainly amounted to much more than Pelletier has allowed for it. The corrected results of the above analysis therefore would be

Copper	50	} 83.3 Hydrat of copper
Oxygen	12.5	
Water	20.8	
Lime	7.	
Carbonic acid	11.	
	101.3	

which corresponds very closely with the quantity analyzed.

The muriatic acid dissolves copper with difficulty except when concentrated and boiling, and then hydrogen gas is given out. The oxyds, however, of this metal, and especially the green carbonat, are very readily soluble in this acid. The colour of muriat of copper when hot or highly concentrated is brown, but by dilution becomes of a grass-green. By careful evaporation and cooling it crystallizes in lengthened rhomboids, and when hastily evaporated in feathery crystals. This salt is commonly deliquescent, but when both the copper and acid are quite free from iron is permanent in the air. It is readily soluble both in water and alcohol; the latter takes up its own weight when boiling, a part of which afterwards separates in a crystalline state as the liquor cools. The composition of the crystallized salt is, according to Proust,

Black oxyd of copper	40
Muriatic acid -	24
Water - - -	36
	100

A dilute solution of muriated copper in water makes a kind of sympathetic ink, which is colourless in the cold, becomes yellow by warming, and again loses its colour on cooling. Besides the common muriat, the ingenious researches of Proust have discovered a second muriat, in which the copper appears to be at a lower state of oxydation than in the former salt. It affords a nearly colourless solution, and when solid is of a greyish white; it may therefore without impropriety be called the white muriat of copper. It is prepared from the common muriat by means of muriat of tin, a salt remarkable for the eagerness with which it absorbs oxygen from almost all the other metallic salts. If therefore some of this latter is poured into common muriat of copper, a precipitate falls down which is at first white, but by subsequent exposure to air passes through

through different shades of violet and blue to black. This precipitate is for the most part a muriated sub-oxid of copper. On exposure to a moderate heat it melts like luna cornea. If directed in warm muriatic acid it readily dissolves, and is deposited, on cooling, in the form of tetrahedral crystals. With nitrous acid some nitrous gas is given out, which shews that the metal was not previously saturated with oxygen. Another remarkable character of this white muriat is, that when dissolved in ammonia the solution is colourless, though, on exposure to the air, it gradually acquires the sky-blue colour of common ammoniac of copper. Its composition, according to Proust, is

Muriatic acid	24.75
Oxyd of tin	1.
Copper	63.
Oxygen	11.25
	—
	100.
	—

Assuming this analysis as correct, it is obvious that the copper exists in a much lower state of oxygenation in this salt than in any hitherto mentioned, for in this the oxyd of copper is composed of 63 of metal and 11.25 of oxygen, or (reduced to the hundred) of 84.84 copper, and 15.16 oxygen, whereas the black copper, to which all the common cupreous salts are reducible by loss of their acid and water, consists of 80 per cent. copper, and 20 oxygen.

There appears to be yet another state of combination of muriatic acid and oxyd of copper, also first noticed by Proust. It is the *submuriat of copper*, differing from the common muriat not by a lower degree of oxygenation in the metal, but in a smaller proportion of acid. It is produced by adding a little potash (less than required for saturation) to the green muriat. A green powder falls down, which is the submuriat in question. This salt when boiled with potash loses about 28 per cent. of its weight, and is reduced to the black oxyd. A similar submuriat is said by the same chemist to be spontaneously deposited when copper is dissolved in nitro-muriatic acid. The composition of this last is as follows:

Black oxyd of copper	79.
Muriatic acid	12.5
Water	8.5
	—
	100.
	—

The native green muriat of copper from Peru appears to be nearly in this state.

Copper seems to have a stronger affinity for muriatic acid than even for the nitric or sulphuric. Thus, if either the solid nitrat or sulphat of copper be digested in muriatic acid a solution takes place, and then, on the application of heat, the liquor immediately loses the blue colour, characteristic of these two salts, and acquires the green of the muriat: also by slow evaporation muriat of copper is obtained in crystals.

Acetous acid has no action on reguline copper, but its oxyd is easily soluble in this fluid, to which it communicates a beautiful grass-green colour. There are two species of acetited copper, the one with an excess of base, the common verdeggris of the shops, and the other in which the acid and oxyd are in a state of mutual saturation, forming the crystallized or distilled verdeggris.

The manufacture of verdeggris is carried on to a considerable extent in most of the southern provinces of France,

and a very exact account, apparently, of the process has been published by Chaptal, from which the following particulars are extracted.

The materials for this manufacture are the *marc* or cake that remains in the wine-press, after the greater part of the juice has been liqezed out: and plates of copper of convenient size and hammered well, in order to smoothe the surface, that the corroded portion may be readily detached from the rest.

The marc of the grape is first fermented by being laid as lightly as possible in a large barrel and moistened with common wine, and then set in a warm airy place. In a few days, varying according to the heat of the weather, it begins to swell, grows hot and exhales a strong odour of vinegar; the fermentation then declines and the marc is fit for use. A layer of this is then put into an earthen pot and a plate of copper, previously made scorching hot, is laid upon it; to this succeeds another layer of marc, and then a plate of copper, in regular alternation till the pot is filled, observing that both the top and bottom layers are of marc. The mouth of the pot is then loosely flopped with straw, and the whole is left at rest from ten to twenty days.

When the marc begins to whiten the pots are unpacked, and, if the process has gone on well, the copper-plates are found covered with a green crust, interspersed with silky green crystals. The marc is thrown away; the plates are set on end on wooden racks in a cellar, and when dry are dipped in water and again set to dry; this is repeated once a week for six or eight times, which makes the crust of oxyd swell and increase both in quantity and quality: after which it is scraped off by a knife without difficulty. Each pot yields about 5 or 6 lbs. of rough verdeggris, and the plates will serve again repeatedly till they are corroded quite through.

This rough verdeggris is further prepared for market by being ground in wooden mortars, and exposed to the air till it is sufficiently dry; and in so doing it loses about half its weight.

Verdeggris thus prepared, may be considered as copper oxydated by the action of the acetous acid, and combined with water, with carbonic acid, and with part of the extractive or mucilaginous part of the marc. It is nearly insoluble in water and its colour is bluish green. If this verdeggris is digested in distilled vinegar it dissolves readily in this fluid, and by evaporation and cooling a crystallized salt of a deep green colour may be obtained, which is known in the shops by the name of *distilled verdeggris*. The method in which this valuable salt is prepared at Montpellier is as follows. Common vinegar is first distilled in a copper alembic, and the acid thus produced is put with common verdeggris into a copper boiler; when a hot saturated solution is thus made, it is strained and transferred to another copper evaporating vessel, where it is boiled down till a saline crust begins to collect on its surface; a light frame of cross sticks is now sunk into the liquor and the fire is put out. On cooling, the acetite of copper crists round the sticks in clusters of rhomboidal crystals of a deep bluish-green colour. It requires about 5 lbs. of verdeggris to make 1 lb. of the crystallized acetite.

The composition of common verdeggris is subject (as might be expected from the method in which it is prepared) to a considerable variation, and this difference is still further increased by variations in the way of manufacturing this salt. Thus, at Grenoble, verdeggris is made merely by disposing plates of copper in a proper room, and moistening their surfaces

surfaces repeatedly with distilled vinegar, till the incrustation of oxyd acquires a proper thickness. Hence this latter is purer, and approaches nearer to the state of crystallized acetite, than that of Montpellier.

A hundred parts of the verdegriis of Grenoble yield, according to Chaptal, by dry distillation,

Carbonic acid	-	-	9.1
Water weakly acidulous	-	-	13.05
Strong, and coloured acetous acid	-	-	53.95
Left in the retort	} Copper	-	20.9
Charcoal		-	3.
			100.

A like quantity of the Montpellier verdegriis afforded

Carbonic acid	-	-	8.
Acetous acid, weak and empyreumatic,	65	15	
Copper	-	-	22.5
Charcoal	-	-	4.35
			100.

To the above particulars may be added some observations, by Proust, on the properties and composition of this salt.

When common verdegriis is put into cold water, it gradually falls to pieces and nearly half of it is dissolved, the remainder is a fine green powder which diffuses itself through the liquor and subsides very slowly. This green powder appears to be pure subacetite of copper, and when washed and dried weighs about 42 per cent. of the original verdegriis. When sulphuric acid is poured on it, pungent vapours of vinegar are given out. Boiled with potash it affords 63 per cent. of black oxyd; and when distilled, after all the volatile products have passed over, there remains about 52 per cent. of copper, principally in the metallic state. From these data therefore the subacetite appears to consist of

Copper	50.4	} forming black oxyd	63
Oxygen	12.0		
Remains for acid and water			37
			100

With regard to the crystallized acetite, Proust found that 39 parts of black oxyd produce, with distilled vinegar, 100 parts of acetite; and on the other hand, that 100 parts of this salt, when decomposed by boiling with potash, yield 39 or 40 parts of black oxyd. Hence it is composed of

Copper	31.2	} forming black oxyd	39
Oxygen	7.8		
Acetous acid	-	-	61
			100

The distillation of the crystallized acetite furnishes the most pungent acetic acid, or radical vinegar, as has been already described under ACETOUS ACID. Acetite of copper, beside being made by direct combination of its ingredients, may be prepared in various ways by double affinity; of these the best upon the whole is the following: Make a cold solution of sugar of lead (*acetite of lead*) in distilled water, to which add, by degrees, a cold solution of blue vitriol (*sulphat of copper*), as long as any precipitation takes place; then pour the whole on a filter, and a green liquor passes through, the sulphat of lead remaining on the filter, in the form of a white powder. The green liquor, being concen-

trated by evaporation, deposits, by cooling, very pure and beautiful crystals of acetite of copper.

The natural combinations of copper with arsenic and arsenic acid have already been noticed. With regard to the artificial arseniats, Scheele discovered that when arsenic acid is digested with copper filings, a green solution is formed, and a blue powder, which is also an arseniat, is precipitated. The sulphat, nitrat, and muriat of copper undergo no apparent change, when added to arsenic acid; but the acetite is decomposed, and arseniat of copper is precipitated. All the cupreous salts, however, are decomposed by arseniated alkali, and a blue arseniat falls down. To these facts Mr. Chenevix has added the following: If arseniat of ammonia and nitrat of copper are added, there falls down a blue crystalline arseniat of copper. On evaporating the supernatant liquor, and adding alcohol, another copious deposition of crystals took place, of a deeper colour than the former, and of a rhomboidal shape. Each of these arseniats was examined separately, first by calcination at a low red heat to expel the water, then by potash for the black oxyd of copper, and lastly by nitrat of lead for the arsenic acid. By this method, the first arseniat was found to consist of

Oxyd of copper	-	50
Arsenic acid	-	27
Water	-	23
		99

The second arseniat afforded

Oxyd of copper	-	35.
Arsenic acid	-	39.5
Water	-	24.
		98.5

Arsenic, in the state of white oxyd, combines with oxyd of copper into a pale green powder, called, from its discoverer, *Scheele's green*. It is prepared in the following manner: Dissolve 24 ounces of sulphat of copper in water, and heat the solution in a copper vessel; also boil in another vessel 24 ounces of pearlsh, 11 ounces of white arsenic, and about 3 pints of water: when the whole is dissolved, strain each solution separately through lincn, and then add the arsenicated potash, little by little, to the sulphat of copper, with constant stirring: an effervescence will take place, and then a green powder will be deposited. When the whole is mixed, let it stand some hours, then separate the precipitate by the filter, edulcorate it well with clear hot water, and dry it very gently in a warm room. The above quantity of ingredients will afford about 184 ounces of the powder, which may be used as a pigment.

Phosphat of copper may be prepared by adding phosphat of soda to the nitrat, or any other readily soluble salt of copper, a bluish-green sediment falls to the bottom, which dries to a powdery semi-crystalline mass. A low red heat turns it brown, and drives off about 15.5 per cent. of water; there remains a phosphat of copper, composed of 35 parts of phosphoric acid, and 49.5 of oxyd of copper.

A striking decomposition of nitrat of copper also takes place, when a tick of fresh melted phosphorus is immersed in a solution of this salt, and exposed to the light. By degrees the copper is precipitated on the surface of the phosphorus, in the metallic salt, and in the form of crystalline grains.

All the salts of copper are decomposed by the alkaline prussiates, and the residu is a sediment of a reddish-brown colour, which, by drying and exposure to the air, acquires a dark

dark chocolate hue. This prussiat of copper mixed well with oil, and has been employed with some success as a pigment.

Tincture or infusion of galls throws down from all cupreous solutions a precipitate of a dirty yellow colour.

Oxyd of copper is soluble in all the other acids, forming with them, however, salts little known, and of little importance: the predominating colour in all of them is green.

Of the alkalies, neither potash nor soda have any action on copper or its oxyds, except that already mentioned, of taking away from the hydrat its water of combination, and reducing it to black oxyd.

Ammonia has no action on metallic copper, but dissolves its oxyds without difficulty. The usual colour of this solution is a deep blue-purple. The most direct method of preparing it is by digesting together liquid ammonia and any oxyd, or carbonated oxyd of copper: the liquor becomes blue almost immediately, and its colour deepens till saturation takes place. By slow and careful evaporation, blue silky crystals of ammoniuret of copper may be procured. This salt, by exposure to the air, gradually loses its alkali, and absorbs carbonic acid, so that at length it is wholly converted into green carbonate. The *acqua saphyrima* of pharmacy and surgery consists, for the most part, of ammoniated copper, to which its colour is owing: it is made chiefly in two ways. The first is to digest in a glass vessel quick-lime, muriat of ammonia, verdegris, and water; the lime decomposes the muriat of ammonia, disengaging the alkali, which, in its turn, decomposes the verdegris, and dissolves the oxyd of copper: hence the clear liquor consists of ammoniated copper and muriat of lime. The second method, where a weaker solution is wanted, is to employ lime-water instead of lime. Another way of producing ammoniated copper immediately is to supersaturate with this acid any of the salts of copper, in consequence of which the first portions of alkali decompose the cupreous salt, throwing down an oxyd, and the succeeding portions redissolve the oxyd, forming a dark-blue solution. As there is no other metal besides copper and nickel which produces this particular colour, and as the latter of these metals is not common, the production of this beautiful tinge, by the addition of ammonia, may be considered as a very probable indication of the presence of copper.

A singular circumstance takes place with regard to ammoniated copper. If a bottle be filled with liquid ammonia, and a few clean copper filings be added, no solution ensues, as long as the bottle is kept close corked. But if the bottle be opened for a while, and then shut again, a solution indeed of part of the copper takes place, but without any change of colour in the liquor: but when the bottle is again opened, the characteristic blue tinge appears first at the surface of the solution, and gradually spreads down to the bottom. If now a few more copper filings be added, and the bottle again corked, the solution will in a short time again become colourless, and continue so till it is again exposed to the air. The reason of these changes appears to be the following: copper requires some, but only a very small quantity, of oxygen to be soluble in ammonia; and when in this lowest state of oxydation, it forms with ammonia a colourless solution, as it forms with muriatic acid a white sub-muriat: but if this solution is exposed to the air, the metal absorbs oxygen, and is thus brought to that state in which it tinges ammonia blue; being again shut up with a few copper filings, the oxygen is partly absorbed by the recently added metal, and reduces the whole to the state of white oxyd.

Many of the neutral salts, especially the muriats, are capable of oxydizing, and, in part, of dissolving copper: this

is especially the case with muriat of ammonia, which, when made into a mass with copper filings and a little water, and kept warm, precisely converts the copper into a green muriated oxyd.

Copper and sulphur readily unite. If equal parts of copper filings and flowers of sulphur are mixed and heated in a crucible, much of the sulphur burns off; but the remainder melts into a blueish-black mass, which is sulphuret of copper. According to Prout, 100 parts of copper take up in this way 28 of sulphur; so that the sulphuret is composed of about 79 of metallic copper, and 21 of sulphur. No oxygen appears to be present. This substance is more fusible than copper, melting readily at a red heat. By roasting in the open air, the sulphur is expelled: the last portions, however, adhere with great obstinacy. According to Dr. Thomson, sulphur and copper filings unite together, by being merely mixed together with or without water, and exposed for a long time to the air.

Hydrofulphureted water, or any of the liquid hydrofulphurets, when added to the solutions of copper, produce a deep blueish-black precipitate, which is a hydrofulphuret of copper.

Phosphorus is capable of intimate combination with copper. If 8 parts of this metal in filings, 8 of vitreous phosphoric acid, and 1 of charcoal powder, are intimately mixed together, and then put into a crucible, and exposed to an intense heat, the phosphoric acid is decomposed by the action of the charcoal, and the phosphorus in part burns off, and in part unites with the copper, forming a hard, steel-grey, brittle alloy, capable of a high polish. A simpler way of preparing the same is to make copper filings red hot in a crucible, and project upon them small pieces of phosphorus, which combines with the metal, and melts down into a grey mass, similar to the former. One hundred parts of copper may thus be increased to about 120; but if this phosphuret is kept for some time melted under charcoal powder, or melted glass, part of the phosphorus burns off. When this excess is thus got rid of, the ingredients of the remaining phosphuret appear to be in a state of mutual saturation, no more phosphorus being dissipated by a continuation of the fusion. In this state the mass appears to consist of 92.3 of copper, and 7.7 of phosphorus: it retains the grain and colour of steel, is susceptible of a high polish, and does not readily tarnish in the air, but is brittle. With a still less proportion of phosphorus, it becomes malleable, and of a yellowish-white colour. Phosphuret of copper, if kept in fusion, with free exposure to the air, loses gradually most of its phosphorus, which burns away with the bright flame and odour peculiar to this substance.

The fixed oils, when kept long in contact with copper, oxydate it, and dissolve a portion, by which they acquire a green colour.

The uses of copper, in its various states, are so numerous and important, as to be scarcely inferior to those of iron. All the salts of copper are more or less poisonous, producing violent nausea, with severe pain and inflammation of the intestinal canal. Yet from the sudden vomiting that they excite, a large dose may be given with safety; and this is sometimes done, when there is an immediate necessity of emptying the stomach. Copper, however, is very little used medicinally in any form.

§ 5. Alloys of Copper.

The alloys of copper are, upon the whole, of more importance than those of any other metal: we shall, therefore, treat of them with some minuteness.

Copper with gold and silver.

Copper,

Copper, when added in small quantity to either of these metals, greatly increases their hardness, without materially debasing their colour or malleability: hence it has been generally adopted as the alloy for that portion of the precious metals which is employed with current coin, and for plate.

Copper with arsenic.

On account of the volatility of arsenic some precautions are required in the preparation of this alloy. The best way, upon the whole, is to melt some copper in rather a large crucible, and then to wrap up in paper some reguline arsenic, or white arsenic, either with or without a mixture of charcoal powder, and to immerse the paper, with its contents, in the melted copper, either by means of a pair of long tongs, or by ramming the paper into a small crucible, and then inverting the crucible in the fluid metal. The arsenic presently rises through the copper in dense white fumes, and is in a great part dissipated; a portion however is retained by the copper, and by repeating the process once or twice more, the alloy will be fully saturated with arsenic.

This alloy is of a silvery white colour and a close texture; it is however very brittle, and, in proportion to the perfect whiteness of its colour, liable to tarnish in the air. As soon as it is brought to fusion the arsenic begins to escape, and the copper regains its malleability: the last portions however of arsenic are not driven off even by long continued heat, and although the copper regains its malleability, its colour remains of a dingy yellow.

Vauquelin has discovered that if to an alloy of copper and silver, in equal proportions (the colour of which is a pale yellow), there be added 2 per cent. of arsenic, the result is a perfectly white ductile and malleable alloy. If this latter ingredient exceeds 5 per cent. the alloy begins to be brittle.

Copper with iron.

These two metals only unite when the former of them is greatly in excess. The result is a hard, grey, and somewhat brittle alloy. According to Mr. Keir, the *tutenag* of the Chinese is a white alloy of copper, zinc, and iron: it is hard, tough, and sufficiently malleable to be wrought into candlesticks and various other articles of domestic furniture, which take a high polish, and are scarcely to be distinguished from silver. The inferior sort of *tutenag* has, however, a very perceptible brassy tinge.

According to D'Azé, the alloy of iron and copper only ceases to be acted on by the magnet, when the proportion of the former is less than $\frac{7}{10}$ of the whole mass. Iron is much inferior in its power of whitening copper to tin or even to arsenic.

Copper with lead.

These metals unite, to appearance, very intimately by fusion; but when a mass of this alloy is exposed to a very low red heat, the greater part of the lead, with a small portion of copper, sweats out, leaving the rest in a porous honey-combed state. When the copper holds a little silver, the lead carries the latter out with it: this process is called *eliquation*, and will be treated of more at large in the article SILVER. Copper, with about a fourth of its weight of lead, forms *pot-metal*. The Roman pot metal was composed, according to Pliny, of 100 parts copper, 2 lead, and 2 tin. The same ingredients, but with larger proportions of the two latter, were the materials of many of the ancient Greek and Sicilian coins, as appears from analyses of them by Klaproth.

Copper with zinc.

Copper, when nearly saturated with zinc, that is, when

the latter amounts to about one-fourth of the alloy, forms *brass*, of which an account has been already given. With a smaller proportion of zinc, the colour of the alloy approaches more nearly to that of gold, and its malleability increases. Mixtures, chiefly of these two metals, are employed to form a variety of gold coloured alloys, known by the names of *tombac*, *Mansheim* or *Dutch gold*, *tinzel*, *similar*, *prince Rupert's metal*, *pinchbeck*, &c. the precise composition of which varies according to the fancy or experience of different artists. The Dutch gold may be beaten into extremely fine leaves, which when fresh are a cheap and good imitation of gold leaf; but they tarnish very soon. The mixture may be made either by melting together copper and zinc, or copper and brass. In either case the copper should be melted first, and the other ingredient added afterwards: being then carefully stirred together with a stick, the alloy is to be poured out into proper moulds without loss of time, lest the zinc should burn off.

A fine malleable *tombac* may be made with 16 parts of copper, one of zinc, and one of tin; if a larger proportion of this latter is added, the alloy becomes harder and brittle. Several Roman coins struck, during the first century of the emperors, have been analyzed by Klaproth, and appear to consist, some of nearly pure copper, others of copper, with from a fifth to a sixth of zinc. A little tin and lead were found in some, but in such small proportions as to appear only an accidental impurity.

Copper with tin.

The alloy of copper and tin are extremely important in the arts, and curious as chemical mixtures. Tin added to copper makes it more fusible, less liable to rust or be corroded by the air and other common substances, harder, denser, and more sonorous. In these respects the alloy has a real advantage over unmixed copper; but this is in many cases more than counterbalanced by the great brittleness which even a moderate portion of tin imparts, and which is a singular circumstance, considering how very malleable both metals are before mixture.

The sensible qualities of the different mixtures of these two metals are the following: Copper, alloyed with from one to five per cent. of tin, is much harder than before; its colour is yellow, with a cast of red, and its fracture is granular: it is still considerably malleable. This appears to be the usual composition of many of the ancient edged tools and weapons before the use of iron; when it appears that the ancients did not possess (as has often been supposed) any peculiar art of hardening pure copper, otherwise than by mixture. An alloy in which the tin is from $\frac{1}{15}$ to $\frac{1}{4}$ of the whole is hard, brittle; but still a little malleable, close-grained, and yellowish white. When the tin is as much as $\frac{2}{3}$ of the mass, it is entirely brittle, and continues so in every higher proportion. The yellowness of the alloy is not entirely lost till the tin amounts to $\frac{2}{3}$ of the whole.

Copper (or sometimes copper with a little zinc) alloyed with as much tin as will make from about $\frac{1}{15}$ to $\frac{1}{4}$ of the whole, forms an alloy which is principally employed for bells, brass cannon (so called), bronze statues, and various other purposes. Hence it is called *bronze* or *bell-metal*, and is excellently fitted for the uses to which it is applied by its hardness, density, sonorousness, and fusibility. For cannon a lower proportion of tin is commonly used. According to Dr. Watson, the metal employed at Woolwich consists of 100 parts of copper, and from 8 to 12 of tin; hence it retains some little malleability, and therefore is tougher than it would be with a larger portion of tin. A common alloy for bell-metal is 80 of copper and 20 of tin; some artists add to these ingredients, zinc, antimony, and silver, in

small proportions, all of which certainly improve the sonorousness of the compound.

When in an alloy of copper and tin, the latter metal amounts to about $\frac{1}{3}$ of the mass, the result is a beautifully white alloy, with a lustre almost equal to that of mercury; extremely hard, very close-grained, and perfectly brittle. It takes an exquisite polish, which well adapts it for the reflection of light for all optical purposes. It is called *speculum metal*, and, besides the above ingredients, generally contains a little arsenic, zinc, or silver. The application of an alloy, similar to the above, to the construction of mirrors, is of great antiquity, being mentioned by Pliny. From the actual analysis, by Klaproth, of a portion of an ancient speculum, it appeared to consist of

Copper	62
Tin	32
Lead	8
<hr/>	
	102
<hr/>	

Of these ingredients the last is considered by Klaproth, with high probability, as only a casual adulteration of the tin.

When the amount of the tin exceeds that of the copper, the alloy begins to lose its splendid whiteness, and acquires a bluish-grey hue; its texture likewise becomes rough-grained, and, as it were, rotten and incapable of receiving a polish.

A perfect speculum metal should be quite white, without showing any cast of yellow when polished, not very liable to tarnish, quite free from pores, even when examined by a lens, of a certain coherence or toughness to bear the grinder, and, for the convenience of working, as soft as may be consistent with the other requisites.

Mr. Mudge, whose specula were celebrated for their goodness, observes, that the extreme of whiteness is given by 32 parts of copper and 16 of tin, but this compound is too hard and brittle; 32 parts of copper with $14\frac{1}{2}$ of tin form an alloy quite white, and as hard as can be wrought. In order that the metal should turn out free from pores, it ought to be twice fused, once for mixture of the ingredients, and afterwards, with as little heat as possible, for casting.

The following observations on the same subject are extracted from an elaborate paper by Mr. Edwards, published in the *Nautical Almanack* for 1787.

The quality of the copper should first be tried by adding successively from so much short of half of its weight of tin, that the mixture proves a little yellow, to the full half of tin, and by comparison of the various samples ascertaining the *maximum* of whiteness. When this is found, take 32 parts of copper, melt it, then add one part of brass and the same of silver, with a little black flux to cover the surface; when these are melted stir them together with a wooden rod, and pour in from 15 to 16 parts of tin (as ascertained by previous experiment) fused in a separate crucible, at a low heat; then stir the mixture again, and immediately pour it into cold water. Re-melt, with as little heat as possible, the alloy thus formed, and for every 16 parts take one of white arsenic, wrap it in paper, thrust the packet to the bottom of the fluid metal with a wooden rod, and stir it well as long as any arsenical vapours arise; when these cease pour the metal into a mould of sand, and as soon as it has solidified lay it in a pot full of very hot embers, and cool it very slowly: unless this precaution is particularly observed, the metal will fly in pieces when cold, or will split in the polishing.

The brass, the silver, and the arsenic in this composition appear to have their distinct use; the brass makes the mixture tougher, and somewhat brittle, the silver improves its colour, and the arsenic renders the texture remarkably finer, closer, and less porous; a larger proportion of this however would make the metal liable to tarnish.

Sir J. Newton's specula were composed of 6 parts of copper, 2 tin, and 1 arsenic; they are upon the whole very good; but after being polished exhibit a rather yellow cast.

The other alloys of copper are not of much importance, and will be found under the respective metals to which they belong.

COPPER, in *Military Affairs*, a kind of metal white as silver, frequently brought from China, and supposed by many to be natural. But it is only an alloy of copper, zinc, and arsenic, in certain proportions. It is made with difficulty, because of the volatility of the two semi-metals; and, as its quality is noxious, it is not much used.

COPPER, in *Military Affairs*. No other metal is allowed in magazines, or for barrels of gun-powder.

COPPER, in *Calico-Printing*, a vessel in which the operations of dyeing, dunging, rinsing, &c. are performed, and which derives its name from the material it is generally constructed of. As these vessels are used indifferently for any of the above purposes, their size, form, and arrangement, are generally the same, and vary little throughout the whole kingdom. They are always circular, from $4\frac{1}{2}$ to 5 feet diameter at the top; $3\frac{1}{2}$ to four feet deep, and about the same in width, across the bottom, which is the thickest and stoutest part of the vessel. This circular form, though in general use, is perhaps the worst that could have been devised for the purpose of calico-printing. It is no doubt the first that was employed, and has advantages in point of solidity of form, and ease of transportation from one place to another, over any other. For the purpose of dyeing, however, or any operations where goods are kept for a long time at a boiling heat, and turned over the winch, it is the most inconvenient that could have been adopted.

In a vessel of this size and form, it is customary to dye from six to twelve pieces of twenty-eight yards each, at one operation. The goods are disposed either in two lengths of four or six over the winch; or, when quick turning is necessary, in one length only, in which case, six pieces, or at most eight, are disposed equally over the whole surface of the winch. In this latter case, the inconvenience of the circular form is particularly felt. It is evident that when six or more pieces are crowded upon a winch, those which are at the extremities will have little or no space in which to float, without disturbing those which are nearer the centre; whilst, on the other hand, those which are in the middle will have more than sufficient, and will float in the copper, scarcely ever touching its sides. In consequence of this, the pieces at the extremities of the winch, being crowded, will press along the sides of the copper, and thus be exposed to greater heat and hazard of copper-marking, than those which are in the middle. Their disposition on the winch will also be deranged, and the copper-man, with all his care and attention, will be unable to preserve that order and regularity in the distribution of their folds, so essentially requisite in good dyeing. When the copper is in a state of ebullition, these evils increase, and it rarely happens that the most experienced dyer can keep his goods disengaged, or prevent their getting completely fastened, when he has two lengths of six over the winch, and keeps them twenty or thirty minutes at an actual boil.

By adopting a square, or, what is still better, an oblong vessel of the same capacity as the former, these inconveniences are in a great measure done away; the goods have all equal space to float in, are equally removed from the centre and sides of the vessel, and preserve their order and disposition on the winch, even in a state of ebullition, with ease, certainty, and comparatively trifling attention.

Dye-coppers are generally set up in brick work, with each their separate and distinct fire-place, chimney, &c.

The same principles apply to the heating of these vessels as to all other boilers, but we need not enter here upon a subject which will be more fully treated of in another part of this work. The recent improvements in the application of steam, as a vehicle of heat, are however of such importance, and have at this moment excited such general interest amongst dyers, and calico-printers, as to claim a short notice in this place.

Mr Gott, of Leeds, was the first who applied steam in the large way, to the heating of dye-coppers, and the success of his experiment was so complete, as to induce many others to follow his example. This mode, which is the simplest and most economical that can be employed, consists in throwing the steam directly into the dyeing vessel. One steam boiler, situated at the extremity of the building, supplies his numerous coppers which are disposed promiscuously about the dye-house, unincumbered with fire-places, ash-pits, chimneys, &c. and simply surrounded with a casing of brick, to support the copper, and confine the heat.

The steam is conveyed in horizontal pipes, carried along the ceiling of the dye-house, from which descend vertical tubes of from $\frac{3}{4}$ of an inch to $2\frac{1}{2}$ inches diameter, according to the size of the copper they belong to. These steam tubes all pass down on the outside of their coppers, and enter them horizontally at the level of their bottoms; and are furnished with brass cocks for regulating the admission of the steam, or entirely interrupting it when the copper is not wanted.

The rapidity with which these coppers are heated, is truly astonishing. One of the largest in Mr. Gott's dye-house of 1800 gallons capacity, according to count Rumford, was brought to the boiling point in half an hour. The saving of fuel, though in general over-rated, is another advantage gained by this mode of applying heat. Mr. Gott states this at two-thirds of the quantity consumed when the coppers are heated by separate fire-places; but this is evidently too much. The saving consists in the application of fire to one vessel only of large dimensions, instead of to a number of small ones; and though this is certainly accomplished with less expence of fuel, yet, if the fire has been well and properly applied in the latter case, the saving will amount nearer to one-third than to two.

The burning of the copper sides and bottoms, when heated by a naked fire, is a heavy expence in a large establishment, and often a source of serious inconvenience. By the application of steam, this is entirely done away, and even copper vessels themselves, for many operations, rendered wholly unnecessary. Wooden vessels have been substituted, with great advantage, in their stead, and when the use of copper cannot be dispensed with, it may be employed in thin sheets, supported by a frame work of brick or wood. Important as these advantages are in an economical point of view, the system of steam-heating has, if possible, still more powerful recommendations. The ease, elegance, and regularity, with which the heat can be transmitted by a steam tube, are of themselves sufficient to entitle it to decided preference.

By the adjustment of the steam-cock, the rate of heating is so regulated, that the copper may be brought to the boiling point in any given time, with an exactness as well as celerity, unattainable by the other mode. The heat may in an instant be withdrawn, or rendered stationary at any fixed point, by a single turn of the cock, the first of which is impracticable, and the latter extremely difficult, when the coppers are heated by separate fire-places. The sides and bottom of a dyeing copper, exposed to a strong and naked fire, are always much hotter than the dye-liquor, and occasion copper-marks and unevenness in the goods, in some cases difficult to avoid. This inconvenience is entirely removed by the use of steam, since the dyeing-vessel deriving all its heat from the heated liquor within it, can never, it is evident, acquire a higher temperature.

The success of Mr. Gott's experiments was such, that many of his neighbours, at first much prejudiced against it, immediately adopted the plan. With a liberality worthy of imitation, his dye-house was open to all inquirers; and such was the interest excited by this new and extraordinary mode of applying heat, that experiments were immediately instituted in different parts of the country, with a view of extending this improvement to other branches of the art of dyeing. Mr. Gott had proved and established the practice as far as the dyeing of woollen goods was concerned, and little more remained to be done; in its application to calico-printing and the dyeing of lighter goods, however, difficulties occurred, of such a nature, as wholly to discourage many whose trials were made in a hasty ill-considered manner, and considerably to embarrass those whose experiments were conducted with greater skill and patience.

The great, and only well-founded, objection arose from the agitation into which the water was thrown when it approached the boiling point, by which the goods were entangled and fastened, much more than in the ordinary mode. This inconvenience was not felt in Mr. Gott's dye-house, where the goods being woollen, and of much greater weight and substance, were less liable to be tossed about by the ascending currents from the steam-tubes than the thin and lighter goods manufactured from cotton. The evil was often increased by want of sufficient attention to the regulation of the steam-cock; thrice the quantity of steam necessary to maintain the copper at the boiling point being admitted, which, retaining its elastic form at that temperature, passed through the copper uncondensed, and threw the goods into the greatest confusion.

To diminish the agitation, it has been found necessary to break the force of the current, by introducing the steam in small quantities, through two or three different openings, or in some cases by introducing a false bottom, pierced full of holes, between the goods and the end of the steam-tube; by this means, and still more by carefully admitting only the necessary quantity of steam, the agitation may be so far reduced, as to be no longer troublesome.

The accumulation of condensed water in the dye-copper, is a necessary consequence of this mode of applying steam, and cannot be avoided. Where it is an object to diminish this as much as possible, it may be accomplished by using strong, or which is the same thing, very hot steam; but it does not appear that any great inconvenience results from this trifling increase, which ceases when the copper has attained the boiling point, due allowance being made for it in the first instance, when the vessel is filled with cold water.

When strong steam is rapidly thrown into a vessel filled with

with cold water, the condensation is instantaneous, and attended with a loud noise, and violent shock.

We have seen a stone cistern of large dimensions, and firm joinings, nearly shaken to pieces by the incautious admission of steam, and many of the early experimenters complained that their coppers were nearly knocked to pieces, and that few would hold water after being heated once or twice.

This inconvenience may be corrected by stopping the end of the steam tube, and piercing the sides full of small holes, or, which is still better, by turning up the end of the pipe, and fixing a valve in it. In either case the steam is emitted through the openings in steamjets, or sheets of small volume, whose condensation is attended with trifling noise, and little agitation of the vessel. Several dye-houses in Lancashire and Cheshire have been fitted up on these principles, and the coppers, thus heated, are used, with few exceptions, for every purpose of calico-printing.

Mr. Gott, as we have before stated, was the first who introduced this improvement on a large scale, the idea of which, count Rumford informs us, was derived from the perusal of his seventh Essay. We know not what share the count's publication might have in deciding the trial, but the idea of heating water by steam had occurred long before that time to Mr. Watt; and, if we mistake not, a warm bath at Soho had been heated in this way, and seen by Mr. Gott, and many others, to whom the idea of its application to more useful purposes had naturally occurred.

For some few purposes we believe this mode of applying heat, by throwing steam directly into the dye-copper, is less advantageous. When goods, for example, are kept a long time at a low heat and never boiled, the accumulation of condensed water, in this case, continues to the end of the operation, and weakens considerably the effect of the dye. All the advantages of this mode may, however, be obtained without any of the inconveniences we have before alluded to, by surrounding the dyeing-vessel with a casing of cast iron, and throwing the steam in between this and the copper. The heat in this case is transmitted through the sides of the copper, as in the ordinary mode of heating by a naked fire, and the condensed water is carried off from the casing either by a reversed syphon, eight or nine feet long, or, when the situation will not admit of this, by a floating valve. In this way the noise and shock, from the rapid condensation of steam in cold water, the agitation in the dye-copper, and the condensed water, are all completely got rid of. The apparatus is, however, less simple and much more expensive than the former.

A strong steam is necessary to produce the boiling heat in a dye copper cooled by the continued exposure of the goods on the winch, and the vessel and joints must be found strong to support this pressure. Both modes have their advantages, and will, we have little doubt, in a few years entirely supersede the ordinary mode of heating by separate fire places.

Copper mark, is a stain, discolouration, and unevenness in dyed goods, caused by contact with the sides of a hot or dirty copper, during the operation of dyeing. In the ordinary mode of heating, as has been observed in the foregoing article, the bottom and sides of a dyeing-vessel, when exposed to a strong and naked fire, are much hotter than the dye-liquor. When this is the case, and the colours pale and delicate, simple contact with the hot copper is sufficient to cause unevenness, either by affecting the hue by the excess of heat, or enabling the mordant to combine with an extra portion of colouring matter. This inconvenience is in general remedied by placing a basket of wicker work within the

copper, which prevents the goods from touching the sides of the vessel; it is still more completely guarded against by heating the copper with steam, in the manner already described.

The sides of a copper will often occasion marks or stains when the vessel has been negligently washed out, and especially when it has not been used for some time. A dye-copper not in use should always remain filled with clean water. It prevents the formation of a rust on its surface, which simple washing will not remove, and which acts as a mordant, and fixes the dye whenever it touches the cloth.

Copper Island, in Geography, otherwise called *Меднои Остров*, i. e. Mednoi island, lies in the sea of Kamtschatka, which separates the two continents of Asia and America. It takes its name from large masses of native copper found upon the beach; and as it lies full in sight of Beering's isle, it was easily and speedily discovered by those who succeeded Beering. These two uninhabited spots, to which the sea-otters and other marine animals were accustomed to resort in great numbers, and which were first visited in 1741, were for some time the only islands that were known, until a scarcity of land and sea-animals, whose numbers were greatly diminished by the Russian hunters, occasioned other expeditions. Besides the native copper which is found on the coast of this island, the true right camphor-wood, and another sort of wood, very white, soft, and sweet-scented, are found among the floating bodies which the sea casts upon the shore. The copper lies on the shore in such abundance, that many ships might be laden with it; and an Indian trader might make a profitable voyage from thence to China, where this metal is in high demand. This copper is mostly in a metallic or malleable state, and many pieces of it seem as if they had been formerly in fusion. The island is not high, but has many hillocks, each of which has the appearance of having formerly been the funnel of a volcano. This island, as well as the others in its vicinity, are subject to frequent and violent earthquakes, and abound in sulphur. (Cox's Russian Discoveries.) From the account in captain Cook's Third Voyage (vol. iii. p. 247.) we learn, that, on Mednoi and Beering's island, scarcely a sea-otter is now to be found; though it appears from Muller, that in his time they were exceedingly plentiful.

Copper-Plates for Engraving. We are favoured with the following account of the method of preparing copper-plates, as practised at present in London, by Mr. Harris, son-in-law and successor to Mr. Whitton of Shoe-lane.

A sheet of copper must be chosen as free as possible from flaws, and of a somewhat greater thickness than the finished plate is intended to be: it is then to be scraped all over with a *scraper*, in shape something like the head of a spear, and fixed in a handle long enough to go under the arm, the other hand holding the tool near the cutting part. When it has been perfectly freed from the outward crust, scales, or rust, it must be carefully examined to see if there are any holes or flaws in it; if there are (which is almost always the case), they must be scooped out by a tool called a *scoper*. This being done, it is next to be well and regularly hammered all over on an anvil, of a considerable degree of convexity, in order to harden it; and afterwards on a broad and nearly flat anvil, to flatten and planish it. After this has been performed, it is to be cut to the size wanted, and the edges a little chamfered or bevilled, and is now to be stoned, that is, rubbed all over with a salt cutting, but not very coarse, grit stone, care being taken to use a great quantity of water, to float off the particles mutually abraded from the copper and stone. When it is judged that all the marks of the scoper

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nad hammer are rubbed out, a stone of a fine grit is to be used in the same manner, and after this a third.

The two first-mentioned stones are sold at the ironmongers in London, under the name of "Carpenters' stone;" the best kind are brought principally from the coal fields in the neighbourhood of Bilton in Staffordshire. The stone last used is called "Water of Aye stone," and brought from Dumfriesshire. All the three kinds contain a considerable quantity of argil in their composition. Lately, a very fine grained argillaceous grit, brought from the neighbourhood of Sheffield, has been used instead of the Bilton stone.

After the operation of floning has been performed, the plate is to be "enald." This is done by rubbing it first with charcoal of birch-wood, or alder, and water, and then with charcoal of willow: the latter gives the finer polish, particularly if oil instead of water be used. Sometimes the plates are finished by burnishing, but this is not now often done.

The charcoal is not prepared by the copper-plate makers, but is procured from the dealers in that article by the workmen, who take a plate of copper, and by trial discover which pieces are fit for their purpose.

COPPER-Plate Printing. See *Rolling-press* PRINTING.

COPPER-Plate Work, in Calico-Printing. The application of engraving has given birth to a new and important branch of calico-printing. It first introduced those machines whose subsequent improvement has so much contributed to the perfection of the art, and which surpass the ordinary mode of block-printing, not only in neatness, accuracy, and precision, but still more in the economy and activity with which the labour is performed.

These machines are of two kinds, the flat press, and the rolling or cylinder press.

The flat press, in its original form, was merely a modification, considerably enlarged, of the press for ornamental prints or engravings; to which was added a contrivance for joining, with accuracy, the numerous and successive impressions necessary to cover a piece of cloth. It was confined at first to one colour, but later improvements have extended it to two and even three. The single colour presses are, however, principally in use.

The cylinder, or rolling-press, is of later invention, and differs from the former chiefly in the substitution of an engraved cylinder for a flat plate. With the latter the cloth is printed by successive impressions, in which the accuracy of the joining is of great importance: in the rolling-press, the revolution of the engraved cylinder forms one continued impression, from one end of the piece to the other, in which there are consequently no joinings. This is a great advantage, especially in small and delicate patterns, where a variation of a hair's breadth in the joint is readily perceived; but its great superiority over the flat press consists in the economy of time and labour. With a well-constructed cylinder-press, and proper arrangements for accelerating the work, one man and a boy will print 200 pieces, of 28 yards each, in the same time that a flat press man will print 12 pieces, or a block printer 8; that is, in one day. They are constructed to work one, two, and even three colours, but are generally confined to one; the difficulty and delay in adjusting the several cylinders to each other, when more than one colour is worked, counteracting, in great measure, the chief advantage of the machine. For a description of these presses, and the mode of working them, see *Press*. See also the article *ENGRAVING*.

COPPERAS, a term employed popularly and by the old chemists as synonymous with vitriol. Of Copperas there are three kinds, the *Green* or Sulphat of IRON, the *Blue* or Sul-

phat of COPPER, and the *White* or Sulphat of ZINC, which see.

The former is distinguished in common by a variety of names, as Martial vitriol and Roman vitriol, but most commonly by the names of green copperas or green vitriol. It is seldom made by the direct combination of sulphuric acid with the oxyd of iron, which constitutes this substance, except for the purposes of experiment in the laboratory of the chemist. The common, as well as the refined, is manufactured on the large scale, as an article of commerce, in the neighbourhood of collieries, and is in some instances found native. It was known to the ancients, as Pliny informs us, (N. H. l. xxiv. c. 12.) and denominated by them Misy, Sory, or Calcanthum. Concentrated sulphuric acid has scarcely any action on iron; when it is heated the acid is decomposed, part of its oxygen combines with the iron and sulphurous acid gas is evolved, but when diluted sulphuric acid is added to iron filings, a violent effervescence takes place, and hydrogen gas is disengaged; in this process the water, with which the acid is diluted, is decomposed, the oxygen of which combines with the iron; and converts it into an oxyde; whilst the hydrogen escapes in the form of gas, the solution is of a green colour, and by evaporation affords crystals of sulphat of iron which are transparent, of a fine green colour, in the form of rhomboidal prisms, having an acid astringent taste; this salt almost always reddens vegetable blues, is very soluble; two parts of cold water, or less than its weight of boiling water, being sufficient for its solution.

The mode of preparing it, as an article of commerce, is pursued principally, as before observed, in the neighbourhood of coal pits, in many of which a substance is found in great abundance, which, though injurious to the coal, forms nevertheless a valuable material as being the basis of copperas, known by the name of pyrites or brasses; these are carefully separated from the coal, and the expence which this labour occasions, is amply repaid by the produce of the manufacture; the process is at once simple and economical, and does honour to the intelligence of those who first suggested it. A large area of ground is inclosed, to which a gentle but sensible declivity is given; the surface is made quite equal, and covered with an unctuous clay, which is every year extended and smoothed, as if plastered, in order to prevent the water from filtrating into the earth; at the same time a furrow is formed in the middle of the area, for collecting all the water in one point, and conveying it to a reservoir; the area being thus prepared, the pyrites are spread all over its surface, in layers one above another to the height of several feet; care is taken in placing the different pieces to leave intervals for the admission of the air: now as these pyrites contain iron in combination with sulphur, when they are exposed to the alternate action of water and the atmosphere, they undergo a material change, the water is decomposed, one of its constituent parts, namely, the oxygen, combines with the sulphur, and forms sulphuric acid, or oil of vitriol; the hydrogen escapes into the atmosphere, by this means a saline powdery mass is formed, the taste of which is aultere and styptic; the decomposition is materially assisted by occasionally turning the pyrites with rakes having long iron teeth, like those used in Glasgow and neighbouring places, for stirring the boiling ingredients of the glue maker, by which means new surfaces are presented to the action of the atmosphere. In summer, when it is long dry weather, it is necessary to sprinkle the brasses frequently with water, to wash away the salt which is already formed, and also to produce that humid warmth which accelerates still further the decomposition; gentle showers are therefore excellent for bringing forward this part of the operation. The water loaded with vitriol,

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finding a clay bottom, which prevents its losing itself in the earth, flows down the inclined plane, and falls into the reservoir, in which a quantity of old iron is placed, purchased principally from the smiths and the coopers, as their refuse. It is well known that, during the decomposition of the pyrites, more sulphuric acid is produced, than the iron contained in them will neutralize; the refuse iron is therefore placed in the reservoir and the liquor run upon it, in order to combine with the superabundant acid. The natural evaporation which takes place here adds to its strength, and, when it is conceived to be properly prepared, it is drawn off into a second reservoir, attached to the workhouses of the manufactory; from thence it passes into leaden boilers, where it is made to boil and evaporate by a large fire, formed of the most inferior kind of coal; when the liquor is brought to a proper state, it is run out by syphons, or drawn out by pumps, into long wooden troughs, where it is crystallized by the operation of cold, the crystals attaching themselves to twigs and branches of trees, which are suspended in the troughs for the purpose by being hung over pieces of wood, several of which are laid across the top of each trough; from these branches they are taken and dried, and are then ready for the market.

Refined Copper is an improvement in the mode of preparing coppers, and was discovered by the late Mr. Thomas Barnes, of Walker, near Newcastle-upon-Tyne, a coal viewer of the first eminence in that neighbourhood; this is effected by merely evaporating still further than in the common mode the water of crystallization, and attending throughout the whole process to a little more cleanliness and exactness in the manipulations.

Two or three men are sufficient to manage a manufactory of either kind, and to produce a great quantity of the articles; considering which, and the rate it sells at, at present (1806) from 10 to 14*l.* per ton, it ranks with the most beneficial manufactories.

Amongst the few places in which this salt is found native, we shall only notice that at Hurlet near Paisley, in a stratum of schistus, sunk through in 1789 to a seam of coal, pyrites abound so much, that native coppers is sometimes found; it does not in this instance lie in any regular bed, but is interperched through the stratum, and separated from the coal by the workmen. These works were established in 1753 by a company of gentlemen from Liverpool, for the sole purpose of making alum, but finding both pyrites and native coppers, they added the manufacture of that article also.

COPPERAS stone. See PYRITES.

COPPER Mine, in Geography, a large river in the central parts of N. America, reckoned to be the most northern in the American continent. Pursuing a northern course, it falls into the sea in N. lat. 72°, and W. long. 120°, according to Mr. Hearne, and 113° according to the position assigned it by Mr. Arrowsmith. In 1771 Mr. Hearne arrived at this river, who found that it flows into the Arctic ocean, or rather, as he intimates in the preface to his book, published in 1795, into an inland sea like that of Hudson. From his journeys, performed in 1769—1772, we may infer, with a great degree of confidence, that the search after a N. W. passage is not likely to succeed. Upon his arrival at the copper river, on the 14th of July 1771, the savages who attended him murdered, in a shocking manner, some of his families. On the 17th he was within sight of the sea; and commencing his survey, pursued it to the mouth of the river, which he found so full of shoals and falls, that it was not navigable even for a boat, and that it emptied itself into the sea over a ridge or bar. As the tide was out, he perceived

by marks on the edge of the ice, that it flowed about 12 or 14 feet, and of course could reach but a little way within the river's mouth, and he found the water perfectly fresh. He concluded that this river ran into the sea, or some branch of it, by the quantity of whalebone and seal-skins which the Eskimos, (or Etiquimaux) had at their huts, and also by the number of seals which he saw on the ice. It has been suggested that, as he did not taste the water, which seems somewhat surprising, this sea, or branch of it, as he conceived it to be, might have been a fresh water lake. Seals, it is observed, are not uncommon in the sea of Daikal; and the whalebone might have been procured in barter. The supposed tide is not unknown on occasion of high winds in the southern lakes. However this be, Mr. Hearne says, that he had an extensive view of the sea, and that, from the mouth of the river, it was full of islands and shoals, as far as he could see with the assistance of a good pocket telescope. The ice was not then broken up, but was thawed for about $\frac{1}{2}$ of a mile from the main shore, and to a little distance round the islands and shoals. The Eskimos here were of a dirty copper colour, and rather shorter in stature than those to the south. Their kettles were made of lapis ollaris, of a mixed brown and white; and their bat-lets and knives were of copper. The dogs have sharp erect ears, sharp noses, and bushy tails, being a fine breed of that sort. Many kinds of sea fowl were observed: and in the ponds and marshes swans, geese, curlews, and plovers. The quadrupeds are mink, cattle, rein-deer, bears, wolves, wolverenes, foxes, Alpine hares, squirrels, ermins, mice. Mr. Hearne, in the prosecution of his survey, visited one of the copper mines, about 30 miles S.E. from the mouth of the river, which was merely a hill that seemed to have been rent by an earthquake, or perhaps by subterraneous water. The copper is found in lumps, and is beaten out by the help of fire and two stones.

COPPER-Mine hills, hills of N. America, in N. lat. 68° 30'. W. long. 112°.

COPPET, a small town of the Pays de Vaud, in Switzerland, delightfully situated on the banks of the lake of Geneva, 12 miles N. of Geneva. It is an ancient Swiss barony, comprising eight villages besides the town; its territory produces excellent red wine. The castle which commands the lake sustained an obstinate siege in 1536 against the troops of Berne, who at last reduced it to ashes. In the year 1657, the barony of Coppet was bought by Frederick, count of Donau. He rebuilt the castle in a modern style, but his son sold the estate to an inhabitant of St. Gall, from whose descendants it was purchased some time before the French revolution by the celebrated Necker, who expended large sums in embellishing a seat, the situation of which is truly enchanting, and where he closed his chequered career. He left it to his daughter, the baroness of Stahl Hollein, whose name is dear to French literature, and who was banished to this estate in 1807, for having produced the interesting novel of Corinna. *Durand.* Statistique Elémentaire de la Suisse 1795.

COPPI, JACOPO, in Biography, considered by Lanzi the same person with *Jacopo del Migliò*, was born in the Florentine state in 1523, and was employed, in concurrence with the other expert mannerists of his school, in the large altar pictures of the church of Santa Croce at Florence. If, however, we may judge from the critiques of Borghini and other writers, his merit upon this occasion appeared less conspicuous than in some small pictures of fabulous subjects, which formed part of the ornament of a chœur executed, under the inspection of Vasari, the chief of the Florentine school of that period, for the prince Francesco de Medici: but his masterpiece is a picture representing the crucifixion

in the church of St. Salvatore at Bologna, which, according to Lanzi, is nowise inferior to the finest works of Vasari himself, and may indeed rank with the best productions of the Bolognese artists prior to the Caracci. It is dated 1579. The artist died in 1591. Lanzi. Storia Pittorica.

COPPICIE, in *Rural Economy*, a low sort of inclosed wood, which is cut over at stated periods, for different purposes.

These sorts of woods, wherever there is much demand for the various small stuff which they are capable of affording, yield considerable returns to their owners; particularly where proper care is taken in fencing and preserving them against live stock.

In cases where new coppices are to be raised, it is necessary to bestow great attention on the nature of the soil, and the exposure of the land; adapting the trees and plants to the nature of these, as much as possible; and at the same time, taking into consideration the sorts that are the most useful, and most in request in the particular district or vicinity: as this sort of wood is in general disposed of to the greatest profit and advantage, where there is little trouble of carriage. The ground should be well drained, where it is inclined to be wet, and also well inclosed from the cropping of cattle. Some likewise advise, that where it is covered with bushes or briars, that they should remain to shelter the young growth of wood; and that if there happen to be a moderate quantity of young oak and ash-trees on the spot, to let them stand by all means: always keeping in mind how necessary shelter is for the growth of wood of all kinds and sorts. But that as newly planted coppice-woods, where all the plants are of the same age, there is not the same reason for letting them stand before they are stocked off for underwood, as for young trees planted to fill up old woods. Those which are intended for underwood may, in such newly planted woods, be cut off when planted, or at any age from eight to fourteen years, without injury. Indeed, young woods should not stand too long previous to the first cutting. It is observed in the seventh volume of the Letters and Papers of the Bath Society, that the kinds of wood to be planted in coppices, either in making new ones, or filling up old ones, should be regulated partly by the demands of the country, but chiefly by the peculiar aptitude of the soil and situation to produce particular sorts. Let nature be the guide, says the writer, in planting, and you will seldom do wrong. Particular soils and particular situations will always favour particular kinds of trees: we need not look for the reason, but only for the fact.

The chalk hills of Hampshire are peculiarly proper for beech; the stony loams and clays of the same county, for oak and ash; the mossy steep sides of the Wiltshire downs, for hazel; and the sands of the same district, for ash; the rugged and smooth naked rocks of Mendip, in Somersetshire, produce the lime tree and the walnut in the greatest luxuriance; and on the highest parts of the same Mendip hills, where no other tree can stand the sea-breeze, fycamore flourisheth as well as in the most fertile valley. Taking the general demand of counties, and the peculiarities of different soils, into consideration, it is asserted that there is no kind of wood so generally proper for planting in coppices as ash: the value of ash-poles being at least one-third more, and frequently as much again, *per hundred*, as that of other poles, as being applicable in all ways to some useful purpose or other; the timber being always in request, and saleable at any age or size, at almost the price of oak; and the wood itself being as quick a grower as any, and quicker than most; and, above all, there being but few soils, from the blackest and wettest bogs to the highest and most exposed mountains,

where it will not grow, are reasons why ash is one of the most profitable woods to plant in such coppices as are favourable to its growth. In soils and situations where ash does not grow kindly, let such other sorts of wood be planted as appear to thrive best in similar soils and situations in the same county. Spanish chestnut, though not so general a grower as ash, is a most excellent wood, either for timber or underwood, and wants only to be more known to be higher in estimation. It partakes much of the properties of oak, but excels it in two points, namely, that it grows faster, and that the sap part of the timber is firmer and less corruptible. To fill up woods that are become thin by age or neglect, the proper time is one year, or at the utmost two years, after the underwood is cut. The young plants should be eight or ten feet high, and an inch and an half diameter at the ground, and should be planted without cutting off. If the soil be dry, no other preparation is necessary than barely digging the holes for the plants; if wet, deep drains should be made, to take off the superabundant water. The earth dug from these drains should be thrown out on the lower side of them, and upon this new earth the plants should be planted. If land of this latter description be black and peaty, ash is peculiarly proper for it; and will, if planted on the earth thrown from the drains, make a most surprising progress. If it be a stiff yellow clay, it is generally more favourable to the growth of oak than of ash. In such soils, oak for timber, with a mixture of willow, birch, alder, and Spanish chestnut, for underwood, will perhaps be the most proper. All these kinds should stand one round of the underwood; and if still weak, should stand two, before those are cut off which are intended for underwood. Birch plants are indeed an exception to this rule: they should always be cut off the first round of the underwood; for, if they are large when cut off, the stocks frequently decay and die. In all mixtures of kinds of wood for coppices, those sorts should be used which are not unfriendly to each other, and which will come round fit to be cut together at the same periods; and such kinds should be allowed to stand for timber, and that at such distances as to injure the underwood as little as possible. The plants for filling up old decayed woods of the coppice kind, should be the strongest and best of their kinds. Those which are weak at first will be drawn up by the surrounding underwood, and become, from their increased height, still weaker. At the next cutting of the underwood, they will be blown down; or, if cut off, the shoots will be too weak to grow up with the other underwood. Oak, ash, and Spanish chestnut, should be kept in a nursery for this purpose. Alder and birch plants grow plentifully spontaneously in some countries, and may be taken up for use; if none such are to be obtained, they may be raised from seed sown on a moderate hot-bed, in the open air. Alder is sometimes propagated by taking up old roots, and dividing them into several parts; and hazel may be propagated the same way. Willow is generally planted in cuttings; but a much better way, where there are any old willow stocks, is to slash down the shoots, and fill up the vacant places round such old stocks. The wild cherry, which will grow on almost any soil, and is easily propagated, makes an exceedingly good underwood, though as yet it is but seldom used for that purpose.

It is remarked by the author of *Modern Agriculture*, that the coppice-woods, when the shoots are young, whether of oak, ash, elm, or birch, or a mixture of these with other sorts, are very little attended to in any part of the island, fencing being the only particular which marks the difference between a good and a bad manager. But, he says, when the wood can be sold for different useful purposes, at various

stages of its growth, as is the case in many parts, an essential improvement in the management of coppices might be introduced with great propriety. In all such situations, it would be profitable to the owners, were the stools thinned two or three times between each general cutting. The weedings or thinnings would do much more than defray the expence, while, by admitting a more free circulation of air, and by cutting off the supernumeraries, the principal stools would advance more rapidly, and become by that means fit for sale, perhaps, two or three years sooner than they do by being allowed to remain in a neglected state. This is a circumstance that particularly merits the attention of those who are favourably situated, in regard to market, for the various productions of coppices; as saving two or three years in the regular cuttings would materially enhance the value of the land so occupied.

He further states, that several other improvements in the management of coppices might certainly be effected, were the owners to bestow due attention. It frequently happens, that, from mismanagement in cutting, many of the stools become useless, while scraggy thorns, brambles, &c. are allowed to spring up, and occupy the place of more valuable plants. Were the owners of coppices in general to permit their labourers, or other industrious poor people in the neighbourhood, to dig up the decayed stools and useless brushwood for fuel, under condition that they plant healthy vigorous stools in their places, the coppices by this management would necessarily become more valuable. Much damage also frequently happens from allowing the underwood to remain scattered over the surface of the wood, for a considerable time after it is cut. Every person must be sensible, that if the cuttings are allowed to remain in this situation till after the young stools begin to spring, it is scarcely possible to remove them without breaking or otherwise injuring these tender sprigs. In all auctions of coppices, it ought, therefore, to be an article of sale, that the whole should be carried off the premises in a limited time; and the forester, or wood-officer, should receive injunctions to see this condition of the sale strictly fulfilled.

Much greater care is requisite, the same writer says, in cutting coppices properly than the owners, in many cases, are disposed to bestow. It cannot be supposed, when fifty or a hundred purchasers, with their assistants, are allowed to use their axes with no other view than to cut the wood which they have purchased, without regard to the success of what may be called the next or following crops, that any regard will be bestowed as to the proper manner of cutting. It is certainly of much importance, not only for the future vigour, but also for the durability of the stools, that the stems or stools should be cut in that manner which experience has proved most effectual for answering both purposes. The stools ought to be cut as low as possible, without injuring the stools. When that practice is adopted, the stools remain nearly even with the ground, and consequently in a much better state of preservation than by cutting the stems at the height of six, eight, or ten inches; as, by this method of cutting being frequently repeated, the stools get in process of time, as he has frequently seen, to the height of several feet above the surface soil. Another common error, and which wood-cutters of the above description may be supposed very guilty of, is to leave the butt ends of the stems jagged and uneven, and part of the bark torn off, or loosened all the way down to the stool, than which nothing can be more injurious. The butt-ends of the stems ought rather to be brought to a point in the middle, and the bark remain quite close and firm, otherwise dews and rain drop into the hollows, and either rot or otherwise prove ruinous

to the future health and vigour of the stools. In short, to render a coppice both valuable and lasting, a larger system of management ought to be adopted. For the reasons mentioned above, they ought to be thinned two or three times between every general cutting. The useless brushwood ought to be rooted out, and other more useful plants substituted. Where too much water abounds, drains ought to be opened; the fences at all times kept in a substantial state of repair; and on no consideration whatever should the purchasers of coppices be allowed to cut down the woods. Men employed by the owners, and who are properly bred to the business, ought only to be employed; who, by bestowing proper pains in dressing and pruning the butts and stools as they go along, would thereby ensure the springing of numerous and vigorous stools the following season.

The periods of cutting coppice underwood must be regulated, it is observed in the work first mentioned, by the luxuriance of its growth, and by the demand of the country, and the uses to which the wood is to be applied when cut: but, in general, the common rule of trade will hold good here, *viz.* "that small gains and quick returns make the dealer rich, but long credit ruins." In the article of underwood, not only the interest of money, but the loss of the succeeding growth, tells against the value of standing wood after it is fit to cut, and makes it doubly the advantage of the owner to cut his underwood as early as it is saleable. As soon, therefore, as any kind of wood is fit for the uses of the country, it should then be cut; unless it can be made appear, that it will pay compound interest for standing longer, or, in other words, will pay not only the simple interest of the first value, but also the loss of so many years growth of the wood, as so far advanced towards another crop. Wood merely for fuel can scarcely be cut too young. Hazel is usually fit for hurdles and dead hedges, from nine to twelve years old; ash for sheep-crisbs, at the same age; and ash and other woods for hop-poles, from eleven to fourteen years old: while ash for carpenters, and other large uses; alder, birch, and willow, for rafters, turner's uses, patters, clogs, coal-pit uses, &c. must stand from sixteen to twenty years, before the poles are large enough for their respective purposes. It therefore behoves every owner of woods of the latter description, unless he is public-spirited enough to give up his own profit to the good of the public, to consider well before he suffers his wood to stand to the age of sixteen, eighteen, or twenty years, whether the value of such wood, when cut younger, and sold for other purposes, added to the interest thereof up to the usual period of cutting, and the gain by the growth between these two periods, will not more than equal the value the wood will be of, if suffered to stand so long; and if so, whether he ought not to cut his wood at shorter periods. He will have this additional satisfaction, that, by more frequent cuttings, his wood will be the less liable to decay, by the strong stools smothering the weak ones, as is before explained: and will have an opportunity of letting up more saplings for timber than he could otherwise do. There are many opinions respecting the most proper time of the year for cutting underwood; but there is one rule which, on the seller's part, is without exception, *viz.* that the older the wood is, the later in the spring it should be cut. When old wood is cut early in the winter, and a hard winter follows, the damage done to the stools is very great: young flourishing wood will bear cutting at any time. But on the part of the buyer, it is allowed that all woods are more durable, when cut in the most stagnant state of the sap; and in all cases where bending is required, such as hurdles, hoops, and even dead hedges, the wood cannot be cut too early in the winter, being,

ing, if cut when the sap is rising, brittle, and unfit for those purposes. Oak underwood will, at the present price of bark, pay well for standing till the sap is up for barking it; and it seldom happens that the stocks are injured by cutting it so late in the year.

The best way of disposing of coppice-underwood, to answer the purpose of the seller, is, in the opinion of this writer, to cut it at the seller's expence, before it is sold; to lay it out in ranges or drifts, according to the custom of the country; to value it in that state, and sell it in such sized lots as the number of buyers may warrant: always keeping up a sufficient number to make a competition, and particularly to oblige the buyers to clear the whole out of the wood by the 24th day of June; and never to suffer them to bring their horses into the woods, after any new shoots are shot out, without muzzling them, or at least tying up their heads.

But in the View of Modern Husbandry, Mr. Donaldson thinks, that the more approved method of disposing of coppice, or other under-sized wood, is that which is practised in Northamptonshire. When the season for cutting arrives, which is during the winter months, or before the sap begins to ascend, that operation is performed by people employed by, and who work under the direction of, the owner of the woods or his agent. The part of the wood intended to be sold, is parcelled out into regular sized lots, to suit the convenience of the intended purchasers. The whole of the underwood, growing upon each lot, is indiscriminately cut, and laid in one direction. As soon as the operation of cutting is completed, and the wood parcelled out in a proper manner, a valuation is put on each lot or parcel according to its quality, and the whole is then sold by public auction to such persons as incline to become purchasers, who, over and above the price of the underwood, repay the expence of cutting. This is, however, by no means the general mode in which woods of this description are cut. It is a very common, but a very bad, practice, to sell the coppice under the condition that the purchasers are to be at the expence of cutting it down. This is often performed in such a careless manner, that the stools are so greatly injured, that they either rot or die, or a few weak stunted shoots only spring up.

The price of coppice or underwood varies so exceedingly, that it is almost impossible to form any idea of the value of the acre. Perhaps 8 or 9*l.* may not be far from the average price of coppices, not remarkably situated in regard to market, and when they are cut every twelve or fourteen years. But the value of coppices depends on many circumstances; as the roots of wood, the uses to which they are applied; the price of bark, &c. In some parts of Kent, where hop-poles are in great request, an acre of coppice will yield sometimes 30 or 40*l.* at a cutting. Whereas in Scotland, where the coppices are for the most part oak, and where the wood is chiefly used for fuel, or converted into charcoal, the value of the coppices consists almost entirely in the quantity and quality of the bark, the wood being little more than sufficient to defray the expence of cutting and peeling.

Mr. Mustall, in his "Management of Landed Estates," has remarked, in respect to stub or coppice wood, that "the proper harvesting it as of timber, depends on situation and other circumstances. And that the age or size of cutting must ever be guided by the demand in a given district; whether it be for the use of coal-mines, or for cord-wood, hop-poles, hoops, sticks, faggot-wood, or other ware.

"The mode of disposal is," says he, "to be determined

upon by the succeeding crop. If the land be intended to be appropriated wholly to coppice wood, it is generally the most eligible to dispose of the crop, as it stands, by auction or proposal. But if seedling plants are to be set out for timber stands, or the young shoots from the stubs to be trained up, in the grove manner, it is requisite that a proprietor should employ his own people in reaping the crop, and making it up into such wares as are the most saleable and profitable.

"In cutting down coppice-woods, the main observances are," he thinks, "to cut them in season, to take off the stems, clean and smooth, with upward strokes of the axe, and that the stubs may shoot with the greater certainty; and to cut them off as low as conveniency will allow, in order that the shoots may be few and vigorous."

COPPICE-WOOD, is that sort of small woody growth, which is raised in inclosed woods of the coppice kind, and which is converted to various purposes of the farmer and manufacturer, such as cord-wood, hop-poles, hoop-stuff, hedge-stuff, faggot-wood, and various other ware.

COPPLE-STONES, in *Natural History*, globuli lapidei, rotule lapideæ, boulder-stones, rolled-stones, or pebbles, as some call them, are rounded and worn fragments of stones and rocks, that are not invested with an exterior stony crust or skin, occasioned by concentric laminæ of the stone, but shew the internal plane laminæ broken off and rounded at their edges by attrition. It is of the utmost consequence, in all researches relating to the strata of the earth, to distinguish carefully between copple or boulder-stones, and original nodules of the strata.

COPPY, in *Rural Economy*, is a term sometimes provincially applied to signify a wood of the coppice kind. Thus to coppy, in some districts, signifies to cut over for underwood.

COPRATAS, in *Ancient Geography*, a river of Asia, in the Persian territory, mentioned by Strabo and Diodorus Siculus; the latter of whom says, that it discharged itself into the Tigris.

COPRIA, a name given by Strabo to a shore of Sicily before Tauromenium, because the wrecks of vessels that were lost in the gulf of Charybdis were collected in this place.

COPROCRITICA, from κοπρος, excrement, and κριτα, separate; medicines which purge away the excrements in the guts.

COPROPHAGOS, from κοπρος, and φάγω, I eat; the dung-fly, in *Natural History*, the name given by many authors to the common yellowish fly found on human excrements. There are several other species found on the excrements of various animals, and thence called *meridivora*.

COPROSMA, in *Botany*, (from κοπρος, dung, and σμα, smell, alluding to the offensive smell of the first species.) Forst. Gen. 69. Linn. jun. Supp. 24. Schreb. 1503. Juss. 205. Lam. Ill. pl. 854. Class and order, *polygamia monœcia (pentandria digynia)*; Linn. jun.) Nat. Ord. Rubiaceæ, Juss.

Gen. Ch. *Hermaphrodite flowers*. Cal. Perianth inferior, one-leaved, short, five-toothed, permanent. Cor. monopetalous, bell-shaped, much larger than the calyx, five, six, or seven-lobed; segments acute, erect. Stam. Filaments five, six, or seven, capillary; anthers oblong, bifid at the base, erect, a little incurved, acuminate. Pist. Germ superior, oblong; styles two, filiform, slightly cohering at the base, longer than the corolla, divaricated; stigma simple. Peric. Berry ovate-globular. Seeds two, flat on the inner,

ner, and convex on the outer side, separated from each other by the pulp of the berry. *Male flowers, Cal., Cor., and Stam.,* as in the hermaphrodite. *Pist.* abortive.

Ess. Ch. Calyx one-leaved, five-toothed. Corolla five, six, or seven-cleft. Stamens five, six, or seven. Styles two, long. Berry with two seeds.

Sp. 1. *C. fetidissima*. Forst. Fl. Aust. 138. Linn. jun. Supp. 178. Mart. 1. Lam. 2. "Flowers solitary." A very fetid shrub. 2. *C. lucida*. Forst. Fl. Aust. 137. Linn. jun. Supp. 178. Mart. 2. Lam. 1. "Peduncles compound." A perfectly smooth shrub, resembling phyllis in its habit. Leaves opposite, petioled, egg-shaped, acuminate upwards and downwards, quite entire. *Stipule* interfoliaceous, solitary, combining the leaves, acute. *Peduncles* axillary, solitary, opposite, two-leaved, terminated by heads of pedicelled flowers. Calyx and corolla greenish. Both the species are natives of New Zealand.

COPSE, in *Agriculture*, a term applied to the regulating iron apparatus, which is fixed to the end of the beam of a plough, and to which the team is attached. These irons are of very different forms and constructions according to circumstances.

COPTIS, in *Botany*, (from *κοπτος, scindo*; a name taken from the cut leaves of the plant.) Linn. Transf. vol. viii. p. 305. A genus formed by Mr. Salisbury for *Helleborus trifolius* of Linnæus, which differs from the other hellebores, in having a caducous corolla. See *HELLEBORUS trifolius*.

COPTIS, in *Ancient Geography*. See **COPTOS**.

COPTITES Nomos, a nome of Egypt, extending along the bank of the Nile, which derived its name from *Coptos* or *Ceptis*, its capital.

COPTOSKILL, in *Geography*, a town of America, in the state of New York; 42 miles N. of New York.

COPTOS, Coptus, or Coptis, in *Ancient Geography*, now *Kepht*, a city of Upper Egypt, three miles distant from the Nile, and connected with it by a navigable canal. It was the centre of communication between Egypt and the Red Sea, by a N.E. route to Myos Hormus, situated on the western coast of the Red Sea, and by a S.E. course to Berenice, which was the staple of the trade with India. If Plutarch is to be credited, Isis, upon receiving the news of the death of Osiris, cut off one of her locks in token of grief; and hence the place was named Coptos, which, in the Egyptian language, is said to denote want or privation. This city was inhabited both by the Egyptians and Arabians, and Piny calls it the emporium of commodities brought from India and Arabia, which were conveyed by the Nile to Alexandria. Piny mentions Juliopolis, as being two miles distant from Alexandria, and says that from Juliopolis to Coptos, the voyage of 303 miles was performed in 12 days, when the northerly winds blew; the distance between Berenice and Coptos was, according to the same author, 258 Roman miles, and the journey was performed in 12 days. The road, however, lay through the desert of Thebais, almost entirely destitute of water; but Ptolemy Philadelphus not only repaired the road, but made provision for supplying the want of water by searching for springs; and wherever these were found he built inns, or more probably in the eastern style caravanseras, for the accommodation of merchants. (Strabo, lib. xvii. p. 1157.) In this channel the intercourse between the east and west continued to be carried on during 250 years, as long as Egypt remained an independent kingdom. The Christians were formerly very numerous in the city of Coptos. The rubbish of this ancient city may fill a circumference of two

miles, and sufficiently evinces its former extent. Amidst the ruins are seen several small columns of grey granite lying on the ground, and some large stones, engraved with hieroglyphics. Near it is also a small part of a bridge over the canal by which water was conveyed from the river into a large basin. This place has occasionally afforded medals, small statues of earthen-ware, pieces of rock crystal, and precious stones.

COPULA, in *Logic*, a verb that connects any two terms in a proposition, either negative or affirmative: as, *A rose is sweet*; where *is* is the copula.

COPULATION. See **COITION**, **CONGRESS**, and **CONSUMMATION**.

COPULATIVE Propositions, are those which include several subjects, or several attributes joined together by an affirmative or negative conjunction.

Thus, v. gr. *Poverty and riches do not make a man happy*. Where *and* is the conjunction that couples *poverty* and *riches*.

COPULATIVE Conjunction. See **CONJUNCTION**.

COPY, in *Law*, a transcript of a writing or instrument, made for the use and satisfaction of some of the parties concerned; or in order to preserve the memory thereof. See **COPIA**.

The copy of an inrolled deed is admitted in evidence; but not the copy of a will of lands nor the probates, nor of a common deed where the original may be procured. Few ancient documents do now subsist otherwise than in copies.

COPY is also used for an imitation of any original work; particularly a painting, draught, figure, &c.

The following process for taking a copy of a recent MS., was communicated to the Philomatic Society at Paris, by M. Charles Coquebert. It consists in putting a little sugar in common writing ink, and with this the writing is made on common paper, sized as usual, when a copy is required; this unsized paper is taken and lightly moistened with a sponge. The wet paper is then applied to the writing, and a flat iron, such as is used by laundresses, of a moderate heat, being lightly passed over the unsized paper, the counter-proof or copy is immediately produced. This process is the more interesting, as it requires neither machine nor preparation, and may be used in any situation. That sugar prevents ink from speedily drying, has been long known (see **INK**); and this method of impression has been used in some of our public offices, and elsewhere in England, for some years.

COPY, among *Printers*, denotes the manuscript or original of a book given to print from.

To cast off a copy, is to make a computation of the number of sheets a manuscript will make in print.

In the bookellers' style, a *good copy* is that which produces a saleable book.

Tenant by COPY of court roll. See **TENANT**.

COPY-HOLD, is a tenure for which the tenant has nothing to shew but the *copy* of the roll made by the steward of the lord's court.

The steward of the court is, among other things, to inroll and keep a register of all such tenants as are admitted to any parcel of land, or teneement, belonging to the manor; and the transcript is called the *copy of the court-roll*, which the tenant keeps as his own evidence.

This tenure is called a *base tenure*, because the tenant holds, in some sort, at the will of the lord. Fitzherbert says, it was formerly called *tenure in villenage*; and that *copy hold* is but a modern name.

This is the land which the Saxons called *folk-land*, as being held *sine scripto*, in contradistinction to *bock-land*, or *charter-land*, *terra ex scripto*, and now *free land*, or *free hold*.

However, it is not simply at the lord's will, but according to the custom of the manor; so that if the copy-holder doth not break that custom, and forfeit his tenure, he seems not to stand at the lord's courtesy. These customs are infinite; varying in one point or other, almost in every manor.

Copy-holders are, in reality, no other but villeins (see *VILLEIN*), who, by a long series of immemorial encroachments on the lords, have at last established a customary right to those estates, which before were held absolutely at the lord's will.

This affords a very substantial reason for the great variety of customs that prevail in different manors, with regard both to the descent of the estates, and the privileges belonging to the tenants. By various means the generality of villeins in the kingdom have long sprouted up into copy-holders; their persons being enfranchised by manumission, or long acquiescence; and their estates, in strictness, remaining subject to the same servile conditions and forfeitures as before; though, in general, the villein-services are usually commuted for a small pecuniary quit-rent. In some manors the copy-holders were bound to perform the most servile offices; as to hedge and ditch the lord's grounds, to lop his trees, and reap his corn, and the like; the lord usually finding them meat and drink, and sometimes, (as is still the case in the highlands of Scotland) a minarel or pipe for their diversion. Thus also, in the kingdom of Whidah, on the coast of Africa, the people are bound to cut and carry in the king's corn from off his demesne lands, and are attended by music during the whole time of their labour. See *WHIDAH*.

The custom of the manor is the life of copy-hold estates; for, without a custom, or if copy-holders break their custom, they are subject to the will of the lord; and as a copy-hold is created by custom, it is also guided by custom. (4 Rep. 21.) A copy-holder, whilst he performs his services, and doth not break the custom of the manor, cannot be ejected by the lord; if he be, he shall have trespass against him:—but if a copy-holder refuse to perform his services, it is a breach of the custom, and forfeiture of his estate. Some copyholders hold by the *verge* in *ancient demesne*; so that though they hold by copy, they are a kind of free-holders; some others hold by common tenure, called “mere copy-hold,” whose land, upon the commission of felony, escheats to the lord of the manor.

It should be recollected, however, that copy-hold land cannot be made at this day; for the foundation of a copy-hold is, that it hath been demised time out of mind, by copy of court-roll; and that the tenements are parcel of, or within the manor. 1 Inst. 58. 4 Rep. 24.

Estates held by copy of court-roll, and not at the will of the lord, have been deemed free-hold by lord Coke (1 Inst. 59 b.) and also by others; and by way of distinction from the ordinary kind, they have been denominated “customary free-holds.” Tenants of this description have claimed the right of voting at the election of the knights of the shire. But the stat. 31 Geo. II. c. 14, enacts, that no person holding by copy of court-roll, should have this privilege.

In some manors, where it has been the custom to permit the heir to succeed the ancestor in his tenure, the estates are styled “copy-holds of inheritance;” in others, where the lords have been more vigilant to maintain their rights,

they remain “copy-holds for life,” only; for the custom of the manor has, in both cases, so far superseeded the will of the lord, that provided the services be performed or stipulated for by fealty, he cannot, in the first instance, refuse to admit the heir of his tenant upon his death; nor, in the second, can he remove his present tenant, so long as he lives, though he holds nominally by the precarious tenure of his lord's will. If the lord refuses to admit, he shall be compelled in chancery. (2 Cro. 368.) And if the lord refuse to admit a surrenderee, on account of a disagreement about the fine to be paid, the court of B. R. will grant a mandamus to compel the lord to admit without examining the right to the fine. (2 Term Rep. 484.) But that court will not grant a mandamus to admit a copy-holder by descent; because, without admittance, he has a complete title against all but the lord. (2 Term Rep. 198.) Copy-holds descend, according to the rules and maxims of the common law (unless in particular manors there are contrary customs of great antiquity); but such customary inheritances shall not be assets, to charge the heir in action of debt, &c. (4 Rep. 22.) though a lease for one year, of copy-hold lands, which is warranted by the common law, shall be assets in the hands of an executor. (1 Vent. 163.) Copy-holders hold their estates free of dower, being created by custom, which is paramount to title of dower. (4 Rep. 24.) By particular custom, there may be dower and tenancy by the curtesy. (Cro. Eliz. 361.) There may be an estate-tail in copy-hold lands by custom, with the co-operation of the stat. W. II. And as a copy-hold may be entailed by custom, so by custom the tail may be cut off by surrender. (1 Inst. 61.) A copy-hold may be barred by a recovery, by special custom; and a surrender may bar the issue by custom. A fine and recovery at common law will not destroy a copy-hold estate; because common law assurances do not work upon the assurance of the copy-hold; though copy-hold lands are within the stat. 4 Hen. VII. c. 24, of fines and proclamations, and five years non-claim, and shall be barred. (1 Rol. Abr. 506.) Copy-holds are not within the statute 27 Hen. VIII. c. 10, of jointures; nor stat. 32 Hen. VIII. c. 28, of leases; copy-holds being in their nature devisable only by copy; they are not within the statute of uses; nor are copy-holds extendible in execution; but they are within the statute of limitation of actions, and the statutes against bankrupts. The lord shall have the custody of lands of idiots, &c. And a copy-holder is not within the act 12 Car. II. c. 24, to dispose of the custody and guardianship of the heir; for, if there be a custom for it, it belongs to the lord of the manor. (3 Lev. 395. 1 Nelf. Abr. 492, 522.) A copy-holder cannot convey or transfer his copy-hold to another, otherwise than by *surrender*; which see.

A manor may be held by copy of court-roll, and the lord of such manor may grant copies; and such customary manor may pass by surrender and admittance, &c.

The fruits and appendages of a copy-hold tenure, which it hath in common with free tenures, are fealty, services, (as well in rents as otherwise,) reliefs, and escheats. The two latter belong only to copy-holds of inheritance, the former to those for life only. Besides these, copyholds have also heriots, wardships, and fine. See each of these articles. See also *FORFEITURE*, *FREENHOLD*, *SURRENDER*, and *TENURE*.

COPY-HOLDER, is defined by West, a person admitted tenant of any lands, or tenements, within a manor, which, time out of mind, by the use and custom thereof, have been devisable to such as will take the same by copy of court-roll, according to the custom of the said manor.

COPYING of LETTERS, and other writings. The celebrated Dr. Franklin made several essays, many years ago, for speedily multiplying the copies of his own hand-writing, which he exhibited to M. Alexis Rochon, of the French National Institute, and director of the Marine Observatory at the port of Brest: an account of which he has given in his memoir on the Typographic Art. This method consisted in writing upon smooth paper, with ink containing much gum, which was afterwards lanced with emery, or powder of cast-iron, and by means of a rolling-press, such as is used by the copper-plate printers, the strokes of the writing were transferred to a plate of rose copper or pewter. This plate supplies as many copies as the depth of the engraving can allow; but the copies are far from being beautiful, and the ground is spotted and spoiled. Before Dr. Franklin's process was communicated to M. Rochon, he showed him that by writing with a steel point on a copper-plate previously varnished, a more satisfactory result might be obtained, by etching the strokes with nitric acid to a sufficient depth, for the subsequent use of a liquid ink similar to that of the printers. In this case, the plate may be wiped without precaution, and twelve or more copies may be pulled off upon coarse paper. These proofs are foul and reversed; and, therefore, in order to have them neat and in the proper direction of the writing, it becomes necessary to place the same number of leaves of white paper, wetted and prepared, upon the twelve proofs; and while the ink is still fresh, the whole being passed together through the rolling-press, the same number of leaves of counter-proofs are obtained as there were proofs; so that instead of twelve turns of the press, thirteen will be required to supply twelve counter-proofs, very black, neat, and legible, even when the plate has not been perfectly wiped. This method is certainly not to be compared with fine engraving; but it may be useful in military operations, and all other cases in which a speedy multiplication of copies is required. No precaution is here necessary; whether the nitrous acid be more or less strong, or remain a longer or shorter time upon the plate, or whether the plate be somewhat heated to increase the strength of the solvent, the process of the operation will never fail; provided the steel point made use of to trace the characters through the varnish, shall lay the copper perfectly bare. It is of advantage that the nitric acid should bite deep, because the counter-proofs are, by these means, much darker. The plate need not be well wiped, because it is of no consequence whether the proof which is used to afford a counter-proof should be very clean, provided that it does not spot the copy intended to be procured. The most liquid kind of printers ink may be used. See ENGRAVING and STEREOTYPE.

In 1780, Mr. James Watt, of Birmingham, obtained a patent for a new method which he had invented to this purpose; of which the following description is given in his specification: Let the letter or other writing, that is intended to be copied, be written with the ink hereinafter described, or with any other writing-ink fit for the purpose. Take a piece, or pieces, of thin paper which contains no size, or glue, or gummy or mucilaginous matter, or which at least does not contain so much size, or other matter, as would make it fit for being written upon. Cut this paper, or papers, to the size and shape of the writing of which a copy is wanted; moisten or wet the same thin paper with water, or other liquid, by means of a sponge or brush, or by dipping, or otherwise. Having moistened or wet the thin paper, lay it between two thick unglazed spongy papers, or between two cloths, or other substances capable of absorbing the superfluous moisture from the thin paper; when it

has been slightly pressed between such thick spongy papers, or other substances, by the hand or otherwise, lay the said thin paper, so moistened and pressed, upon or under the side of the writing which is to be copied, and in such manner that the one side of the said moistened paper shall be in contact all over the side of the said writing, so intended to be copied; and that to the other side of the said moistened thin paper, there shall be applied a piece of clean writing-paper, or cloth, or other smooth uniform substance. Lay the said writing intended to be copied, with the thin moistened paper intended to receive the copy, (placed respectively as above directed,) upon the board of a common rolling-press, or of that of which a description and drawing are hereunder written and drawn, and press them once, or oftener, through the rolls of the said press, in the same manner as is used in printing by copper-plates; or, instead of using the said or any rolling-press, squeeze the said papers, placed respectively in the manner above described, in a screw-press; or subject them to any other pressure sufficient for the purpose; by means of which pressure, in whatever manner applied, part of the ink of the writing intended to be copied shall press from the said writing into, upon, and through, the said thin moistened paper, so that a copy of the writing, more or less faint, according to the quality of the ink and paper employed, shall appear impressed on both sides of the said moistened paper, *viz.* upon one of the sides in the natural or proper order and direction of the lines, as they are in the original writing, and on the other side in the reverse order and direction. But, in order to make the impression or copy of the writing more strong, legible, and durable, it is proper and useful to moisten the said thin paper, which is to receive the copy or impression, with the following liquor, instead of water or other liquid, and to proceed in all other respects as is above directed; or to moisten the said thin paper with the following liquor, and to dry the said paper, and, when a copy of a writing is required to be taken, the said paper, thus previously prepared and dried, ought to be moistened with water or other liquid, and to be proceeded with in all other respects as has been directed. The said liquor to be used for moistening the said thin paper, or for preparing the said paper previously to its being used, is made in the following manner: Take of distilled vinegar two pounds weight, dissolve in it one ounce of the sedative salt of borax; then take four ounces of oyster-shells, calcined to whiteness and carefully freed from their brown crust, put them into the vinegar, shake the mixture frequently for four-and-twenty hours, then let it stand until it deposits its sediment; filter the clear part through unglazed paper into a glass vessel, then add to the said mixture or solution two ounces of the best blue Aleppo galls bruised, and place the liquor in a warm place, shaking it frequently for twenty-four hours: then filter the liquor again through unglazed paper, and add to it, after filtration, one quart, *ae* measure, of distilled or other pure water. It must then stand twenty-four hours, and be filtered again if it shews a disposition to deposit any sediment, which it generally does. The liquor, thus compounded and prepared, is to be used as hath been directed.

N. B. In place of the vinegar, any other liquor impregnated with a vegetable acid may be used; and, in place of the galls, oak bark, or any other vegetable astringent, or substance which is capable of becoming black, or deep coloured, with solutions of iron; and, in place of the oyster-shells, any other pure calcareous earth may be used. But if the impressions are not wanted to be very black, and the writing ink is good, water itself may be used to moisten the thin paper, as herein first directed. It may be found necessary

fary to add more or less water, in the preparation of the above liquor to be used for moistening the thin paper, or to vary the proportions of the other ingredients, according as they are more or less perfect strong, or as the impression is required to be more or less deep coloured. The writing-ink, which the patentee uses for letters or writings intended to be copied, is prepared as follows: Take four quarts, ale measure, of spring water; one pound and a half, avoidupoise weight, of Aleppo galls; half a pound of green copperas or green vitriol; half a pound of gum-arabic; four ounces of macealun; pound the solid ingredients, and infuse them in the water six weeks or two months, during which time the liquor should be frequently shaken; strain the liquor through a linen cloth, and keep it in bottles, closely corked, for use.

Plate III. *Miscellany*, *fig. 1.* represents a front or end view of the rolling-press invented by Mr. Watt, and referred to in the above specification. A B C is one of the ends of an iron or wooden frame, which serves to connect the two rollers. D, D, are two wooden or metalline rollers, turned extremely exact, or truly cylindrical, and which are mounted on iron axles, firmly fixed in them. E E is a double-ended lever, by means of which the roller, on whose axle it is applied, may be forcibly turned round. F F represents the board of the rolling-press, on which the writings to be copied are to be laid. N N is a piece of cloth, or other elastic pliable substance, placed next the roller, and above the writings to be copied; and the board, G, is a strong plank of wood, or plate of metal, serving to connect the two end-pieces of the frame at bottom. H H represents the edge of a common table, to which the press may be fastened by the iron screw-cramps I, I. K is a slit, of which there is one in each end-piece of the frame; these slits are filled with elastic steel, or other metalline springs, or with some other elastic substances which serve to press the two rollers forcibly together. L is a brass bolster, supported upon the springs, and serving to support the end of the axis of the under roller.

Fig. 2. represents a side view of the rolling-press, in which A B, A B, are the two end-pieces of the frame. D, D, are the two rollers. E is the double-ended lever. G is a strong plank, or plate of metal, which forms the bottom of the frame. H H is the table on which the press stands. I is one of the iron cramps which fasten the press to the table; and M is a bar of iron which connects the upper part of the frame.

Fig. 3. represents a screw-press, which may be used, instead of the rolling-press, in taking off impressions from writings. A A is a double-ended lever. B B the screw. C a block of wood, or metal, which the screw acts upon, and which is attached to it. D D the frame of the press, made of iron or wood. E E is a moveable board, on which the writing to be copied is to be laid, with a cloth over it. F F the bottom or sole of the press, made of wood or metal. Be it remembered, that these presses are made of different sizes, according to the sizes or largeness of the writings intended to be copied. Those now referred to are drawn from one sufficiently large to take an impression from a folio page of writing or post paper, and are drawn to a scale of one inch and a half for each foot, or one-eighth of their natural size.

Fig. 4. represents one of Hawkins's patent polygraphs, for making two or more copies of any writing at once. A A B, is an upright frame, from the upper piece of which is suspended a double parallel ruler, D D, E E; *dd, ee,* is another similar parallel ruler, of which *fig. 5.* is a plan, fastened to the board, F F, of the instrument. These two rulers are connected to a stout bar, G; the vertical one, D D E E, by pivots at the end of the bar, H,

fig. 4. going into holes in the projecting part of two pieces of brass, *gg,* at each end of G; and the horizontal one, *dd ee,* by pivots at the ends of its corresponding bar, *b,* working in holes in another arm of the same brasses. The pens are connected with the bar, G, by a curved brass limb, *a,* turning on a screw put through the bar, G, as a centre. On the other side of the bar is a short arm, *b,* in the same piece with the limb: this is jointed at its upper end to the end of a small rod, *i,* the other end of which is jointed to another exactly similar limb, carrying the other pen. The pens are fitted into a small tube, called the pen-tube, having a shoulder at its upper end. This fits tight into another tube, in the same piece with the curved limb, and is pushed in as far as the shoulder of the pen-tube will allow.

The weight of the machinery is suspended by eight small spiral springs, I, fastened to a ring fixed to the bar, G; their upper ends are connected with the end of a double jointed lever, K, which can follow the motion of the bar, G, without stretching the springs too much. The rod, L, by which the perpendicular motion is suspended, turns upon pivots working in pieces of brass beneath the piece, B: the right-hand one is called a regulator, and has two screws, one moving the pivot vertically, and the other horizontally, for adjusting the instrument. The two bars, *ee,* of the horizontal motion are connected with *dd* by pivots at the end of *b,* so that *dd* can be lifted up without moving the other, whose weight is supported upon two small brass wheels *ii.* The frame, A A B, when the instrument is not in use, turns down on the board, F F, and is kept fast by a spring lock, which is opened by pushing in a round button, *k.* The frame now forms the sides, and the front board becomes the lid, and, when shut down, is locked by a lock, M. In explaining the use of the instrument, we cannot do better than copy the printed directions fold with the instrument. Choose two goose quills, taking care they are of the size wanted; make them into pens, and put them into the pen-tubes. Having introduced them with the nibs first, apply the shoulder end of the pen-tube against the semi-circular hollow, in the upright part of the gauge, Q, *fig. 4.* and push the pen through the tube, till the nib reaches a line drawn across the end of the gauge; slide the pen-tube into the fixed socket, until the shoulder of the pen-tube stop it, holding by the fixed socket, and not by the work, so as not to strain the machinery. If the polygraph is in order, the pens will now write, draw, or copy whatever may be required, with the greatest exactness. To prove the machine's being in order, bring the pens to the upper part of the paper, and try if they both touch; if not, with a small screw-driver turn the perpendicular screw of the regulator, till they touch equally. Bring the pens to the bottom of the paper, and move the horizontal screw till they both touch. When a pen wants mending, nothing more is necessary than to take the pen-tube out of the socket, and mend the pen, gauge it, and return it into the socket again. When the machine is out of use, wipe the pens clean, and place the left one, with the curved limb, on the hook beneath the horizontal rulers. Let down the frame, A A B, which falls up by a spring-lock, and at the same time raises the writing-board, which then becomes the lid of the portable case for the polygraph.

The patent now belongs to Mr. Farthing, Cornhill, who manufactures the instruments.

These instruments are made with three, four, and five pens, and answer the purpose very well.

COPYIST, in *DIPLOMATIC SCIENCE*, signifies a transcriber or copier of deeds, books, &c.

COMPOSIT, a transcriber of *Musick*. Whatever improvements have been made in literary typography, no music printed

Printed with types has equalled that of writing, engraving, or stamping. Rousseau has extended this article to a greater length than seems necessary. It is indeed necessary for a *copyist* to know practical music well, and to be sufficiently acquainted with composition to avoid gross mistakes himself and detect them in others; to write a neat and legible hand; to know the Italian and French technic, to form all the characters in a bold and clean manner; and, by understanding the language of music, leaving no bar incomplete, by omission or redundancy. These seem to be all the necessary requisites of a good *copyist*, if to them be added care and accuracy, particularly in forming a score, where quantity must be attended to in the exact arrangement of the notes over each other. Music has long been very neatly engraved in France, on copper; and in Holland, though less neat, with more force and distinctness: 60 or 70 years ago, the Dutch editions of the works of Corelli were much sought all over Europe; and 30 or 40 years ago, there was no music printed in Italy or Germany; all was MS. By which employment so many *copyists* obtained a livelihood, that it was thought a cruelty to shorten labour by the press; as in the first attempts at erecting silk and cotton-mills. Works in literature, till the invention of the press, must have been disseminated very slowly by transcription; perhaps by the medium of the press works of little merit, and of corrupt and noxious principles, have been too easily multiplied, and put in circulation. And indeed cheapness has not been eventually the consequence of musical typography, stamping, or engraving; as printed music is now dearer than written was, early in the last century.

COPY-RIGHT. See *Literary Property*.

COQ. *ad med. consumpt.* an abbreviation among Physicians, signifying that the thing is to be boiled till half of it be consumed.—*Cog.* in *S. Q. Ag.* implies it to be boiled in a sufficient quantity of common water.

COQUALLIN, in *Zoology*, the *SCIURUS variegatus* of Gmelin, and *varied squirrel* of Pennant.

COQUANTOTOTL, in *Ornithology*, a bird of the warmer climates of America, described by Seba under this name: it is a small crested-bird, shaped like a sparrow; the *PIPPA Grisea* of Gmelin, the *manacus cristatus griseus* of Brisson, and the *gray manakin* of Latham.

COQUAR, the variety *hybrida*, ϵ . of Gmelin's *PHASIANUS Colechicus* and the pied-pheasant of Hayes's British birds.

COQUATOTOTL of Hernandez and Ray, the variety ϵ . of Gmelin's *AMPELIS garrulus*, the *chatterer* of Carolina of Edwards and Catfishy.

COQUES, GONZALO, in *Biography*, a painter who was born at Antwerp in 1618, and became the disciple of David Ryckaert the elder. He soon gave proofs of extraordinary talents in small pictures; and the early friendship which he formed with the son of Ryckaert, whose name was likewise David, did not a little contribute to rouse his emulation, and quicken his diligence. His first essays, after the example of his master, were domestic subjects and conversations, in the manner of Teniers and Ostade; but his admiration of the works of Vandyke, soon caused him to adopt a style, in which the beautiful and picturesque grouping of his former models acquired additional interest, by being united to greater elegance and dignity of character. In this manner he painted a picture for Jacques Le Mercier, a rich merchant of Antwerp, which gained him great applause. It represented his employer with his wife and children at table: the painter himself was introduced in profile. From this period he devoted himself princi-

pally to the painting of small portraits, which he executed with such delicacy and happy effect, that excepting Vandyke, no artist of his time enjoyed a greater reputation. He was employed by the court of Brussels, Charles I. king of England, and several other potentates. He died in 1684, leaving considerable riches to his family. Descamps.

COQUET, in *Geography*, a river of England, in Northumberland, which runs into the sea seven miles S. E. of Alnwick, at Hawkfley, and is navigable for about 12 miles up to Warkworth bridge.—Alto, a small island of England, in the German ocean, about a mile in circumference, near the coast of Northumberland. It was taken by the Scots in the reign of Charles I. N. lat. 55° 13'. W. long. 1° 36'.

COQUETTE, a female character, no less contemptible than odious; against the iniquity of which Mr. Osborne, in his excellent treatise, "On the Duties of the Female Sex," cautions his readers in the following descriptive and unpressive terms. "To delude a young man by encouraging his attentions for the pleasure of exhibiting him as a conquest, for the purpose of exciting the assiduities of another person, or from any motive except the impulse of mutual regard, is a proceeding too plainly repugnant to justice, and to delicacy of sentiment, to require much observation. On such subjects, even inadvertence is highly culpable, what then is the guilt of her, who deliberately raises hopes which she is resolved not to fulfil!"

COQUILLADE, in *Ornithology*, the *ALAUDA undata* of Gmelin and *undated lark* of Latham.

COQUILLES A BOULETS, shells or moulds for bullets. They are made either of brass or iron. Two of them are required for the casting of a cannon-ball. And they never join or close so effectually, as to prevent the liquid metal when poured in from running somewhat out at the seam, where they join. This small part of the metal, or excess of the bullet, is called the beard, which is broken or knocked off to make the ball perfectly round.

COQUIMBO, or *LA SERENA,* in *Geography*, one of the 13 provinces of Chili in South America. This is a rich, verdant fruitful valley, not far from the coast of the South Sea, producing corn sufficient for considerable exportation to Lima, and abounding with various mines. One mine of copper, situated about 5 leagues N. from the town of Coquimbo on mount Carro Verde, or Green Hill, rises to a considerable elevation in form of a sugar-loaf, and serves as a land-mark to the port. The climate is singularly agreeable, being almost uniformly mild and serene.

COQUIMBO, or *La Serena*, the capital of the fore-mentioned province, was the second town built by Valdivia, in the kingdom of Chili, in 1544, for the purpose of maintaining an intercourse between Peru and Chili, in order to procure a regular supply, and to secure the fidelity of the Indians who lived in that valley. The town stands about $\frac{1}{2}$ of a league from the sea in a most delightful situation, commanding an extensive prospect of the sea, a river of the same name, and the country, and presenting to view a charming variety of fields, with different kinds of grain and woods of a lively verdure. The town is large but not proportionably populous; the number of families not amounting to above four or five hundred, consisting of Spaniards, Mestizos, and a few Indians. The streets are conveniently wide, intersecting one another from north to east, and from east to west, so as to form squares of buildings, with intervals for gardens. The houses are constructed with mud walls and covered with leaves, and each of them is provided with a large garden, planted with fruit trees and excellent vegetables.

vegetables. It has several parish churches, and three convents, and also a town-house, where the Alcaldes and Regidores meet, who, with the corregidor, form the corporation. On the north side of the town runs the river; after flowing in various meanders through the whole valley of the same name; and, by canals cut from it, furnishes the town with water, which is principally applied to preferve the fertility and beauty of their gardens. The river at its mouth forms a very fine bay, where ships lie safely and commodiously, though the coast is rocky; some islands lying fo as to keep off the winds. S. lat. 29° 52'. W. long. 71° 59'.

COR, in *Geography*, a town of Chinese Tartary, in the desert of Cobi. N. lat. 44° 16'. E. long. 93° 29'.

COR, in *Anatomy*. See HEART.

COR, Fr. CORNO, Ital. in *Misic*. A HORN.

COR de *Chasse* is a very long and instructive article in the *Encycl. Meth.*; but the plates, to which the reader is frequently referred, not being yet published, the precepts for performing on the instrument, if translated, would not be intelligible.

COR, in *Natural History*. See CHAMA.

COR Caroli, in *Astronomy*, an extra-constellated star of the second magnitude in the northern hemisphere, situated between the Coma Berenices and Ursa Major; so called by sir Charles Scarborough, in honour of king Charles I.

COR Hydrae, a star of the second magnitude, in the heart of the constellation HYDRA.

COR Leonis, or *Regulus*, a fixed star of the first magnitude, in the constellation LEO.

COR Scorpii. See ANTARES.

COR Anguinum, in *Natural History*, a species of ECHINUS found only in a fossil state.

COR Bovis. See CARDIUM ACULEATUM.

COR Marinum, the name of one of the classes of the *echini marini*, the characters of which are, that the anus is placed in the side of that point of the shell which appears as if cut off; and the mouth has two lips, and is placed in the third region of the axis of the base. Klein's *Echin.* p. 34.

COR Venaris, *Venus's heart*. See CARDIUM CARDISSA.

CORA, in *Ancient Geography*, a town and Latin colony of Italy, in the country of the Volsci, according to Virgil, Silius Italicus, and Livy; now *Cori*. This is a town of Latium on the left of the Appian way. S. E. of Velitæ. By its ruins we may conclude, that it was a place of importance: among these we discover a temple of Castor and Pollux, and an aqueduct for conducting water, &c. The ancient walls are still remaining.—Also, a town of Italy, situated in a promontory of Etruria. Justus Lipsius says, that in the passage of Tacitus which mentions it, we ought to read *Cosa*, which is not improbable.

CORAAE, CORAAGIUM, in our *Old Customs*, a kind of imposition extraordinary, growing upon some unusual occasion; and it seems to be of certain measures of corn; for *corus tritici* is a measure of wheat. *Bracton*, lib. ii. cap. 116. num. 6. who, in the same chapter, num. 8. has these words: "Sunt etiam quædam communes præstationes, quæ servitia non dicuntur, nec de consuetudine veniunt, nisi cum necessitas intervenerit, vel cum rex venerit; sicut sunt hidagia, coraagia, & carvagia, et alia plura de necessitate et ex consensu communi totius regni introducta, &c."

CORACA, or CORACE, in *Ancient Geography*, a town of Arabia Petraea. Ptolemy.

CORACE, in *Geography*, a river of Naples, which runs into the gulf of Squillace; four miles south of Balicastro.

CORACESIUM, a fortified place of Asia in Cilicia, according to Piny and Strabo; the latter of whom says, that it was situated on a rugged rock at the extremity of Cilicia.

CORACIAS, in *Ornithology*, a genus of the order, *Pica*, or Pies. The birds of this genus have the bill sharp at the edges, the tip incurvated, and the base bare of feathers; tongue cartilaginous and bifid; feet formed for walking.

The coracias genus comprehends only those birds which are known by English writers under the title of *Roller*, amounting altogether to between twenty and thirty species. In Dr. Latham's synopsis it is observed, that the bill of the roller is straight, bending towards the tip, with the edges cultrated; the nostrils narrow and naked; and the legs for the most part short, with the toes placed three before and one behind, the whole of which are divided to their origin. It differs from the corvus, or crow tribe, chiefly in the nostrils being destitute of reflected bristles, and having the legs shorter. Brisson makes a particular genus of pies under the name of coracias, including those birds of the Linnæan genus corvus which have the beak a little bent or arched. The coracias of the late French writers, it may be likewise remarked, belongs to the corvus genus both of Gmelin and Latham, as for example, the corvus graculus (*Cornish chough*) and corvus eremita (*Hermit crow*), &c. of the two last mentioned writers are referred to the coracias genus by the French.

The roller tribe is not confined to any particular part of the world like some other genera of birds, but the far greater number of its species are found in warm climates.

Only one species of the roller has been yet discovered in England, the *garrulous roller*, *coracias garrula*.

GARRULA. Blue, back red; quill-feathers black. Linn. Fn. Sv. Common roller. Penn.—Donov. Brit. birds. *Pica marina* et *garrulus argenteatensis*, Ray. *Galgulus*, Brisson. *Rollier*, Buffon. *Gazza marina*, Zinn.

A beautiful bird, in size somewhat inferior to the common jay; the head, neck, breast, and belly are of a fine blueish-green, the back and scapulars reddish-brown; coverts on the edge of the wing rich blue; the tips of the quill feathers dusky above, beneath blue; the tail forked with the two middle feathers obscure green, the rest blue with the tip on the outer edge black; legs short and dirty yellow.

This species inhabits various parts of Africa, and Europe, but in greatest numbers in the warmer regions; in the north of Europe they are uncommon, in England very rare. It has obtained the name of garrulous roller in allusion to its chattering noise. The species is of the migratory kind, gregarious and timid, and builds in trees, particularly the beech. In the south of Germany it is seen in flocks in autumn, in company with the rooks and other birds searching for worms, small seeds and roots, in tilled, or cultivated grounds.

BENGALENSIS. Somewhat fulvous, beneath blueish; neck beneath violet with paler streaks; tail entire. Lath. *Coracias bengalensis*, Linn. *Galgulus mindanensis*, Briff. *Rollier de Mindanao*, Buff. *Le cui*, ibid. Jay from Bengal, or Bengal Pyc, Albin. *Bengal roller*, Lath.

Inhabits Bengal and the ile of Mindanao. Dr. Latham observes that it does not essentially differ from the following species, the chief difference being the rufous violet colour on the breast, and the want of the long outer tail-feathers. The bengalensis, he thinks, may be perhaps the female or a young bird, as the long tail-feathers of coracias caudata do not appear till the second year. Lath. Gen. Syn.

530. In Ind. Orn. of the same writer, since published, these two birds are considered as distinct species.

CAUDATA. Somewhat fulvous, beneath bluish; neck beneath violet, streaked with paler; the outer tail-feathers very long. Linn. *Galgulus angolensis*, Buff. *Rollier d'Angola*, Buff. *Long-tailed roller*, Lath.

A native of Angola, and measures fifteen inches and a half in length.

SENEGALA. Reddish fuscous; beneath, head, tail, and upper part of the wings bluish sea-green; face white, shoulders and quill-feathers blue; exterior tail-feathers very long. Lath. *Coracias senegalensis*, Gmel. *Rollier de Senegal*, Buff. *Swallow-tailed Indian roller*, Edwards. *Senegal roller*, Lath.

This is rather less than the common jay. The bill black; the whole space round the base of the bill white; head and under parts of the body, the upper parts of the wings, and tail, bluish-sea-green; shoulders and quills deep blue; the outer tail-feathers of great length as in the last species; hind part of the neck, and the back of a reddish-brown; the legs of a reddish-flesh-colour. It inhabits Ceylon and Senegal.

ABYSSINICA. Rufous-brown; head, neck, body beneath, and wing-coverts green; shoulders, greater quill-feathers, and rump blue; outer tail-feathers very long. Lath. *Coracias Abyssinica*, Gmel. *Rollier d'Abyssinie*, Buff. *Abyssinian roller*, Lath.

The bill of this bird is black; tip of the upper mandible much bent; sides of the head from the nostrils to a little beyond the eyes are white; the rest of the head, neck, and under parts of the body fine green; the two middle feathers of the tail are dusky, with a gloss of blue especially down the middle, the outer ones blue-green: the two exterior tail-feathers are five inches longer than the rest, and the end, beyond the extremity of the others, of a fine deep blue; the legs are red-brown. A native of Abyssinia.

ORIENTALIS. Green; throat striated with bluish; tail-feathers black at the tip. Lath. Linn. *Galgulus indicus*, Buff. *Rollier des Indes*, Buff. *Oriental roller*, Lath.

A native of the East Indies. Its size is that of a jay, the length ten inches and a half; the bill yellowish, broader at the base, and more hooked than in any of the genus; the head and hind part of the neck brown; back, rump, and scapulars, with the wing and tail-coverts, green-brown; throat fine blue; down the shaft of each feather a pale line, the other parts beneath blue-green; quills blue and black, with a large pale blue spot. The wings are longer than in the other species of roller; the tail even at the end, the two middle feathers green at the base, with the other part black; legs yellowish with black claws.

INDICA. Blue, fore-part tawaceous; cap green. Linn. *Blue jay* from the East Indies. Edwards. *Indian roller*, Lath.

The length of this bird is eleven inches. The bill is dusky, an inch and a half in length; the crown of the head blue-green; throat, breast, neck, and back, reddish-brown, with the sides of the head and throat darkest, streaked with white; rump and tail, with the under parts from the breast, fine cyanous blue; the middle feathers of the tail green, the outer ones blue at the bottoms and tips, in the middle sea-green; the wings green and blue. A native of Ceylon.

CAFFRA. Blue, exterior edge of the quill-feathers pale yellow. Linn. *Cape roller*, Lath. Inhabits Ethiopia; an obscure species described on the authority of Linnæus.

VIVIDA. Entirely of a molt vivid blue. Lath. *Coracias cyanea*, Gmel. *Ultramarine roller*, Lath.

Length of this species eight inches; the bill dusky. Native place unknown.

MADAGASCARIENSIS. Purp'e-brown; rump, vent, and tail bluish-green; tail towards the tip marked with a purplish band, tip and quill-feathers dark blue. Gmel. *Rollier de Madagascar*, Buff. *Madagascar roller*, Lath.

A beautiful species found in Madagascar. The length of this bird is ten inches; the bill is very stout at the base, rather short and of a yellow colour; the legs reddish-brown.

MEXICANA. Reddish-grey; beneath and on the wings pale grey mixed with flame colour. Gmel. *Galgulus mexicanus*, Buff. *Merula mexicana*, Seba. *Rollier de Mexique*, Buff. *Mexican roller*, Lath.

Larger than a thrush, and inhabits Mexico.

PUELLA. Blue, collar in front, and at the side, with the breast, belly, quill-feathers, and greater wing-coverts black. *Fairy roller*, Lath.

Size of a blackbird, and inhabits India.

STRATA. Blue-black, streaked with greenish-blue; bill, tail, and legs, black. Lath. *Coracias striata*, Gmel. *Blue-striped roller*, Lath.

The length of this bird is eight inches. The female cinereous-grey and not streaked like the male; quill-feathers black, edged with cinereous; irids pale red. A native of New Caledonia.

SINENSIS. Green, beneath yellowish-green, tail cuneated, and white at the tip. Gmel. *Galgulus sinensis*, Buff. *Rollier de la Chine*, Buff. *Chinese roller*, Lath.

Inhabits China, and is called at Canton Sau-ta-hoang. The size is that of a jay, the length eleven inches and a half; the bill and irids are red; head, and hind part of the neck, back, rump, and upper tail-coverts green; through the eyes on each side is a black stripe; the underparts from the chin to the vent yellowish-white tinged with green; wing-coverts olive-brown; quills the same with a mixture of chestnut in some, and others tipped with white; the tail resembles that of a magpie in form, and is marked at the tip of every feather with a white spot; the legs and claws are pale red, and longer than in other rollers.

VAGABUNDA. Head and neck black; body above ferruginous-brown, beneath cinereous; middle of the wing white; tail very long, wedge-formed, greyish with the tip black. Lath. *Grey-tailed roller*, Lath.

This is a native of India; the length is seventeen inches; its bill black; legs cinereous; lesser wing-coverts rusty brown; greater and secondary quill-feathers white, the primary ones black.

CAYANA. Tawny-green; beneath dirty white; eyelids white; chin with a black streak each side; tail cuneated. Gmel. *Grievet, ou rolle de Cayenne*, Buff. *Cayenne roller*, Lath.

Inhabits Cayenne, and measures about nine inches in length, the bill is reddish; legs long and grey.

DOCILIS. White interspersed with reddish; beneath chestnut; legs pale yellow; tail-feathers black with the tips white. Gmel. *Docile roller*.

Size of a blackbird, and inhabits the southern parts of Asia. The bill is yellow; the nine first quill-feathers white as far as the middle and from thence black, the rest entirely black; claws flesh colour.

NIGRA. Body and limbs entirely black; tail long. Gmel. *Black roller*, Lath.

Length sixteen inches; bill thick, and with the legs black; tail seven inches. Native country unknown.

AFRA. Tawaceous red; beneath reddish-purple; vent blue-green; wing and tail-feathers blue, with the tips blackish. Gmel. *African roller*, Lath.

Length

Length eight inches and a half; the body stout, bill yellow; legs brown. A native of Africa.

MELANOCOPHALA. Blue-purple; head and neck black; body beneath white; quill-feathers fuscous; tail emarginated and white at the tip. Gmel. *Black-headed roller*, Lath.

Size of a crow, bill and legs red; nape pale grey; two middle tail-feathers blue, the rest purplish, and the whole white at the tip. Inhabits China.

STRERPERA. Black; spot on the wings, vent, base, and tip of the tail black. Lath. *Noisy roller*.

This is an inhabitant of Norfolk island in the Pacific ocean, where it occurs in vast numbers; it has the reputation of being a silly bird, and is very noisy in the night. The length is nineteen inches, of which the bill is two inches and a half long, somewhat straight, black, denticulate, and horn-coloured near the tip; nostrils naked, long, and placed near the base of the bill. The first six quill-feathers are white at the base; the tail long and rounded, the larger feathers white at the base, the lateral ones white at the tips within. When the wings are folded they reach as far as the middle of the tail. The legs are black, the outer toe connected at the base to the middle one.

VARIA. Black; beneath, lower part of the back, rump, and upper tail coverts white; tail black, equal, with the tips of the feathers white. Gmel. *Cassican de la Nouvelle Guinée*, Buff. *Pied roller*, Lath.

Length about thirteen inches; the bill two inches and a half long, and of a bluish colour with the tip dark; legs lead colour. A native of New Guinea. This bird partakes of characters common to the oriolus, coracias, and ramphastus genera, and might with some propriety be referred to either. In the index ornithologicus it is placed with the coracias tribe.

CORACINSII, in *Ancient Geography*, a people who inhabited the northern part of the isle of Sardinia.

CORACINUS, in *Ichthyology*, the name of a ten-fish caught in the Mediterranean, and called by some authors *skiena*, and by Aldrovand and Salvian *umbra*. It is of the colour of the common tench, but in figure more approaches to the perch: its scales are small; its mouth not very large, but well furnished with teeth; and its tail is not forked, but when extended, seems of a roundish figure; the ends of the rays or nerves of the tail-fin are black, and the other fins are all black, and seem as if dyed with ink.

CORACINUS Brasiliensis, the *LABRUS Cromis* of Gmelin, and *Guatucupa* of Maregrave. Found in Carolina.

CORACIUS Mons, in *Ancient Geography*, a mountain of Asia Minor in Jonia, situated near the town of Colophon. Strabo.

CORACLE, a fishing boat of curious construction used in Wales for time almost immemorial. These boats afford a specimen of the earliest British navigation, and they are used at this time on many of the rivers in Wales, probably without any deviation from their original form. They are made with very strong basket-work, and covered with hides, or coarse canvas, with a thick coating of pitch. Their shape is oval and resembles the section of a walnut-shell, their length is generally five feet, and their breadth seldom less than four. They contain only one person, who sits precisely in the middle, and by dextrous management maintains his just balance. The instrument with which he moves his boat is a paddle; one end of which rests upon his shoulder, and the other is employed by his right hand, in making a stroke alternately on each side. The left hand is, in the mean while, employed in conducting the net, and he holds the line between his teeth. These vessels were anciently used, as the means of intercourse between the inhabitants on the opposite banks of

the rivers. They are now applied only to the purpose of fishing. So frail an invention would probably have been succeeded by something of greater strength and capacity, had not there been found a remarkable convenience in their lightness. The fisherman, when his labour is finished, slings his boat across his back, and marches homewards under the burden of his machine and booty. There is scarcely a cottage in the neighbourhood of the Tivy in South Wales, or several other rivers in those parts, abounding with fish, that has not its coracle hanging by the door. Such is the adroitness of those who use them, that they are very rarely overturned on lakes or rivers; and they sometimes even venture a little way out to sea, when the weather is perfectly calm. Similar to these in their nature are the Indian canoes; though they are constructed of different materials and forms, and applied to different purposes.

CORACOBRACHIALIS, in *Myology*, a muscle of the shoulder-joint, arising by a tendinous and fleshy origin from the apex of the coracoid process of the scapula, and connected for some extent with the short head of the biceps. It passes downwards and backwards, to be inserted into the inner side of the os humeri about the middle of the bone. The musculo-cutaneous nerve generally penetrates the fibres of the muscle; whence it has been called the *miculus perforatus* Cassirii. It will move the os humeri towards the side; it will elevate the bone, and carry it obliquely forwards across the front of the chest. It may rotate the os humeri outwards, particularly if that bone has been previously turned inwards.

CORACODES, in *Ancient Geography*, a port of the W. coast of the island of Sardinia. Ptolemy.

CORACHOYHOIDEUS, in *Myology*, a term applied to the omohyoides muscle, for which see **LARYNX**.

CORACOIDES, in *Anatomy*, a small sharp process of the scapula; so called from its resembling a crow's bill.

The word comes from *κοραξ*, *corvus*, and *ειδος*, *imago*. The coracoides is placed in the upper part of the neck, and projects over the head of the bone of the arm. It serves to strengthen the articulation of the shoulder; and gives origin to one of the muscles of the arm.

CORACOMANTES, from *κοραξ*, *crow*, and *μαντις*, *divination*, in *Antiquity*, a kind of diviners, who made their predictions by observing the crows.

CORACONESUS, in *Ancient Geography*, an island of the Mediterranean sea, towards the coasts of Libya. Steph. Byz.—Also, a place of Peloponnesus, in Arcadia; situated, according to Pausanias, where the river Ladon discharged itself into the Alpheus.

CORACORADIALIS, a name given by Winslow to the biceps flexor cubiti. See **BICEPS**.

CORADI, or **CURADI**, **OTTAVIO**, in *Biography*, a Bolognese painter, the scholar of Giacomo Cavedone. His principal excellence consisted in the boldness and truth with which he copied the works of his master. He flourished in 1630, and is said by Pilkington to have died in 1643. Malvasia, Orlandi.

CORAH, or **CORAH-JENEHABAD**, in *Geography*, a small city of Hindoostan, or capital of a province in the Doob, or country between the rivers Ganges and Jumnah; subject to the nabob of Oude; 184 miles S.E. of Agra, and 67 S.S.W. of Lucknow. N. lat. 26° 10'. W. long. 80° 50'. When lord Clive assumed the government of Bengal, in 1755, he restored to Sujah Dowlah all the conquests that had been gained from him, except the provinces of Corah and Allahabad, which were reserved as part of an establishment for the emperor, or great Mogul. The Corah provinces were valued at 30 lacs. The emperor was to reside at Allahabad, under the protection of the English, to whom,

in reality, be owed all that he possessed; and a treaty offensive and defensive was entered into with Sujah Dowlah, nabob of Oude. The ambition of the emperor was not satisfied; but after about six years quiet residence at A lahabad, he put himself into the hands of the Mahrattas, who promised to feat him on the throne of Delhi. The immediate consequence of this connexion was a cession of the Corah provinces to the Mahrattas, who, unless the English had interposed, would have established themselves in that important angle of the Doab, which commands the navigation of the upper part of the river Ganges, and the whole course of the Jumnah. On this occasion, the British government considered the Corah, &c. p. ovinces, which, by right of conquest, were originally theirs, as having reverted to them again, when they were alienated from the purposes for which they had been originally granted to the emperor; and applied to the aggrandisement of a power inimical to them and their allies. They, therefore, resumed the possession of these provinces, and immediately ceded them to the nabob of Oude, for a valuable consideration. See OUDE.

CORAL, in *Botany*, *arbor non spinosa*; Pct. Rai. See *ERYTHRINA cristata gali*.

CORAL *arbori affinis*; Sloan. See *SOPHORA occidentalis*.

CORAL *arbor americana*; Com. See *ERYTHRINA corallo-dendrum*.

CORAL *carolinensis*; Dill. See *ERYTHRINA herbacea*.

CORAL *arbor polyphylla*; Sloan. See *PISCIDIA erythrina*.

CORAL, in *Zoology*, a general English name for zoophytes of the Isis tribe, or those whose animal resembles a plant, and have the stem stony and articulated; with the joints longitudinally striated, united by spongy or corneous junctures, and covered by soft porous cellular flesh. About six species of this curious genus are at present known. See ISIS.

CORAL, *red*, or true red coral, was considered by Linnæus as an Isis, and arranged as such in the Systema; though Linnæus himself acknowledged to Mr. Ellis, the author of the Natural History of Zoophytes, that the latter had more properly classed it with the gorgonia, or sea-fan, the genus Isis being sufficiently distinguished by its jointed stem. In the last edition of the Systema, the coral is placed with the sea-fans, or gorgonia.

The red coral grows in an expanded and somewhat flattened form, with dichotomous branches, that lessen towards their extremities. The flesh is of the colour of red lead, or inclining to vermilion, soft, slippery, and full of minute vessels. The mouths are placed on the surface, and rise up in a conical form, consisting of eight valves, just opening, from whence proceed polypes of a white colour, with eight claws, each of which has a double fibre at both edges. The bone itself, disenclosed of the flesh, is the true coral of the shops, and which, in its natural state, is of a stony texture, and of a bright red colour, with the outside marked with minute furrows, or irregular striations, interspersed with a few slight depressions, corresponding with the situation of the shells, before the flesh be removed. For a further account of this curious article, see *GORGONIA nobilis*.

CORAL, *black*. In the Linnæan system, the true black coral is described as appertaining to the same genus of zoophytes as the red kind, under the specific name of antipathes. This sort is found on the shores of the Indian and Mediterranean seas, and grows in a shrubby form to the height of about two feet, with the branches erect, and alternately pinnated. The bone is of a black colour, marked on the outside with flexuous striae, and in its native state is covered with flesh of a grey colour. See *GORGONIA antipathes*.

The gorgonia antipathes, or true black coral, must not be confounded, from the similarity of names, with the antipathes genus, the latter being very distinct, although its species are not unfrequently denominated black corals, as well as the gorgonia before-mentioned. There is a great affinity between the antipathes and gorgonia genera; notwithstanding which they may be readily distinguished, the bony part of the antipathes being beset with small spines, and covered with gelatinous flesh, and numerous polype-bearing tubercles, while the bone of the gorgonia is smooth, or destitute of spines, and the flesh cellular.

From the old botanical writers it appears, that many of the zoophytes were considered as genuine plants; and that in particular several sorts of black corals were formerly called antipathes. But as the characters of these marine bodies are better understood in the present age, only part of these have been retained in the genus antipathes, and some of the kind referred to the gorgonia. The antipathes of certain reefs were formerly used as sceptres for princes, and likewise for diving rods, and other similar purposes, as is evident from the remarks of Salmalius, addressed to Solinus, wherein he says, that antipathes denotes something proper to resist incantations, and that they were in use for that purpose by several Indian nations.

There are a number of different species of this kind of black coral, which, not being sufficiently noticed under the article antipathes, it may be proper to describe in this place.

SPIRALIS. With a very simple, spiral, rough stem. *Antipathes simplicissima attenuata flexuoso-spiralis spinulis seriatis scabra* of Pallas. *Gorgonia spiralis*, Linn. *Palinjuncus anguinus*, Rumpf.

This kind inhabits the Indian, Mediterranean, and North seas. It is of a hard and horny black substance, extremely brittle, and varying in length and thickness; one described by Mr. Ellis measured two feet long, and was about the thickness of a writing-pen; another, not thicker at the base than the quill of a hen's feather, was seven feet in length. In its natural state this kind is variously twisted, or generally in a spiral manner, and the flesh which covers the spiny surface of the bone is full of little gelatinous warts.

ULEX. Very much branched, with scattered spreading rough and pointed branches. *Furze-like antipathes*, Soland. and Ellis.

A native of the Indian ocean. This kind is full of small short spines, the branches are loose and irregular, and the whole remarkably black. The specimen brought from Batavia, and described by Mr. Ellis, had the surface marked with ovate cavities, dispersed about the branches, which were of a brownish-yellow colour, and supposed to be the ovaries.

SUBPINNATA. Branched and pinnated, rough with fetaceous alternate sub-divisions, and a few others proceeding transversely from them. Soland. and Ellis.

Described by Gmelin as a native of the Mediterranean sea on the authority of Ellis, who, however, merely informs us his specimen was brought from Gibraltar, and is supposed to be taken in the sea thereabouts. The spines of this kind are long and small, and of an amber colour when magnified. The surface of the antipathes appears to be cinereous.

MYRIOPHYLLA. With numerous, incurved, pinnate branches, the subdivisions with lesser spinous pinnules on the upper side. Soland. and Ellis. *Myriophyllum indicum ramosissimum*, Petiv. *Erica marina tenuis*, Rumpf.

This is called by Ellis the yarrow-leaved antipathes; it is of a beautiful shrub-like appearance, with many pinnated branches, bending downwards all round; the colour yellowish-

lowish-brown, and the surface rough, but considerably less so than the species subspinata. Found near the Spice islands.

ALOPECUROIDES. With spinous, setaceous, closely panicled branches. Soland. and Ellis. *Fox-tail antipathes*.

The trunk of this species rises from a broad spreading base, and divides immediately into several large branches, of about one-third of an inch in diameter. As they rise up, one side of them appears flat, with a groove or channel along the middle of it, where there are the remains of many little branches that have grown in rows on each side. It then divides into branches, and often into other branches, all which are in form of close panicles, not unlike the fox-tail grass. These panicles are composed of very rough thorny minute branches, which are twice as long on one side of the stem as the other. This rises to the height of two feet, and is of a greyish colour on the outside, the inside black and very brittle. A rare species, discovered on the coast of South Carolina.

CUPRESSUS. Growing in the form of a simple rough panicle, with recurved branches. Soland. and Ellis. *Antipathes cupressina*, Pallas. *Gorgia abies*, Linn. *Cupressus marina*, Rumpf.

The cupress antipathes was erroneously classed by Linnæus with the gorgia; Gmelin places it with the antipathes. The species inhabits the Indian ocean; it is about two feet in length, and is covered with a brownish-down, beneath which the colour is deep black.

DICHOTOMA. Very long, dichotomous, and upright. Pallas.

Inhabits the Mediterranean, is about two feet in height, round, and dusky.

ORICHALCEA. Brassy, smooth, with a simple, rigid, flexuous stem, and alternate, scattered, dichotomous branches. Pallas. *Gorgia enea*, Linn.

Twelve inches in length, and very rigid. A native of the Indian ocean.

CLATHRATA. Very much branched, intricate, with confused sub-divisions in every part coalescing, the younger ones setaceous. Pallas.

Size of the last, and of a black colour within: this inhabits the Indian ocean.

FLABELLUM. Dilated, very ramose, and sub-divided, the sub-divisions branching both ways, and cohering together in a reticulated manner. Pallas. *Erica marina affinis*, Rumpf. This kind inhabits the Indian sea, and is about six inches wide, black, rough, and undulately curved.

PENNACEA. Branched, somewhat incavated, the branches with setaceous and very crowded rough sub-divisions. Pallas. *Acabarr rutturuttu*, or *Erica marina crassa*, Rumpf. *Peucites prifina*, Aïd.

Inhabits the Indian ocean, the outside grey and rough, within black.

ERICOIDES. Very much branched, rough and black, with scattered branches, covered throughout with subulate sub-divisions. Pallas. *Cupressus marina prior*, Rumpf.

A species about a foot high, and of a deep black colour; an inhabitant of the Indian ocean.

POENICULACEA. Very much branched, with setaceous decomposite sub-divisions. Pallas. *Fenum marinum*, Rumpf. Twelve inches high, the colour black. A native of the Mediterranean.

CORAL, white. See MADREPORA, MILLEPORA, and CELLEPORA.

CORAL gives title to an official composition, called *Jyrup of coral*, sometimes prescribed by physicians; as is likewise the powder of coral finely ground, and afterwards levigated

on a marble, and made up into a proper form. But there are few, except those who are fond of medicines with gems in them, that make use of it. By means of its exceeding hardness, it is suspected to take away with it a great deal of the levigating stone.

Dispensary writers have given us receipts for a great many preparations of coral, as magilleries, tinctures, salts, &c. none of which enter the present practice.

Coral and coralline being the shells of marine animals of the polype kind, possess the same chemical properties as the fresh shells of oysters and other shell fish, i. e. they are calcareous earths impregnated with some animal principles.

CORAL, artificial, is made of cinnamon well beaten; a layer whereof is applied on a piece of wood well dried, and polished, first moistened with fixæ: the whole is then again polished; and for varnish, rubbed over with the white of an egg. See GROTTO.

CORAL-fishery. The time for fishing coral is from April to July; the places are the Persian gulf, the Red sea, coasts of Africa towards the bastion of France, the isles of Majorca and Corsica, and the coasts of Provence and Catalonia.

The method of fishing is nearly the same in all places: that used at the bastion of France, where there is an established fishery, under the direction of a company at Marseilles, is as follows.

Seven or eight men go in a boat, commanded by the patron or proprietor; the cafter throws his net, if we may so call the machine wherewith he uses to tear up the coral from the bottom of the sea; and the other six manage the boat. The net is composed of two beams tied across, with a leaden weight to press them down; to the beams is fastened a great quantity of hemp loosely twisted round, among which they mix some iron nets. In this condition the machine is let down into the sea; and when the coral is pretty strongly embarrassed in the hemp and the nets, they draw it out by a rope, which they unwind according to the depth, and which sometimes requires half a dozen boats to draw. If the rope happen to break, the fishermen are in great danger of drowning. They have two machines, one for fishing up the coral where the bottom is smooth; and the other, called in the Provençal language the *salabre*, so constructed as to be employed where the bottom of the sea is rocky and unequal.

Before the fishermen go out, they agree on the price of the coral, which is ordinarily at the rate of 4 s. 6 d. per pound.

When the fishery is over, which in a season usually amounts to twenty-five quintals of coral each boat, it is divided into thirteen parts: the patron whereof, or master coraller, has four, the cafter two, and each of the six companions one: the thirteenth being reserved for the company, &c.

Spallanzani has particularly described the coral-fishery in the Strait of Messina. (Travels in the two Sicilies, &c. vol. iv. p. 305.) This, he says, is both a laborious and dangerous occupation. The instrument, with which they force the branches of coral from the rocks, is formed with two poles of wood, crossing each other at right angles, and having a piece of a net fastened on the under side to their extremities. A large stone is fixed where the poles cross each other, that the instrument may more readily sink to the bottom. A cord is strongly tied round the middle of it, one end of which the fisherman holds in his hand, guiding by it the net to those places where the coral is supposed to grow; and which is inclosed, in the pieces of the net, broken off, and drawn up. This fishery

is carried on from the entrance of the Faro to the part of the strait opposite to the church of the grotto, or through a tract six miles in length, and to the distance of three miles from Messina. The rocks which produce the coral are situated almost in the middle of the strait, at different depths, from 350 to 650 feet. The bottom and caverns of the rocks are the places from which they endeavour to bring up the coral with their nets; and it is a constant observation, that every branch is perpendicular to the plain on which it grows, without ever turning on one side. Coral, it is said, grows more plentifully in places situated to the east than in those to the south; it is rarely found to the west, and never to the north. In the first situation it is larger, and of a finer colour, than in the second and third; which two valuable qualities are likewise found in that which is brought from a less depth, compared with that which is grown at a greater. The greatest height to which it grows is never a foot, and its usual thickness is that of the little finger, and somewhat less than that of the coats of Trapani and Barbary; but the latter are exceeded by the Messinae in vividness of colour. These differences, according to the account of the fishermen, arise from their coral being produced in a sea which is kept in continual agitation, from the surface to the bottom, by the current and the winds. With respect to colour, there are three kinds; the red, the vermilion, and the white coral. The first is subdivided into the deep crimson-red, and the lighter red. The vermilion is extremely rare, but the white common. In the white they include the clear white and the dull white.

The coral fishermen have divided the whole tract in which they fish into ten parts. Every year they fish only in one of these parts, and do not fish in it again till ten years are elapsed. This interval of ten years they think necessary for the coral to acquire its full growth in height and consistence. When they transgress this law, they find, in fact, the coral smaller, and of less consistence, and the intensity of the colour is always in proportion to the number of years they have desisted from fishing. When the ten years have elapsed, they believe that the coral no more increases in height, but only in thickness, which, however, has its limits. In fact, they have observed that the coral fished up near San Stefano, a place where none had been sought for in the memory of man, though it was of a very bright colour, was not higher than the ordinary coral, though it exceeded it by one-third in thickness.

The number of ships which usually go together in this fishery is eighteen or twenty, each of which is usually managed by eight men. The quantity of coral procured may amount every year to twelve Sicilian quintals. The quintal, as is well known, contains two hundred and fifty pounds, and the pound twelve ounces. The gain acquired is therefore adequate to the labour; yet may the fishery be considered as a secondary occupation, since the fishermen only follow it when they have no other employment by which they can make a greater profit. Spallanzani examined the branches of coral, as they were taken out of the nets, by putting them into glass vessels filled with sea-water. It is well known that, in this case, the white polypi will come out of their cells in the coral as soon as the water is perfectly at rest. He examined and re-examined these polypi, as it was the first time he had seen them; but he discovered nothing which can make any addition to the accurate observations of Peyssonel, Jusseau, Guettard, Donati, and the very recent remarks of the celebrated Cavolini, which seem to leave nothing to be desired to complete our knowledge of these animalcula, and their na-

tural habitudes. Having made some additions and corrections to the observations of count Marfigli, relative to this subject, he proceeds to describe the principal of those branches, which now make a valuable addition to the class of Zoophyta in the imperial museum at Paris. He observes, 1. That the bark of this branch has the colour of sealing wax; but the solid coral is purple, with some transparency at the extremity of the branches.

2. The bark in colour resembles that of the foregoing; but the included solid coral is of a less vivid red.

3. The bark is of a blueish grey; the solid coral grey, with a slightly reddish tinge.

4. In this specimen four branches shoot from the same stem; two of a pale red in the bark, and a whitish red in the solid coral. In the fourth the bark is of a whitish colour, and the solid coral still whiter.

5. Three branches joining in one, the colour of which, both in the bark and the solid coral, is a milky white.

With respect to the structure of the cortical and solid parts of the white corals, he observes that they are the orifices of the cells in the bark of the white coral, which being orificed like those in the red, appears to be a proof that the polypi in both are of the same structure, and consequently of the same species; the polypi inhabiting the red coral having likewise eight tentacula. That coral is soft in the sea, but hardens when it comes in contact with the air, was the opinion of the ancients; but has been proved false by the observations of the moderns. The coral-fishermen of Messina, who derive all their knowledge from experience only, are convinced this opinion is erroneous; but they assert that coral which has not attained maturity has not that degree of consistence it acquires when it has arrived at its full growth. The truth of this position Spallanzani was not able to ascertain, as, for that purpose, it would have been necessary to call the net in one of those ten parts of the strait in which it is prohibited by the law to fish till the expiration of the ten years prescribed. Yet the rules of analogy derived from what is observed in all animals and vegetables, incline him to favour this opinion. It is agreed however by the fishermen on the coasts of Barbary, and also by those of Messina, Sardinia, and Corsica, that the deeper they descend into the sea, the smaller is the coral. Donati observes, that the broken and detached branches of coral will continue to live and multiply in the sea; and this Spallanzani allows to be the case, provided they meet with a firm point of support to which they can attach themselves with their viscous humour. Otherwise, if they fall on the moveable sand, they become the sport of the waves, and he has no doubt that they must perish. The fishermen, with whom Spallanzani conversed, appeared to be well acquainted with the true generation of coral; as they told him that they had frequently observed, on hard matters drawn from the bottom of the sea, the first principles of coral beginning to germinate; which they describe as having the appearance of a red spot, with a button or bud implanted in those matters, sometimes tender and fragile, and sometimes hardened, and of the colour and nature of ordinary coral.

They were likewise acquainted with those branches of coral which, when fished up, are sometimes found perforated by lithophagous worms, and which are mentioned by Vitaliani and Marfigli. Their nets had frequently brought them up, either from the bottom of the sea, from caverns, or the sides of rocks; and these perforated corals were found sometimes broken in the trunk, where the per-

forations

forations are most frequent; and at other times attached to some body which served them as a base. They were of opinion that these corals were thus perforated, because they were dry; and this dryness, they imagine, proceeds either from age, or their having been broken from their root by some fish, or by a part of a rock falling on them; or possibly by the coral nets, which do not always bring up all the branches of coral they tear away from their roots.

CORAL ISLANDS, in *Geography*, called by the Spaniards in their old charts *los corales*, or *isles del coral*, three islands lying in the form of a triangle and situated S.W. of the Ladrões, in the East Indian ocean.

CORAL RIVER, a river of New Mexico which runs a W. by S. course and discharges itself into the head of the gulf of California, near the mouth of the Colerado river.

CORAL-TREE, in *Botany*. See *ERYTHRINA CORALLOBENDRUM*.

CORAL-WOOL. See *DENTARIA BULBIFERA*.

CORALARIA, *parvifolia*; Rumph. See *ADENANTHERA PAVONINA*.

CORALIS, in *Ancient Geography*, a marsh of Asia, in Lycæonia, placed by Strabo in the vicinity of Galatia.

CORALIUS, a river of Greece, in Bœotia.

CORALLA, a place of Asia, in Cappadocia, on the Euxine sea, according to Arrian's Periplus.

CORALLI, a people of European Sarmatia, who inhabited the banks of the Euxine sea, towards the Danube.

CORALLINA, in *Zoology*, a genus of zoophytes, the animal of which is of a plant-like form, with the stem fixed, and the branches subdivided, calcareous, and mostly jointed.

The ancient naturalists mistook corallines for a particular tribe of plants, and accordingly introduced them into their works under the title of marine mosses. Tournefort enumerates thirty-six species among his plants; and indeed certain kinds appear to be so nearly allied to the lichen family, that some continental botanists, even in the present day, are in doubt where to draw the exact limit between the cryptogamia and the corallina.

All the corallines adhere to rocks or other solid bodies, and are concretions formed by the polype animals which inhabit them, the coralline itself being only the habitation of these creatures. The branches are commonly elevated, of a shrub-like form, and exhibit an elegant appearance from the symmetry and general proportions of their respective articulations; the branches being composed of little joints, like beads strung in a necklace. The joints consist of a calcareous and gelatinous matter, and have the surface perforated, or full of minute pores, which in many species are so very small as to be visible only with the aid of glasses. It is in these minute cells that the polypes reside, and through which they either protrude their limbs when they lie in wait for food; or draw their nourishment through the aperture. When a branch of coralline is immersed in vinegar the calcareous crust dissolves, and leaves the cartilaginous parts uninjured, and by that means enables us to examine its internal tubular structure. In point of colour the corallines differ very considerably, not only in different, but also in the same species, and without exception the whole become white on exposure to air.

The coralline tribe, possessing much elegance and beauty, are highly ornamental in a collection of natural history; one species only appears to be appropriated to an useful purpose, which is the *corallina officinalis*, vast quantities of

which are gathered and employed in medicine as an abortif.

Among the older writers the word coralline had a very general acceptation, and seems to have comprehended every description of polype-bearing substances, in addition to the coralline genus of modern naturalists, such as the *subipora*, *fertularia*, *cellepora*, *flustra*, *alcyonium*, *spongia*, &c. Mr. Ellis, in his publications on corallines, adheres rather too closely to this idea, and still defines the several genera with so much accuracy as to render his works of the greatest value to future naturalists. His vesiculated, tubular, ciliated, and articulated corallines are referable to the different genera above-mentioned (which see respectively). He includes also among his corallines the *iris*, *gorgonia*, *antipathes*, &c. in which he is certainly wrong. The species of the true corallina at present known are as follow.

Species.

TRIDENS. Trichotomous, with compressed three-lobed flat joints. Ellis.

Found on the coast of the North American islands, where it was first discovered by Mr. John Greg.

OPUNTIA. Trichotomous, with kidney-shaped joints waved at the edges. Gmel. Indian fig coralline, Ellis. *Corallina latifolia*, Plunk. *Muscus*, &c. *Bocc. Fucus*, &c. C. Bauh. *Scutellaria*, *opuntia marina*, J. Bauh. *Sertolaria*, Imper.

This kind grows on the coast of Jamaica, and other West India islands, and is found also in the Mediterranean sea. The colour is white, and the joints somewhat kidney-shaped.

MONILE. Trichotomous, with the lower joints compressed, convex, cuneated, oblong, and with the upper ones sub-cylindrical. Soland. and Ellis. Necklace coralline.

Inhabits the shores of Jamaica.

INCRASSATA. Trichotomous, with compressed plano-convex wedge-shaped joints. Soland. and Ellis. Flethy coralline.

This kind is very frequently cast up on the shores of the American islands, particularly Jamaica.

TUNA. Trichotomous, with compressed flat roundish joints. Soland. and Ellis. *Tuna coralline*. *Opuntia marina*. Park. Theat.

Found in the Mediterranean sea.

NOBULARIA. Trichotomous, and very much branched, with thick wedge-shaped joints, those at the divisions broadest, the terminal ones tricuspidate or ovate. Pallas. *Nodularia alba*, Imp. *Muscus coralloides*, C. Bauh.

Inhabits the same sea as the preceding. Grows to the height of eighteen inches, and is very thick, strong and white.

SQUAMATA. Trichotomous, the joints of the stem roundly compressed and wedge-shaped, those of the branches flatly compressed; terminal ones flatish and sharply two-edged. Ellis.

Inhabits European coasts, and is of a sea-green colour.

LORICATA. Trichotomous, with compressed, sub-convex, wedge-shaped joints, angulated at the sides; the terminal ones with small obtuse lobes. Ellis.

A native of the Mediterranean sea.

PALMATA. Trichotomous, with compressed, sub-convex, wedge-shaped joints, slightly denticulated at the tip; the extreme joints broad, and often furnished with short finger-like lobes. Ellis.

This was found in the American seas, and is of a glossy white colour.

ELONGATA. Trichotomous, with the joints of the stem roundish and cuneated; those of the branches cylindrical; the extreme joints a little obtuse, and some of them capitated. Ellis.

Varies in colour from red to purple. It inhabits the European coasts.

SUBULATA. Trichotomous, with the joints of the stem cuneated and two-edged, and projecting small pointed branches from the top of each of their sides, with round joints. Ellis.

The appearance of this coralline is very flat, white, slender, and small, and seems as if it were very closely pennated or beset with fine white fibres, projecting out on each side like the plume of a feather. This is the most delicate of the coralline tribe. Found in the West Indies.

GRANIFERA. Trichotomous, with the joints of the stem compressed and wedge-shaped; those of the branches roundish, and furnished with opposite ovate ovaries, seated on small pedicles. Ellis.

This differs from all the other kinds of trichotomous corallines, in having proliferous ovaries, or branches growing out of them, being other ovaries. It is of a fine slender texture, and of a sea-green colour. It was found on the coast of Africa, in the Mediterranean sea.

OFFICINALIS. Sub-bipinnate, and usually trichotomous, with the joints of the stem somewhat cuneated or turbinated; those of the branches round, and some of the terminal ones capitated. Ellis. *Corallina officinalis, sub-bipinnata, articularis fulturbinatis*, Linn. Fn. Suec. *Corallina altera*, Tobernacm herb. *Muscus corallinus flicinus*, Barrel.

Common on almost every shore, where it grows on the rocks in tufts of two, three, or four inches in length, and varying considerably in colour, being red, yellow, green, and white. This is the coralline of the shops, and is the kind used in powder as an astringent.

PINNATA. With pinnated branches without joints, and covered with a mealy substance. Ellis.

Found on the coast of the Bahama islands.

RUBENS. Dichotomous, filiform, with the joints of the stem round; those supporting the divisions clavated, and some of the lower ones bicornuted. Ellis. *Corallina rubens*, Linn. *Corallina filiformis dichotoma fastigiata, articularis omnibus cylindricis*, Pallas.

Inhabits European seas; length two inches; colour red.

CRISTATA. Dichotomous, filiform, in crested clusters, with roundish joints; those supporting the last sub-divisions clavated. Pallas.

This kind inhabits the European and American seas. The colour, as in officinalis, varies from red to purple, green, yellow, and white.

FRAGILISSIMA. Dichotomous, with smooth, even, cylindrical joints; those at the extremity broadest at the tip. Linn. *Corallina minimum capillaceum*, Sloane.

This is found in the West Indian and Mediterranean seas, and is so extremely fragile, that perfect specimens are very rarely obtained; the colour is milk-white; length about two inches.

SPERMOPHOROS. Dichotomous, filiform, with roundish branches; those supporting the two last sub-divisions clavate. Linn., &c.

Inhabits European seas, is of a milk-white colour, and about an inch in length.

CORNICULATA. Dichotomous, with the joints of the stem and branches bicornuted; those of the subdivisions roundish. Linn.

Inhabits the same seas as the preceding.

FRUTICULOSA. Dichotomous, with round branches tapering towards the extremities, without joints, and mealy. Ellis and Soland.

There are many varieties of this shrub-like coralline; the species occurs on the coast of the Bahama isles.

INDURATA. Dichotomous, with smooth round spreading branches, scarcely jointed. Ellis and Soland.

Found on the same shores as the preceding species.

LICHENOIDES. Dichotomous, with the branches a little rugged and not jointed, the tips dilated and flattened. Ellis. Liver-wort coralline.

This coralline is of a sea-green colour; it inhabits the Bahama islands.

RUGOSA. Dichotomous, with cylindrical branches, hardly jointed, rough, with transverse wrinkles, and compressed at the tips. Ellis and Soland. *Fucus Marinus*, &c. Sloane.

Found on the coast of Jamaica.

MARGINATA. Dichotomous, with scarcely jointed smooth flat branches, and raised margin. Ellis.

This kind occurred on the shore of one of the Bahama islands. Mr. Ellis observes, that though this coralline is found, when dry, on the shore, more flat than the rest of this kind, it is very probable, when it is fresh taken out of the sea, it is much rounder, the fibres in the inside being extremely delicate, which occasions its shrinking very much, when the gelatinous fluid is evaporated.

CYLINDRICA. Dichotomous, with cylindrical and nearly equal smooth joints. Ellis.

Mr. Ellis received this species of coralline preferred in spirits, from the West Indies, and observed by that means the internal parts appeared full of a clear gelatinous substance. Upon opening some of the joints, a number of minutely branched tubes were also disclosed, and hence this writer concludes, that the tubular-hollow appearance described by authors, proceeds from their having dissected only dried specimens.

OBTUSATA. Dichotomous, with oval-oblong joints, a little compressed and rounded at the ends. Ellis.

Inhabits the shores of the Bahama islands.

OBELONGATA. Dichotomous, with oblong cylindrical joints, a little compressed. Ellis.

A species allied to the two foregoing corallines, and found on the shores of the same islands.

LAPIDESCENS. Dichotomous, with cylindrical downy branches. Ellis.

This kind is sometimes found trichotomous, or three-branched, instead of two. In specimens just received from the sea, the surface appears covered with short hair-like verticillate down, of a reddish colour, disposed in regular circles, one above another.

BARBATA. Dichotomous, with short cylindrical joints; those at the extremity bearded at the tips. Linn.

Inhabits the shores of Jamaica, and measures about three inches in length. This is the bearded, or bead-coraline, of Ellis.

ROSARIUM. Dichotomous, with round bead-like joints, those of the stem longest and cylindrical. Ellis. Kofary coralline.

Nearly allied to the last, but specifically different. A native of the West Indies.

CUSPIDATA. Branches often dividing into four parts, and ending in sharp points; joints cylindrical, and united by a glutinous tendinous substance. Ellis.

Found in the West Indies; it is very brittle, white, and grows in tufts about three inches high.

* TRIBULUS.

TRIBULUS. Branches often dividing into five; joints two-edged, and united by a glutinous tendinous substance. Ellis.

A West Indian species, of a whitish colour, and rather larger than the last.

FLABELLUM. Stem single, incrustated, with the branches flicking together, in a foliaceous fan-shaped manner, and somewhat waved. Ellis.

This coralline is also found in the West Indies, and varies much in figure, being sometimes of a flat kidney-shaped form, of about an inch in height, and sometimes expanding to a large subdivided, lobed, and undulated mass, from one to five inches broad, and as many in height. At the bottom of the stalk is a tuft of fine hair-like tubes. There are many kinds of this curious coralline found in the West Indies, which vary in colour from a greenish-brown to a milk white.

CONGLUTINATA. Stem single, slightly incrustated, with the branches dichotomous, and agglutinated together, and forming a naked fan-shaped leaf. Ellis.

Found on the coast of the Bahama islands; the colour sea-green, and the height an inch and a half.

PHOENIX. Stem single, incrustated, terminating in an oblong frond, composed of distinct fasciculated branches, produced on all sides, the sub-divisions of which are united together, and appear quite flat. Ellis.

This is the palm coralline of Ellis, a singular species found on the coast of the Bahama islands; it is of a milk white colour, and about three inches and a half high.

PENCILLUS. Stem single, incrustated, terminated by an orbicular tuft of dichotomous, filiform, jointed ramifications. Linn. Pencill coralline. Ellis.

This coralline varies in the thickness of its branches, as well as in size, being found from one to four inches long. In some the stem is very short, in others four times the length of the head. The joints are easily distinguished where the branches divide; the stem is composed of tubular filaments covered with calcareous crust; its general colour is white. This sort of coralline adheres to shells by the base of its filaments, and is often found attached to such bodies, in large clusters, in the West Indian ocean.

PENICULUM. Stem single, incrustated, and terminated by an orbicular tuft of dichotomous, filiform, jointed ramifications. Ellis, &c. Mop coralline.

This is one of the most singular of the coralline genus, and differs from the rest, among other particulars, in having the stem regularly wrinkled. The stem is small at the base, and grows wider as it rises, till it sends forth its branches at the top; it adheres at the base like the fertilizing, by means of ramose tubes, which tubes do not lessen as they extend or branch out, but have an equal diameter throughout their whole length. The species is found in clusters in the American seas, particularly near the Bahama islands.

We must lastly mention the coralline terrestris of Linnæus, a species, according to that writer, distinguished by having the branches placed opposite, and the joints cylindrical, with lateral peduncled, and transversely wrinkled fructifications; it is further added, that the species is a few lines high, and inhabits heaths in Friesland. Gmelin admits it as a species of coralline, with some doubt, and seems uncertain whether to consider it of the animal or vegetable kingdom, and undoubtedly not without reason, for it has been described by different writers, both as a plant and a coralline. Meese defines it to be a vegetable of the cryp-

togamia class "Lichen fruticulosus ramifolus articulatus, articulis longis cylindricis peltis pedunculatus." But Pallas, on the contrary, inserts it in his work on Zoophytes, as a genuine coralline. "Corallina opposita ramifolia articulis cylindricis, fructificationibus lateribus pedunculatis transversim oblongis." Between two such opposite authorities, it must be acknowledged it might be improper to form any very conclusive opinion as to the real nature of the article in question. Considering the situation in which it was said to be discovered, we should scarcely hesitate for a moment in concluding that it must belong to the vegetable kingdom, but then again the decided assertion of Pallas would militate against such an opinion, and the testimony of such an intelligent naturalist is not unworthy of regard. It is fortunate, however, that the accurate Ellis has afforded us much satisfactory information on this very subject: the matter is not so completely elucidated, perhaps, as we might wish; but his observations on the article are remarkable, and deserve to be transcribed. "I should have taken notice, (says this writer) of the corallina terrestris mentioned by Linnæus, Syst. Nat. 1306, from other authors; but as I found it a defective specimen, of some one of the trichotomous corallines already described, I must refer the reader to a full account which I have given of it, in the Philosophical Transactions, vol. lvii. p. 415, wherein the absurdity of a marine animal substance, growing on a heath many miles from the sea, is, I hope, fully demonstrated." We are hence inclined to suppose, that in the course of correspondence between Mr Ellis and Linnæus, the former had obtained an opportunity of examining some specimen of the article in question, or at least of ascertaining from Linnæus himself, what was really meant by his corallina terrestris, and we shall therefore conclude, that it could not be of the shrubby lichen kind, as some imagine, but as Mr. Ellis states it, a defective or mutilated specimen of the coralline tribe, and in which case Linnæus and others must have been greatly deceived as to its habit; the specimen might, indeed, be found on a heath at any distance from the sea; but, if truly a marine production, no one can be ridiculous enough to conceive it could grow there.

The ancients have said great things of the virtues of the common coralline. Dioscorides prescribes it for mitigating the pain of the gout, and for preventing stagnations of the humours in any part; he says nothing of its virtues against worms, which are what we alone esteem it for. They have been given in powder from ten grains to a scruple or half a dram twice a day in these cases, and it has been said with considerable good effect. Geoffroy, Mat. Med. vol. ii. p. 238.

Although the corallum and coralline are reckoned alkaline and absorbent, they are neglected in the present practice as unnecessary.

CORALLINUM ARCANUM. See ARCANUM.

CORALLO ACHATES, in the *Natural History of the Ancients*, the name of a very beautiful species of agate, found at this time in the East Indies, but not in any plenty. It is very hard, and capable of a fine polish; and, when wrought, is an extremely elegant stone.

CORALLO-DENDRON, in *Botany*. See *CORAL-tree*.

CORALLO-FUNGUS, Vail. See *CLAVARIA*.

CORALLOIDE MARBLE See *MARBLE*.

CORALLOIDES, in *Botany*, Tournef. See *CLAVARIA*.

CORALLOIDES, Cord. See *DENTARIA enncaphylla* and *vulgifera*.

COPALLOIDES, Dill. See LICHENES *Scyphiferi* and *Fruiculosi*.

CORALLORHIZA, Gmel. Hall. Scop. See OPHREYS *corallorhiza*.

CORALLUM, in *Mineralogy*, a name given by some of the writers on these subjects to the common PYRITES.

CORAM, THOMAS, in *Biography*, a name worthy of some memorial, as the founder of a new species of charity, was born about the year 1688, and introduced at an early period to the business of the seas. Having spent some years in the service, he settled in the eastern part of the metropolis, and was frequently witness to distressing scenes of children exposed, through the indigence or cruelty of their parents, which excited him to project the founding hospital; for which he obtained a charter in 1730. This charity has been of much real benefit to society; but its regulations respecting the children seem to require revision, as it should seem, by some late publications on the subject, that for a child to become an inmate there, the parent must be prevented for a long term of years from having the smallest intercourse with her infant, for which she must be supposed to have a tender affection, although unable to support it. Mr. Coram was highly instrumental in procuring a bounty upon naval stores imported from the colonies, and in establishing the colonies of Georgia and Nova Scotia. He died March 29, 1751, in his 84th year, and was buried in a vault under the chapel of the Foundling Hospital, where an inscription perpetuates his memory; but his good deeds will live longer than inscriptions on brass or marble. *Biog. Brit.*

CORAM, in *Geography*, a post-town of America, in Suffolk county, Long island, New York. It has about 60 houses, and lies 62 miles eastward of New York city, and 10 from Smithtown.

CORAM *non Judice*, in *Law*, is when a cause is brought into a court whereof the judges have no jurisdiction.

CORAMBIS, in *Ancient Geography*, a town of Ethiopia, near Egypt.

CORANCALI, a people of India, on this side of the Ganges. *Ptolemy*.

CORANI, a people of Italy, in the country of the Volsci. *Pliny* gave this name to the inhabitants of Cora; and says, that they derived their origin from Dardanus the Trojan.

CORANITÆ, a people of Arabia Felix. *Pliny*.

CORANTO, a *Dance*, *Courante*, *Fr. Corrente*, *Ital.* &c. It is strange that the *courant* is said by some writers to be the *most solemn* of all dance-tunes; forgetting the *saraband*, and that the word is derived from *currere*, to run. See *COURANT*.

CORAS, JOHN DE, in *Biography*, a learned French lawyer, born at Realmont in 1513. He studied law at Toulouse with so much success, that he gave public lectures upon it before he attained to manhood. He was afterwards elected professor of the university of Toulouse, where he taught with so much celebrity that he is said to have had 4000 auditors at one and the same time. He was appointed to the chancellorship under the queen of Navarre; and counsellor in parliament in the reign of Hen. II. He embraced the reformed religion, and lay under the suspicion of being one of the authors of the conspiracy in 1562, to deliver Toulouse into the power of the Calvinists. On this account it was with difficulty that his life was spared. For taking part with the prince of Conde, and other alleged offenders, he was apprehended in 1572, imprisoned, and at length assassinated. The works of Coras, consisting of interpretations of the civil law, were printed at Lyons in 1556 and 1558, in two folio volumes, *Moreri*.

CORASAN, in *Geography*. See KORASAN.

CORASIE INSULÆ, in *Ancient Geography*, a name given by *Pliny* to islands of the Ægean sea.

CORASIUS MONS, a mountain of Asia in Syria, near Antioch.

CORASPHI, or CORAXI, a people of Scythia, on this side of Imaus. *Ptolemy*.

CORAX, a mountain of Greece, in Etolia, between Naupacte and Callipolis, according to *Livy*, *Ptolemy*, and *Strabo*. It is now a mountain near Lepanto.—Also, a river of Asiatic Sarmatia.—Also, mountains of Asia, between Sarmatia and the Colchide territory, forming the boundary between the countries.—Also, a promontory of Tauric Cherfonefus; E. N. E. of Cricu-Metopon.—Also, a river of Asia (*Carvasday*) which took its rise in the mountains, ran from N. to S., traversed the country of the Abari, and discharged itself into the Euxine sea, E. of Pytium.

CORAX, in *Ichthyology*, the TRIGLA *hirundo* of Gmelin.

CORAX, in *Ornithology*, the raven, a species of CORVUS.

CORAYA, the name given by *Buffon* to the TURDUS *Coraya* of Gmelin, or barred tail thrush of *Latham*.

CORBACH, in Latin *Corbacum*, in *Geography*, a small town of Germany, in the circle of the Upper Rhine, capital of the principality of Waldeck, which is now enclosed on all sides by the kingdom of Westphalia, and likely to be considered only as a fief of the same.

The town is divided into the Old and New, each of which has its church. There is an excellent gymnasium or grammar school. One of the churches is adorned with a fine marble monument, erected by the republic of Holland to the memory of prince George Frederic of Waldeck, who was a field marshal in the Dutch service. Corbach is situated in N. lat. 51° 17', forty miles south of Paderborn.

CORBAN, a Scripture term, signifying an oblation, or offering, to God on the altar.

CORBAN also denotes a ceremony in use among the Mahometans, yearly performed at the foot of mount Ararat in Arabia, near Mecca. It consists in slaying a great number of sheep, and distributing them among the poor.

This festival occurs seventy days after that of Beiram, and like the latter, continues three days; and these two are the only festivals which the Mahometans of the East observe with great ceremony; so that the people do not labour during these three days. The Moors keep each of these festivals eight days; and the emperor of Morocco holds this festival out of the city, that more people may assemble, and he thus preserves the custom which subsists among the Moors, of praying in the open fields, before they were converted to Mahometanism. He leads a slain sheep to his palace by a horseman, and, if the heart palpitates when it arrives there, this is interpreted to be a good omen.

CORBASA, in *Ancient Geography*, a town of Asia, in Carbalia, a country of Pamphylia.

CORBEIAN MS. in *Biblical History*, *Codex Corbientis*, a MS. of the New Testament; of which there are two; one published by Bianchini, and the other by Sabatier. These two MSS. were noted 1. 2. by Griesbach, in his preface, p. 23, 24.

CORBEAU, *Raven* or *crow*, a moveable bridge, that received at the distance of six feet, from one end of it, a round pillar of wood about 12 feet high, and three palms in diameter, fixed or erected on the prow of a vessel with a pulley at the top of it. This moveable bridge or stage was about 18 feet long, and 4 feet broad, and was made somewhat in the form of a ladder of strong timbers, laid close

close across, and cramped together with iron. On each side lengthways of this bridge or stage, there was a parapet, which reached just above a soldier's knee. At the farthest end of this stage or ladder, there was a bar of iron in shape somewhat like a pebble, but sharpened at the bottom, or brought to a point at the lower end. And connected with the top or upper end of it, there was a ring. To the ring there was fixed a rope, by means of which, with the help of the pulley at the top of the pillar, the machine was hoisted up, and as an enemy's vessel approached let fall on it, sometimes on the prow, and sometimes on either side, as an opportunity presented itself. The farthest end of the machine falling with great force, struck into the deck of the enemy's vessel, and held it fast. In this situation, if the two vessels happened to be side by side, the Romans, who first made use of such means in the sea-fight between them, commanded by Duilius, and the Carthaginians, leaped on board the enemy's vessel from every part of the side of their own at once. But if the vessels were joined only by the prows, they then went two and two abreast along the machine, the two foremost extending their shields or bucklers right before them to ward off the strokes or blows that were aimed at them in front, whilst those that followed, rested each of them, the boss of his buckler upon the top of the parapet on either side, and thus covered both their flanks. Such were the machines employed on that occasion by the Romans, to which they gave the name of *Corvi*, or *Corbeaux*.

Some French writers give the name of *Corbeaux* to the machines with long beaks extending beyond the battlements and iron-hands suspended to them by chains, with which Archimedes, at the siege of Syracuse, under Marcellus, raised the Roman vessels erect out of the water, and then, by loosening the chains from the beaks, let them fall into the water sometimes on one side, and sometimes bottom uppermost. But it is evident from Polybius's account of those machines, that they were quite different from the *corvi* of the Romans, which we have just given a description of. The *corvus* was also very different from what these writers call the *corbeau à laes-courans*, the *corbeau à griffes*, the *corbeau demolisseur*, the *corbeau à tenailles*, and the *corbeau à faux*.

CORBELL, in *Natural History*, the name of a curious species of *Chama*. It is of the larger kind, and is deeply striated, both longitudinally and transversely; so that it has a sort of reticulated surface, like basket-work.

CORBELL, in Latin *Corbellium*, in *Geography*, a town of France, in the department of Seine and Oise, situated at the confluence of the rivers Seine and Juine or Elonne, which divides it into the Old and New Town, in N. lat. 48° 38', twenty-four miles south of Paris. It is the chief place of a district, and has a sub-precinct and a court of justice. The inhabitants excel in calico-printing and the manufacturing of glue; they have also very good tan-yards. Between Elonne and Corbell is a larger powder-mill. The district has besides several manufactures of cotton and linen, a sugar-house, a paper-mill; and in the village of Moulin Galons there is a considerable manufactory of large copper coppers, kettles, and all sorts of tinned copper kitchen utensils. The population of Corbell itself is 3200; that of the canton, which contains 26 communes upon a territorial extent of 225 kilometres, is 14,807. The district comprises four cantons, containing together 56,567 inhabitants upon 697 kilometres and a half. Corbell was formerly a county.

CORBEILLES, *Fr.* Baskets about eighteen inches high, eighteen inches wide at top, and only about nine or ten inches wide at bottom, in order to furnish loop-holes or

openings for men standing behind the parapet or work, they are placed on, to fire through without being seen by the enemy. They may be used either by the besieged, or the besiegers, on the parapet of the body of a place, or of any of its out-works, and on all kinds of retrenchments, whether they be lines of circumvallation or countervallation, of approach or counter-approach, &c.

CORBEILLES, in *Geography*, a town of France, in the department of the Loiret, and district of Montargis; eight miles N. W. of Montargis.

CORBEL, in *Architecture*, the representation of a basket, sometimes seen on the heads of carvatures.

The word is also used for the vase, or tambour, of the Corinthian column; so called from its resemblance to a basket, or because it was first formed on the model of a basket.

CORBEL, or *Corbil*, is also used, in *Building*, for a short piece of timber placed in a wall, with its end sticking out six or eight inches, as occasion serves, in manner of a shouldering-piece. The under-part of the end, thus sticking out, is sometimes cut into the form of a baulkin; sometimes of an ogee, and sometimes of a face, &c. according to the workman's fancy; the upper-side being plain and flat.

These corbels are usually placed for strength immediately under the semi-girders of a platform, and sometimes under the ends of chamber-beams: in which latter case they are commonly placed a foot or two below the beam, and have a piece of timber standing upright close to the wall from the corbel to the beam.

CORBEL is also used by some architects for a niche, or hollow, left in walls for images, figures, or statues to stand in.

CORBELIN, in *Geography*, a town of France, in the department of the Isere, and district of La Tour-du-Pin; 30 miles E. S. E. of Lyons.

CORBENY, or *St. MARCOUL*, a small town of France, in the department of the Aisne, with a priory of Benedictines, where the kings of France used to pray for nine days, after having been anointed at Rheims.

CORBERA, a town of Spain, in the province of Valencia; 20 miles S. of Valencia.

CORBETT, in *Architecture*, is used by some, as Harris, in his *Lexicon*, for corbel.

CORBEUNTOS, in *Ancient Geography*, a town of Asia, in Galatia, assigned by Ptolemy to the Tectosages.

CORBIA, a town of the island of Sardinia, situated 25 miles from Bos, according to the Itinerary of Antonine.

CORBIANA, or *CORBIENA*, a province of Asia, between Hyrcania and Bactriana, according to Strabo, who says that it was in the country of the Elymaeani.

CORBIE, in Latin *Corbeia*, a small town of France, in the department of the Somme, on the Somme, in N. lat. 49° 54' 32", one hundred miles north of Paris; it is the chief place and canton in the district of Amiens, and has 1913 inhabitants. The whole canton contains 14,626 inhabitants dispersed in 24 communes upon an extent of 173 kilometres and a half.

CORBIENA, in *Ancient Geography*, (*Khorren abad*) a place of Asia, on the banks of the Gyndes, S. S. W. of Ecbatana and N. N. W. of Susa.

CORBIERES, in *Geography*, a town of Switzerland, and chief place of a bailwick, in the canton of Friburg; 10 miles south of Friburg.

CORBIERES, a valley of France near the Pyrenées, celebrated on account of a victory which Charles Martel obtained over the Saracens.

CORBIGNY, or **ST. LEONARD**, in Latin *Corbinacum*, a small town of France, in the department of the Nièvre, chief place of a canton in the district of Clamecy, has 2315, and the whole canton 11,221 inhabitants. The territorial extent of the latter is 307 kilometres and a half. It is composed of 15 communes.

CORBILO, in *Ancient Geography*, (*Coctton*) a port of Gaul, upon the Loire. M. D'Aville places it at a little distance from Condivicnum or Nantes to the west.

CORBIO, a town of Spain belonging to the Suesitanii. —Also, a town of Latium, whose situation is unknown.

CORBIVEAU, from *Corbeau*, a raven, in *Ornithology*, an African bird, described by M. F. le Vaillant, in his "Histoire Naturelle des Oiseaux d'Afrique, &c." This bird is similar to the raven in the shape of his body, his feet, and his claws; his middle claw is united as far as the first articulation, by a membrane, to the inner one; and the feathers on the lower part of his beak are turned upwards, and cover his nostrils; but he is unlike the raven in his back, in the length of his wings, and in his graduated (*stagé*) tail. He appears, says the writer, to occupy in part the interval between the genus of the ravens and that of the vultures; though he resembles the former in a greater degree than the latter. He is similar to the African vulture in the size of his wings, which when spread are three inches longer than his tail; in his *graduated* tail, in the form of his beak, which is compressed side-ways, convex above, crooked and rounded. These particulars distinguish the corbiveau from all the species of ravens hitherto described; and this bird may be always ascertained by the white patch on the nape of his neck, which strongly contrasts with the glossy black that constitutes the rest of his plumage; except a white mark which separates the sides of this white patch on the back of his neck, and encircles the neck. This bird has some resemblance, in point of form, to birds of prey; and his manners and mode of life confirm the resemblance. Carnion constitutes the chief part of his food; and these birds frequently assemble in large and noisy crowds. The appetite for flesh and blood leads him to kill lambs and young antelopes, and to pursue even the largest quadrupeds. He flies with great strength, and raises himself to a great height by his long wings. He constructs his nest, in October, amidst the trees; and lays four eggs greenish, spotted with brown. The corbiveau is not a bird of passage, but continues the whole year in the country where he was born. The female is less than the male, and the black less glossy.

CORBRENÉ, in *Ancient Geography*, a people of Asia, placed by Polybius in the valleys of Media, with the Cossians and other barbarous nations.

CORBRIDGE, in *Geography*, a place of England in Northumberland formerly a borough, which sent members to parliament. In 1295 it was burned by the Scots, and in 1311 suffered severely from the same invaders; 4 miles east of Hexham.

CORBULO, **CN. DOMITIUS**, in *Biography*, a distinguished commander under some of the Roman emperors. By Tiberius he was made superintendent of the highways in Italy. His conduct in this situation was questioned by succeeding sovereigns. In the year 57, he engaged in military service, and had the command of an army in Lower Germany, among whom he maintained, though at the expense of his humanity, the most exact discipline. In this commission he was eminently successful over the enemies of the empire. By Nero, in 54, he was sent into Armenia, which was invaded by the Parthians. He employed all his efforts in restoring the discipline of the legions which had been enervated by the luxury of Syria. A maxim by which

his conduct was governed, was, "that an enemy might be conquered with a pick-axe," referring to the labours of entrenchment and fortification, for which the Roman armies were so much distinguished. No severity, either of season or climate, prevented him from keeping his troops in the field; and in suffering, as well as in exertion, he was an example to his men, going constantly in their clothing, and with his head bare. He never pardoned a deserter who was apprehended. His various successes were important to the government under which he was employed, and will be related under the article **ROME**. After he had forced the Parthians to an accommodation, he became, on account of the glory attached to his military reputation, an object of suspicion and jealousy with Nero, who resolved upon his death. He accordingly summoned him to his presence by a letter filled with the most flattering expressions of regard. The brave soldier scorned to suspect the integrity and honour of his infamous sovereign. He prepared to attend the court, but no sooner had he reached the port of Corinth, than he met an order to die. Reflecting for a moment upon his own want of prudence and foresight, he exclaimed, "I have merited my fate by trusting to the professions of the monster," and instantly plunged his sword through his body. This was in the year 67. He left behind him memoirs of the several wars in which he had been engaged.

CORBUT, **CHARLES** and **PHILIP**, two draftsmen and mezzotinto scrapers of London, by whom we have several portraits from different masters, as well as other prints from Vandyke, Ramsley, Titian, Oildate, Reynolds, Wilson, &c. Charles Corbut, who was the elder, flourished about the year 1760. Heinecken. Strutt.

CORCANG, or **ALJORJANIYAH**, in *Geography*, a town of Asia, on the river Gihon.

CORCAS, or **GRAND CORCAS**, an island almost in the form of a crescent, N. of St. Domingo, in the windward passage, about seven leagues W. of Turk's island, and about twenty E. of Little Inagua, or Henecagua. N. lat. 21° 55'. W. long. 70° 55'.

CORCELET, in *Natural History*, that part of the fly class which is analogous in its situation to the breast in other animals. Many have called it the breast in these also, but improperly; because the breast of other animals is the place of the lungs and trachea; but these organs are in the fly class distributed through the whole body. The wings are affixed to this part of the fly class; and there are some distinctions of great consequence, in regard to the arrangement and distribution of those animals into genera. Reaumur's Hist. Insect. tom. iv. p. 126.

CORCELE, in *Geography*, a river of France, which runs into the Aroux near Autun.

CORCHORUS, in *Botany*, a name given by the ancients to one or more of their most common pot-herbs. Linn. gen. 675. Schreb. 917. Willd. 1052. Tourn. Cl. 6. gen. 9. Gært. 391. Jusq. 290. Vent. 3. 207. (Corete. Encyc.) Class and order, *polyandria monogynia*. Nat. Ord. *Colummifera*, Linn. *Tiliaceae*, Jusq.

Gen. Ch. *Cal.* Perianth five-leaved; leaves linear-lanceolate, acute, erect, deciduous. *Cor.* Petals five, oblong, obtuse, narrowed towards the base, erect, the length of the calyx. *Stam.* Filaments numerous, capillary, shorter than the corolla; anthers small. *Pist.* Germ superior, furrowed; style thick, very short; styles simple or bifid. *Peric.* Capsule from two to six-celled, from two to six-valved. *Seeds* numerous, angular.

Ess. Ch. Corolla five-petalled. Calyx five-leaved, deciduous. Capsule from two to six-celled, from two to six-valved.

Sp. 1. *C. vilitarius*. Britly-leaved corchorus, or common

moon Jews' mallow. Linn. Sp. Pl. 2. Mart. 1. Lam. 1. Willd. 1. Comm. Hort. tab. 12. Lam. Ill. Pl. 478. fig. 1. Gært. tab. 64. fig. 2. (C. Plinii; Bauh. Pin. 317. Lob. ic. 505. Melochia; Alp. Egypt. 45. tab. 30.) "Capsules oblong, ventricose; lowest ferratures of the leaves bristle-shaped." *Root* annual. *Stem* about two feet high, cylindrical, smooth, even-surfaced, a little branched. *Leaves* alternate, some spear-shaped, some oval, some almost heart-shaped, serrated, with a bristle-shaped reflexed appendage on each side at the base, on long slender petioles; stipules simple, red at the base. *Flowers* small, reddish-yellow; peduncles a line and half long; bracts three, awl-shaped. *Capsules* oblong, somewhat cylindrical or spindle-shaped, two inches long, obsoletely pentagonal, attenuated into a beak at the tip, five-celled, five-valved; cells divided by incomplete transverse partitions. *Seeds* numerous, nearly pyramidal, dark brown, fixed in a double longitudinal row to the central margin of the partitions. A native of Asia, Africa, and America; cultivated as a pot-herb in Egypt, Syria, and other parts of the East, particularly by the Jews. It is said to possess some medicinal qualities, and to be useful as an emollient, a sweetener, and a pectoral. 2. *C. trilocularis*. Linn. Mant. 177. Mart. 2. Lam. 2. Willd. 2. Jacq. Hort. 173. (C. fluans; Forsk. Desc. 101.) "Capsules triquetrous, three-celled, three-valved; angles bifid, scabrous; leaves oblong; lowest ferratures bristle-shaped." *Root* annual. *Stems* a foot high, erect, cylindrical, even-surfaced, green. *Leaves* alternate, petioled, undulate-ferrated; stipules bristle-shaped, small. *Flowers* yellow; peduncles nearly opposite to the leaves, short, two-flowered; calyxes angular; petals narrow. *Capsules* linear, triangularly prism-shaped, channelled at each angle, scabrous, obtuse and simple at the tip. A native of Arabia. 3. *C. tridentis*. Linn. Mant. 565. Mart. 3. Lam. 3. (C. Americanus angulato barbato folio; Pluk. Phyt. tab. 127. fig. 4.) "C. trilocularis; Burm. ind. 123. tab. 37. fig. 2." "Capsules linear, nearly cylindrical, scabrous; lowest ferratures of the leaves bristle-shaped." *Stem* even-surfaced, green. *Leaves* lanceolate, marked with lines, undulate-ferrated. *Capsules* terminated by the three, much diverging, bifid styles. La Marck received from Sonnerat an East Indian specimen, which seems to be *C. trilocularis* of Burman, and to be somewhat different from Plukenet's plant. Its leaves are linear-lanceolate, toothed, on short petioles; its capsules grow two or three together, on very short peduncles, and are terminated by three diverging points, which do not appear bifid. 4. *C. fluans*. Linn. Sp. Pl. 3. Mart. 4. Lam. 4. Willd. 4. Gært. tab. 64. Lam. Ill. Pl. 478. fig. 2. Jacq. Hort. 1. tab. 85. (C. americana carpinifolia, fructu longiore; Tourn. 250. Triumfetta subvillosa; Brown, Jam. 232. tab. 25. fig. 1.) "Capsules oblong, three-celled, three-valved, six-furrowed, six-cuspidate; leaves heart-shaped; lowest ferratures bristle-shaped." *Root* perennial. *Stem* about a foot high, cylindrical, purplish, with divaricating branches. *Leaves* petioled, oval-heart-shaped or oblong, edged with sharp teeth, the two lowest sometimes, but not always, extended into a long awl-shaped appendage. *Flowers* yellow, small, lateral, two together, on short petioles. *Capsules* terminated by three widely divaricated bifid beaks; valves marked on the inside with obsolete transverse wrinkles, instead of partitions; furnished with a double, crenulate, and somewhat undulated dorsal wing. A native of the West Indies. 5. *C. acutangulus*. Lam. 5. Willd. 5. (Lyfimachia; Pluk. Phyt. tab. 44. fig. 1) "Capsules prismatic-wedge-shaped, acutely angular, three-toothed; leaves egg-shaped, sometimes with a single bristle at the base; petioles hispid." *Root* perennial. *Stem* about a foot high, cylindrical, rather slender, hispid,

branched. *Leaves* alternate, on long petioles; stipules five or six lines long, narrow, bristle-shaped. *Flowers* yellow, small, lateral, in pairs, on short peduncles; petals oblong, rather narrow; bracts three, bristle-shaped, often longer than the flower. *Capsules* scarcely an inch long, narrowed towards the base, pentangular, two of the angles more acute and more prominent than the others, terminated by three bifid beaks. A native of the East Indies. 6. *C. capsularis*. Linn. Sp. Pl. 4. Mart. 5. Lam. 6. Willd. 7. Gært. tab. 179. fig. 6. Lam. Ill. Pl. 478. fig. 3. (Alcea sine corchorus; Pluk. am. 18. tab. 255. fig. 4. Genia fativa; Rumph. amb. 5. 212. tab. 78. fig. 1.) "Capsules roundish, depressed, wrinkled; lowest ferratures of the leaves bristle-shaped." *Root* annual. *Stem* five or six feet high, erect, cylindrical, smooth, branched. *Leaves* five or six inches long, petioled, oval-lanceolate, toothed, thin, pale green above, glaucous underneath. *Flowers* small, lateral, single; calyx-leaves concave, incurved, shorter than the corolla; petals emarginate. *Capsules* short, striated, wrinkled, five-celled, five-valved, (imperfectly ten-celled, ten-valved; five larger cells fertile; five smaller barren, placed between the others near the circumference of the capsule; Gært.) A native of China and the East Indies. A kind of hemp is obtained from the macerated stems, which is much used in China. 7. *C. fascicularis*. Mart. 13. Lam. 7. Willd. 6. Vahl. symb. 3. p. 69. (Euphrasia affinis; Pluk. amath. 85. tab. 439. fig. 6.) "Capsules conoid, woolly, facieled, nearly sessile; leaves oblong-elliptical, petioled, without bristle-shaped appendages at the base." *Root* perennial. *Stem* one or two feet high, slender, cylindrical, almost entirely smooth, a little branched. *Leaves* less than an inch long, alternate, toothed; petioles somewhat villous; stipules simple, narrow-lanceolate. *Flowers* yellowish, small, almost sessile, lateral, in fascicles opposite to the leaves. *Capsules* five or six lines long, erect, three-valved, six-celled, furrowed. A native of the East Indies. 8. *C. hirsutus*. Linn. Sp. Pl. 6. Mart. 6. Lam. 8. Willd. 10. Jacq. Amer. 165. Hort. 3. 57. Pfl. 81. tab. 157. (Guazuma; Plum. gen. 36. Burm. amer. tab. 104.) "Capsules roundish, woolly; leaves egg-shaped, obtuse, tomentous, equally ferrated." Linn. "Leaves elliptical, tomentous, crenate; capsules ovate-oblong, downy, unbelled." Lam. A shrub three feet high, or more; branches alternate, cylindrical, clothed with a whitish cottony down. *Leaves* alternate, petioled, near two inches long, and one broad. *Flowers* yellow; common peduncles opposite to the leaves, the length of the petioles, solitary, cottony, supporting five or six pedicelled flowers; calyx cottony on the outside; petals scarcely the length of the calyx. *Capsules* a little incurved, very woolly, obtuse, two-celled. A native of South America. 9. *C. tomentosus*. Thunb. Fl. Jap. 223. "Capsules oblong, woolly; leaves tomentous." Thunb. *Stem* shrubby, cylindrical, erect, two feet high, and more; smooth, purple, branched; branches alternate; at the bottom purple and smooth; at the top tomentous, erect, wand-like; branchlets filiform, spreading, tomentous. *Leaves* alternate, petioled, nerved, spreading; petiole very short, tomentous. *Flowers* orange-coloured, axillary and terminal, generally solitary. *Capsules* cylindrical, woolly. A native of Japan. La Marck asserts that it is distinct from the preceding. 10. *C. hirtus*. Linn. Sp. Pl. 5. Mart. 8. Lam. 9. Willd. 13. Jacq. Hort. 3. tab. 58. (C. folio ulmi major; Plum. Sp. 7. Burm. Amer. tab. 103. fig. 2) "Capsules oblong, hairy; stem hairy; leaves oblong, equally ferrated." *Root* annual. *Stem* about two feet high, cylindrical, rather slender, branched. *Leaves* alternate, unequal at the base, on short hispid petioles; stipules narrow,

very hispid. *Flowers* yellow; peduncles and calyxes hispid; petals oblong, shorter than the calyx, obtuse, narrowed a little towards the base; filaments yellow, the length of the petals; germ oblong, columnar, hispid, with whitish hairs directed upwards; style filiform, the length of the filaments; stigmas two, not spreading. *Capsule* near an inch long, two-furrowed, two-valved. *Seeds* small, black. A native of the West Indies, and South America. 11. *C. hirsutus*. Linn. Sp. Pl. 1. Mart. 9. Lam. 10. Willd. 14. Jacq. Hort. 3. tab. 59. (C. folio ulmi minor; Plum. Sp. 7. Burm. Amer. tab. 103. fig. 1. Corchoro affinis; Sloan. Jam. 50. hilt. 1. 145. tab. 94. fig. 1. Coreta foliis minoribus; Brown. Jams. 147.) "Capsules linear, compressed, two-valved; leaves lanceolate, equally serrated." *Root* perennial. *Stem* about two feet high, almost woody, erect, slender, cylindrical, panicle, somewhat pubescent. *Leaves* smaller than those of the preceding species, without awl-shaped appendages at the base, on rather long petioles, which are pubescent on one side. *Flowers* yellow; lateral, peduncled, solitary or in pairs; germs clothed with short hairs. *Capsules* nearly smooth, two-valved. According to Linnaeus, the spring flowers are without petals, tetrandrous, with a four-leaved calyx; but those produced in autumn, correspond with the generic character. A native of the West Indies. 12. *C. japonicus*. Mart. 7. Lam. 11. Willd. 11. Thunb. Fl. Jap. 227. (Teito, vulgo jamma buki; Kämpf. aman. 844.) "Capsules round, smooth; leaves doubly serrated." *Stem* shrubby, two feet high or more, smooth; branches alternate, filiform, angular. *Leaves* several together from alternate buds, petioled, almost heart-shaped, ovate-acuminate; serratures acute, almost bristle-shaped, nerved, villous, and particularly so on the nerves underneath. *Flowers* yellow or orange-coloured, terminal, solitary, on short peduncles. A native of Japan, where it is cultivated on account of its beauty. There is a variety with double flowers. 13. *C. tetragonus*. Mil. Mart. 10. (C. flor. flavo fructu ceryophylloide; Pluk.) "Capsules quadrangular, reflexed at the points; leaves ovate-heart-shaped, crenate." *Stem* about two feet high, with small branches. *Flowers* pale yellow, very small. *Capsules* swelling, rough, about an inch long, flattened at the top. A native of both Indies. 14. *C. linearis*. Mil. Mart. 11. "Capsules linear, compressed, two-valved; leaves lanceolate, serrate toothed." *Stem* three feet high, with weak branches. *Leaves* about three inches long, and one broad, sitting close to the branches. *Flowers* pale yellow, very small, opposite to the leaves, solitary. *Capsules* two inches long, flat, two-celled. A native of New Spain, about Carthage. 15. *C. bifurcatus*. Mil. Mart. 12. "Capsules linear, compressed, with two horns at the points; leaves heart-shaped, serrated." *Stem* between three and four feet high, herbaceous, strong, with upright branches. *Leaves* on long slender petioles, and between them many smaller leaves, nearly of the same form, sitting close to the branches. *Flowers* pale yellow, very small, lateral, on short peduncles. *Capsules* near three inches long, flat, ending in two horns, two-celled. A native of Jamaica; raised from seeds sent to Miller by Dr. Houlton. 16. *C. flexuosus*. Mart. 14. Willd. 12. Thunb. in Linn. Transf. 2. 335. "Leaves doubly serrated, cuspidate; stem zig-zag." *Stem* cylindrical, rendered somewhat angular by the decurrent leaves, two feet high, erect, smooth. *Leaves* two inches long, alternate, petioled, obliquely heart-shaped, villous, spreading. *Flowers* yellow, terminal. 17. *C. ferratus*. Mart. 15. Willd. 9. Thunb. ibid. "Leaves oblong, serrated, cuspidate; branches smooth." *Stem* erect, smooth, branched; branches cylindrical, purple, erect. *Leaves* two inches long, alternate, petioled, spread-

ing; serratures large, bristle-shaped at the tip, slightly rough with hairs above, smooth underneath. 18. *C. scandens*. Mart. 16. Willd. 8. Thunb. ibid. "Leaves egg-shaped, bristly-serrated, opposite; stem and branches zig-zag, climbing." *Stem* cylindrical, branched; branches opposite, divaricated. *Leaves* opposite, on short petioles, rounded at the base, acuminate, an inch long. *Flowers* yellow, terminal, solitary. The last three species are natives of Japan.

Propagation and Culture.—All the species may be raised from seeds sown in the spring in a hot-bed, protected by a glass frame. Soon after they come up, they should be transplanted into a fresh hot-bed; when they are grown strong, they should be removed into separate pots; and if gradually enured to the open air, they may be shaken out of the pots in June, and let in an open border, where they will generally flower and ripen their seeds. *C. hirsutus* must be kept in a bark-bed in the stove during winter. Miller.

CORCIA, in *Geography*, a town of the island of Corsica; 14 miles N.N.W. of Corte.

CORCIEUX, a small town of France, in the department of the Vosges, chief place of a canton, in the district of Saint Dié, with a population of 1143 individuals; that of the canton amounts to 8351, upon 177½ kilometers; and the number of its communes is 13.

CORCOBA, in *Ancient Geography*, a town situated on the south coast of the island of Taprobana, according to Ptolemy.

CORCOMA, a town of Africa, in Mauritania Cæsariensis, between Carepula and Lagrutum. Ptolemy.

CORCONIANA MANSIE, a place of Sicily, on the route from Catania to Agrigentum, according to the Itinerary of Antonin e.

CORCORAS, a river of Pannonia, which, according to Strabo, passed before Naupontus, and discharged itself into the Savaus.

CORCULUM, in *Vegetable Physiology, is a term used by Linnaeus, after Cæsalpinus, for the heart, or more properly embryo, of a seed; alluding to its shape, which, in the walnut, and many other seeds, resembles the animal heart in miniature. It is the most important and even essential part of a perfect seed, to which all the rest are subservient, being the point whence the future plant originates. In unimpregnated seeds it is deficient, or rather abortive; in fertile ones it is closely connected with the cotyledons, on which it depends for the first supplies of nutriment, and other exciting causes of its evolution. The corculum consists of two parts: the *rostellum*, or radicle, which, by an unerring law of nature, descends in order to become the root; and the *plumula*, or feather, which as regularly ascends, and becomes the stem and leaves. Dr. Darwin ingeniously accounts for this diversity of direction in these two parts, from the former being stimulated by moisture, the latter by air; and presumes that each extends itself accordingly where its vitality is most excited. Other philosophers have explained the same phenomenon, far less happily, on mechanical principles. See **COTYLEDON** and **EMBRYO**. S.*

CORCULUS, the *little heart*, in *Natural History*, a name given by authors to a small species of *cordiformis*, or *heart-shell*, of a rose colour.

CORCURA, in *Ancient Geography*, a town of Asia, in Assyria. Ptolemy.

CORCYRA, (*Corfu*) one of the Greek islands, situated in the Ionian sea, and called, in more ancient times, Drepane, Scheria, and Phæacia. It is said to have taken its name from that of a nymph, whom Neptune ravished in this

this island. It is about 45 miles in length, 23 in breadth, and 210 in compass. It was famous for the delightful gardens of king Alcinous, who courteously entertained Ulysses after his shipwreck. The southern parts of the island are barren, mountainous, and ill provided with water; but the northern coast is very fertile in all kinds of delicious fruit, excellent wines, olives, grain, &c.; whence Homer has denominated it the fruitful Scheria. It had anciently two cities of no small note, *viz.* Corcyra and Cassiope: the former was the metropolis of the island, and once very powerful, as appears from Thucydides, and others; the latter is commended by Pliny and Ptolemy as a wealthy and well-built city, but Cicero calls it only a haven.

This island is said to have been first inhabited by the Phæaciæ, whence it was called Phæaciæ; but afterwards the Corinthians sent hither a numerous colony, B.C. 756. The Corcyrians were, for some time, masters of the sea. Their government was first monarchical; but afterwards they formed themselves into a republic, and made a very considerable figure in the flourishing times of Greece. Herodotus informs us (lib. vii. cap. 168.) that they were very powerful by land; but he much blames them for their deceitful conduct, with respect to the assistance they promised the Greeks against Xerxes: for, being invited by the Athenian and Lacedæmonian ambassadors to join them in the common cause, they readily engaged to send powerful succours, assuring them that they would not neglect the safety of Greece in so imminent a danger; being well apprized, that if the enemy prevailed, they would soon be reduced to the condition of slaves. The ambassadors departed; and the Corcyrians, fitting out a squadron of 60 ships, sailed to the coast of Peloponnesus, and having anchored about Pylos and Tenarus, waited in that station to see the event of the war, being resolved to join the victorious party. When they heard that the Persians were defeated at Salamis, they left their station, and joined the rest of the Greeks, pretending that they had been prevented by the Etesian winds from doubling the cape of Maleæ, and being present at the battle. The Corcyrians submitted to Alexander, and remained subject to the kings of Macedon, till they were delivered by the Romans, in the reign of Perseus, from which time they enjoyed their liberty, till the reign of Vespasian, when they underwent the common fate of the other Greek islands and states both in Europe and Asia. The Corcyrian seditions were proverbial even among the Greeks. See CORFU.

CORCYRA *Melana*, or *Nigra*, so called to distinguish it from the former, an island in the Adriatic sea, on the coast of Illyricum. The Cnidians built a town on this island. In the war of Illyricum, B. C. 229, the Romans, under the consulship of L. Postumius Albinus II. and Cn. Fulvius Centimalus, landed in the island, and the Corcyrians delivered up the garrison of the Illyrians, who had taken possession of it under the command of Demetrius of Pharos; and the whole island submitted, conceiving that this was the only method of securing themselves for ever from the insults of the Illyrians. Upon the conclusion of peace, it was agreed, that Corcyra, as well as some other places, should continue in the possession of the Romans. This island is now called *Curfola*.

CORCYRIS, a town of Egypt. Steph. Byz.

CORCZYCZ, in *Geography*, a town of Poland, in the palatinate of Volhynia; 46 miles N. of Constantinow.

CORCZYN, or KORTSCHIN, a town of Poland, in the palatinate of Sandomirz, on the Vistula; 48 miles W.S.W. of Sandomirz.

CORD, or CHORD, an assemblage of several threads of hemp, cabled or twisted together by means of a wheel.

The word comes from *χορδή*, which properly signifies an intestine, or gut, whereof cords may be made.

CORD of *St. Francis*, a kind of rope adorned with knots, worn by the brothers of the fraternity instituted in honour of that saint.

Some, as the Cordeliers, Capuchins, Minorites, and Recolets, wear it white; others, as the Pique-puces, black. Its design is to commemorate the bonds wherewith Jesus Christ was bound.

CORD, the *scitry of the*, includes a great number of people besides religious. To obtain indulgences, they are only obliged to say five Paters, five Ave Mariæ and Gloria Patris, and to wear this rope, which must have been first blessed by the superiors of the order.

CORD of wood, a certain quantity of wood for burning; so called, because formerly measured with a cord.

It is now measured, particularly in Worestershire, where the fane has been regulated by statute, between two stakes of wood, four feet high, and eight feet apart; and is to be four feet broad and high, and eight feet long = 128 cubic feet = 4 7/4 cubic yards = 3,622 steres or cubic inches of France = 445.223 cubic links.

CORD wood is properly new wood; and such as, when brought by water, comes aboard a vessel; in opposition to that which is floated. All burning wood, not exceeding eighteen inches circumference, is deemed cord-wood.

CORD, in *Geometry*, *Music*, &c. See CHORD, and STRING.

CORD, *Magical*, an instrument in great use among the Laplanders, and supposed to be of great virtues among them. It is a cord or rope, with three knots tied in it. They use many magical rites and ceremonies in the preparing and tying of this cord; and when thus prepared, it is supposed to have power over the winds; and they will sell, by means of it, a good wind, or at least a promise of one, to a ship. If they untie only one of these knots, a moderate gale is to succeed; if two, it is to be much stronger; and if three, there is to be a storm.

CORD, *Umbilical*. See UMBILICALIS funiculus.

CORD-Wood, in *Rural Economy*, a term applied to the small sorts of broken-up or other wood, which was formerly sold by the cord.

CORDA, in *Ancient Geography*, a town of Albion, in the country of the Sclavovæ. As this place was situated farther to the N.W. than the other towns of the Sclavovæ, it is thought to have stood on the banks of Loch-Cure, out of which the river Neith springs.

CORDAGE, is used, in *general*, for all sorts of ropes and cords, great and small; and more particularly for those that are used in the rigging and fitting out of small vessels. The word is also used for the art of preparing and manufacturing the ropes, &c. See CABLE. See also ROPE, and RIGGING.

The naval cordage of different ages and nations has been formed of very different materials. Those of the earlier ages were probably thongs of hide or leather; the use of which was retained by the Caledonians in the third century, and by the nations north of the Baltic in the ninth and tenth centuries. They are even now used as ropes in the western isles of Scotland. These were superseded in the southern parts of Britain, and on the continent, at an early period, by iron chains. Accordingly we find, that in the maritime and commercial

commercial country of the Veneti, who were intimately connected with the Belgæ of Britain. Iron chains were used for cables in the days of Cæsar. However, in the more improved countries of the south, thongs of leather and chains of iron had long given place to the use of vegetable threads; and the art of combining them into strong cords was understood and practised. In this manner the Greeks used the common rushes of their country, and the Carthaginians applied to the same purpose the Spartium or bloom of Spain. And as all the cordage of the Romans was formed of these materials, at their late descent on our island, the art of manufacturing them would necessarily be introduced with the Roman settlements among the Britons. Under the direction of the Roman artists, their *junci*, or rushes, would be wrought into cordage. Accordingly the remains of old cables and ropes are still distinguished among the British sailors, by the name of "old junk." Moreover, the Roman sails, which, in the days of Agricola, were composed of flax, were afterwards made of hemp; and our own are therefore denominated *cannabis*, or "canvas," by our present mariners. About the same period, the same materials were substituted for the junk of the British cordage; for the use of hempen ropes upon land, and of hempen nets for hunting, was very common among the Romans in the first century. The Indians still make their cordage of the bark of coccos, and other trees, and of shreds of plants. The cordage of the British navy is made of the Riga or best Russian break hemp, and tarred with good Stockholm or Ruffia tar.

The cordage is said to be *baked*, when, having passed a stove, or other hot place, it is drained of all its moisture. *White cordage* is that not yet pitched. *Cordage pitched in the stove*, is that which is passed through hot pitch as it comes out of the stove. Each quintal of cordage may take up about twenty pounds of pitch. The cordage is sometimes pitched in the thread. For the method of making ropes and different sorts of cordage, see *ROPE-making*.

By 25 Geo. III. c. 56. no person shall use, in the manufacture of any ropes for shipping, (or sell the same,) hemp called *street chucking*, half clean, whale line, or other topping, cordilla, damaged hemp, or any hemp from which the staple part thereof shall have been taken away by the manufacturer, on pain of forfeiting, for the manufacturer, such rope, and treble the value of it; and for the vender, not being the manufacturer, a sum equal to treble its value. For the better distinguishing the quality of such ropes, that which is inferior to clean Petersburg hemp shall be deemed *inferior cordage*, and marked accordingly, by running from one end of it to the other three-tarred mark yarns, spun with turn contrary to that of rope yarn, and also one like tarred yarn in every other rope for the use of shipping; and the maker shall mark or write, on a tally to be affixed on it, the word "staple," or "inferior," (as the case shall be,) and also his name, signed by himself or his attorney, together with the name of the place where manufactured; and in default thereof, shall forfeit 10*l.* for every hundred-weight. And if any such rope-maker shall wilfully or knowingly permit his name to be put to any such ropes, not being of his own manufacture; or if the vender or proprietor, or any other person, mark upon the tally the name of any person, not being the manufacturer, he shall forfeit 20*l.* And if any person shall make any cables of any old or worn stuff, which shall contain above 7 inches in compass, he shall forfeit four times its value. Foreign-made cordage, for which no duties have been paid, belonging to a ship owned by any of his majesty's subjects, resident in Great Britain, or the British

colonies, and entering any port in this kingdom, shall be duly entered on oath at the custom-house (standing and running rigging excepted); and before the ship be cleared inwards, the master shall pay the duties, on pain of forfeiting the cordage, and 2*s.* for every *cut*. of it. Upon the importation of cordage, tarred or untarred, there is a duty payable of 8*s.* *od.* per *cut*., and no drawback allowed upon exportation; and in the port of London there is a further seavage-rate of 1*d.* per *cut.* of 112 *lbs.* upon the importation of cable-ropes for cordage.

As to the strength of ropes, or cordage, M. Reaumur takes occasion, in the Memoirs of the Royal Academy, to consider the question, whether a rope composed of several twills, or strands, interwoven, *v. gr.* ten, have more strength to sustain a weight, than the ten twills would have separately, placed parallel over one another; or, which is the same thing, whether, if each twill be capable of sustaining the weight of a pound, the whole cord be able to sustain more than ten?

On the one hand, 1. By virtue of the twisting, the diameter of the rope is made larger than are those of the ten twills together; but it is apparently by its thickness that a rope sustains a weight, or resists a fracture. 2. Twisted strands have not all, as when parallel; a vertical direction with regard to the weight: several of them, and even the greatest part, have oblique directions, and of consequence do not bear all the share of the burden they would otherwise bear. In effect, they are inclined planes that are only pressed with a part of the load.

Hence it would follow, that the surplus of the strength of the twills might be employed in raising a larger weight.

On the other hand, it is true, that, in twisting the strands, some are stretched, and others left more loose; and the new tension given the former, serves to weaken them, and has of itself the effect of a weight: thus they become less able to sustain one so large. Those more lax, on the contrary, evade, in some measure, the action of weight: for the action is distributed equally on the ten supposed equal twills; and if some, by reason of their particular disposition, receive less than their quota, the weight will act more forcibly on the rest, and will break them first, as being more tense; after which, it will easily dispatch the rest, as not being in sufficient number to oppose it.

This is the sum of what can be urged for and against the twisting: to decide between them, M. Reaumur had recourse to experiment. The result was, that, contrary to all expectation, he still found the twisting diminished the strength of the rope: whence it is easily inferred, that it diminishes it the more, as the rope is the thicker. For inasmuch as the twisting diminishes; the more twisting, the more diminution.

The resistance or friction of cordage is very considerable; and by all means to be considered in calculating the power of machines. M. Amontons observes, in the Memoirs of the Royal Academy, that a rope is so much the more difficult to bend, 1. As it is stiffer, and more stretched by the weight it draws. 2. As it is thicker; and, 3. As it is to be more bent; *i. e.* as it is to be coiled, for instance, into a smaller ring.

The same author has thought of ways to prove, in what proportion these different resistances increase: that arising from the stiffness or rigidity occasioned by the weight which draws the rope, increases in proportion to the weight; and that arising from its thickness, in proportion to the diameter. Lastly, That arising from the smallness of the gyres, or pulleys,

pulleys, about which it is to be wound, is indeed greater for smaller circumferences than large ones, but does not increase so much as in the proportion of those circumferences.

On this footing, the loss a machine sustains by the cordage, being estimated in pounds, becomes, as it were, a new weight, to be added to that which the machine is to raise. This augmentation of weight will render the cords still the more flaccid; which excess is to be computed as before.

Thus we shall have several sums still decreasing; which are to be added together, as in the article of friction; and it will be surprising to see what a sum they will amount to. See FRICTION.

Where ropes are used in a machine, all the resistance resulting from their stiffness is to be put together; and all that occasioned by the friction; which will make so considerable an augmentation to the difficulty of the motion, that a power which to raise a weight of 3000 pounds, by means of a fixed and moveable pulley, needed only 1500 pounds, must, according to M. Amontons, have 3942 pounds, on account of the frictions, and the resistance of the cordage.

CORDAGE, *twice-laid*, is that which is made of cast rigging, as shrouds, stays, mooring and other cables, which, if not much worn, will make good ropes for wetting the sides of ships, worming and wood'ing for cables, spun-yarn for seizing, worming for large stays, seizing for stays of blocks, small cable-laid ropes for warping ships, rat-lines, scaffolding-ropes for dock-yards, &c. When the yarn of this old stuff is overhauled, a little thin tar should be poured on it, which will make it pliable and lie better. The yarn unfit for knotting will pick into oakum for caulking.

CORDATED LEAF, in *Botany*. See **LEAF**.

CORDAX, in *Antiquity*, a gay sort of dance.

CORDE, MAURICE DE LA, in *Biography*, born at Rheims, where he attained considerable eminence for his classical and critical learning, was made doctor of the faculty of medicine, at Paris, in the year 1559. In the course of an harangue, before his brethren of the faculty, having censured with asperity the manners of the Romish clergy, and some of their ceremonies, and spoken too favourably of the reformed religion, he was seized and thrown into prison. This happened in the year 1569. An edict of pacification being obtained the following year, he was released, and, with the rest of the Huguenots, allowed openly to profess his religion. He was also permitted to practise medicine; but the College, who were firm in the Catholic religion, took from him the place of reader or lecturer. De la Corde was one of the few Huguenots who escaped the massacre, which took place on the eve of St. Bartholomew, in the year 1572; and in 1574, he obtained an order from parliament, reinstating him in his rights in the faculty of medicine. He published, in 1574, "Hippocratis Libellus de iis quæ Virginibus accidunt," with Commentaries, 8vo. Paris; and in 1584, "Hippocratis de morbis Mulierum, Interpretatio," folio. Haller Bib. Med. Eloy Diët. Hist.

CORDE A feu, *Fr.* cord-match, or match of cord, fit for retaining a small quantity of fire for a long time, and of furnishing it, or being lighted up, when wanted.

CORDEAU, *Fr.* a cord made use of for measuring ground. That which engineers commonly made use of was divided into toises, feet, and inches, in order to have the exact openings or magnitudes of angles, and the lengths of lines, which they wished to trace or measure. But as cords shrink in moist or wet weather, and lengthen in dry, this in-

equality of extension rendered the measures of the divisions untrue, and not to be depended on. To guard against such errors or mistakes, a chain of iron-wire, not so liable to undergo alterations with those of the weather, was introduced and made use of. The French say, *manier le cordeau, prendre le cordeau, travailler au cordeau*.

CORDEAU de campement, or *cordeau d'alignement pour le campement*, cord of the encampment, or cord of alignment for the encampment; a long line or cord, divided equally from distance to distance, and marked at the points of equal divisions by pieces of cloth of a scarlet or other vivid colour, in order to be the better seen and perceived. It serves, in the first place, to mark and aligne, from the left wing to the right wing, the extent on the front line of the camp for each battalion, company by company; and on which line are the colours and standards of the troops that occupy the camp. It then serves for laying or marking off, on one and the same right line, the bundles or bells of arms advanced in front of the aforesaid line, about ten paces, or five toises, or thirty feet, and parallel thereto. The same operation is performed for the alignment or the tracing out of the rear of the camp. Then the tents are placed, which occupy each about three paces or nine feet, with an interval of three paces between every two of them. About ten paces, or 30 feet, from the rear of the camp is the line for the kitchens or cooking-places for the companies; and about ten paces behind them is the ground for the drums and fiddlers. At about 20 paces from this ground are the tents of the subaltern officers; and from 10 paces to 20 paces behind them are those of the majors and captains, and those of the colonels and lieutenant-colonels.

CORDED CROSS, in *Heraldry*. See **CROSS-CORDED**. This is a term used to express the cordage of a bale; as for example, a bale argent, corded gules.

CORDELIER, a Franciscan, or religious of the order of St. Francis.

The Cordeliers are clothed in thick grey cloth, with a little cowl, a chaperon, and cloak, of the same; having a girdle of rope, or cords tied with three knots: whence the name.

The Cordeliers are otherwise called *Minor Friars*, their original name. The denomination Cordelier is said to have been first given them in the war of St. Louis against the Infidels; wherein the *Friars Minor* having repulsed the Barabians, and that king having inquired their name, it was answered, they were people *cordeliez*, tied with ropes. The Cordeliers are, to a man, professed Scotists.

CORDELIER, *Order of*, in *Heraldry*. Anne de Bretagne, after the death of her first husband, Charles VIII., instituted this order in 1498, for widow ladies of noble families.

The badge was a Cordelier's girdle argent, and was placed round the escutcheon of their arms. It was also worn round the waist, with the ends hanging down. This order, however, soon after the decease of the founder, fell into disuse.

CORDEMOI, GERARD DE, in *Biography*, a native of Paris, destined by his friends for the bar; the studies preparatory to which he neglected for the more alluring pursuits of philosophy. On this subject he wrote some treatises, that recommended him to Bossuet, by whose influence he was appointed reader to the dauphin. For the instruction of that prince, he studied with much assiduity the history of France, and the result of his labours were published in two volumes, folio, soon after his death, which happened in 1684. This work did not obtain from the French that praise which it justly merited. By some English historians

toian: it has been more worthily appreciated; as well on account of the purity of its style, as from the depth of its researches. M. Coudemou was elected a member of the French academy in 1775. Besides his History of France, we have a 4to. volume of his works, published in 1702. In the latter part of his life, he was assisted in his literary labours by his son Lewis, who was born in 1651, and who became successively a licentiate of Sorbonne, and an abbot in the diocese of Clermont. He was a voluminous writer, chiefly on theological subjects; and was considered among the Catholics as an able advocate of their cause, against the attacks of the defenders of Protestantism. He was, however, of considerable service to his father, in the latter part of his General History of France; and, it is believed, wrote the whole of that part which extends from about the conclusion of the reign of Lewis V. to the end of the work. By order of Lewis XIV. he continued that history from the time of Hugh Capet until the year 1660, which he did not live to finish. He died at the age of 71, in the year 1722. Moreti.

CORDERIE, *Fr.* a rope-yard. A sort of work-house or place convenient for making, both for the artillery and vessels, cords, cables, hawsers, &c. In inland towns, the corderies are open and uncovered, and commonly on the rampart, along by the walls; and in maritime towns, or sea-ports, where considerable armaments are made, they are usually low buildings, covered, long, and narrow, constructed near the arsenals and magazines. These last mentioned corderies have generally, in France, been called *Corderies Royales*, because the most of them were built and kept up at the expence of the king.

CORDES, in *Ancient Geography*, a river of Asia, in Mesopotamia, which, rising in the mountains, pursued its course to the south, and encompassing the town of Dara, was lost in a gulf near it.

CORDES, BALTHASAR, in *Biography*, born at Antwerp, in the year 1592, belonged to the society of Jesuits in the Low Countries, and was doctor of theology at Vienna, where he attained a considerable share of celebrity, as professor of that faculty. He was a man of great learning, particularly in Greek literature. His principal works, as editor and author, were, "S. Dionysii Areopagitæ Opera omnia, Gr. et Lat., cum Scholiis, &c." in 2 tom. fol.; "Expositiones Patrum Græcorum in Pfalmos," in 3 tom. fol. He died at Rome, in the year 1650.

CORDES, JOHN DE, was born at Limoges, in the year 1570, and at an early age discovered a considerable turn for literary pursuits, in which he would probably have been encouraged, but the death of his father obliged him to apply to trade. When he was about 30 years of age, a change of circumstances enabled him to relinquish business, and to indulge his original propensity. He entered himself with the society of Jesuits at Avignon; but a series of ill health obliged him to quit their seminary, and to pursue his studies privately. He afterwards became a canon of his native place, and a collector of rare and valuable books. He was himself an author and editor of considerable reputation; and after his death, which happened in 1642, his library was purchased by cardinal Mazarine. He was editor of the works of Hincmar, archbishop of Rheims; and of the works of George Cassander. He translated father Paul's "History of the Differences between Pope Paul V. and the Republic of Venice;" and likewise Camillo Portio's "History of the Troubles in the Kingdom of Naples, under Ferdinand I." Moreti.

CORDES, in *Geography*, a small town of France, in the department of the Tarn, on the river Ceron; 12 miles N.W.

of Alby. It is the chief place of a canton, in the district of Gaillac, and counts 2303 inhabitants. The canton contains 24 communes, upon 185 kilometres, with 8019 inhabitants.

CORDES Toulouse, a town of France, in the department of the Upper Garonne; 20 miles N.W. of Toulouse.

CORDESHAGEN, a town of Germany, in the circle of Upper Saxony, and duchy of Pomerania; 10 miles W. of Collin.

CORDESSE, a town of France, in the department of the Saone and Loire, and district of Autun; 2 leagues N. of Autun.

CORDEVATO, a town of Italy, belonging to the state of Venice, in the country of Friuli; 5 miles N. of Coucordia.

CORDEVOL, a river of Italy, which runs into the Piavo, between Belluno and Feltri.

CORDIA, in *Botany*, (named by Plumier in honour of Emericus Cordus and his son Valerius, two German botanists of the sixteenth century, the former author of *Botanologia, seu Colloquium de varis Herbis*; the latter of *Annotations on Dioscorides*, and of a *History of Plants in four books with figures*.) Linn. Gen. 256. Schreb. 350. Willd. 396. Lam. Ill. 270. Juss. 128. Vent. 2. 382. (Sebestena; Gært. 474.) Clats and order, *Pentandria monogynia*. Nat. Ord. *Asterifolia*, Linn. *Borraginea*, Juss. *Fragaria*, Vent.

Gen. Ch. Cal. Perianth one-leaved, tubular, or bell-shaped, toothed or deeply divided. *Cor.* monopetalous, generally funnel-shaped, sometimes campanulate or wheel-shaped; tube about the length of the calyx, often enlarging upwards; border erect-spreading; generally cut into five, sometimes four, six, seven, or eight obtuse divisions. *Stam.* generally five, sometimes four, six, seven, or eight, awl-shaped, inserted into the tube; anthers oblong. *Pist.* Germ. superior, roundish, acuminate; style twice bifid; stigmas obtuse. *Peric.* Drupe globular or egg-shaped, growing to the calyx; nut furrowed or pitted, two or four-celled; some of the cells frequently abortive. *Seeds* solitary, egg-shaped, acuminate at the summit.

Ess. Ch. Style twice bifid. Drupe with two or four-celled nuts.

Sp. 1. C. *Myxa*. Assyrian plum. Linn. Sp. Pl. 1. Mart. 1. Poir. in Encyc. 1. Mart. 1. *Myxa* seu sebestena, J. Bauh. Hist. 1. 197. Rai. Hist. 1555. *Sebestena niveitris* et *domestica*. C. Bauh. Pin. 446. Prosp. Alp. Egypt. 30? *Cornus sanguinea*; Forsk. Egypt. arab. 33. "Leaves egg-shaped, smooth above; corymbs lateral; calyxes ten-lobed." *B. officinalis*; Lam. Ill. 1895. tab. 96. fig. 3. *Sebestena officinalis*; Gært. tab. 76. fig. 1. *Sebestena domestica*. seu *Myxa*; Comm. Hort. 1. 139. tab. 72. Blackw. tab. 398. *Prunus sebestena*, longiore folio; Pluk. Almag. 306. tab. 217. fig. 3. *Vidi-maram*; Rheed. Mal. 4. 97. tab. 37. Rai. Hist. 1563. Burm. Flor. ind. 58. "Leaves egg-shaped, rather acute, unequally serrated above; calyx somewhat cylindrical, even-surfaced." *Leaves* like those of alder, serrate-angular, scabrous underneath. Linn. A middle-sized tree. *Trunk* thick; wood whitish; bark scaly, marked with purple lines; branches and branchlets very smooth and even surfaced, cinereous, dotted. *Leaves* alternate, petioled, large, narrowed at the base, enlarged, rounded, and a little acute at the summit, entire towards the base, toothed or almost slightly sinuated on the upper part; teeth unequal, distant, acute or obtuse; nerves lateral, oblique, projecting; veins reticulated; petioles smooth, cylindrical, little more than one-third of the length of the leaves. *Flowers* white, sweet-scented, in a large, close, terminal panicle,

consisting of lateral branches with a few short ramifications; calyx green, cylindrical, five-cleft; divisions of the corolla five or six, open, a little reflexed. *Drupe* black, oval, acuminate, smooth, pulpy; not deeply furrowed, perforated; naturally four-celled, but two of the cells generally abortive or quite obliterated. α . a native of Egypt; β . of the East Indies. Poir. asserts that it is not easy to determine what was the myxa of Linnæus, and thinks it probable that two species have been confounded, but though the African and the East Indian plants differ a little in habit, and in the form of their leaves, he has, for the present, considered them only as varieties. A more accurate knowledge of their flowers and fruit will be necessary before they can be pronounced to be absolutely distinct. The fruit has been esteemed a valuable medicine in disorders of the chest and urinary passages, but is now entirely out of use in England. The East Indians eat it macerated in salted vinegar, and reckon it serviceable in diarrhœas. An excellent glue is made of the pulp, which is more viscid than that of the Jujube. 2. *C. lutea*. Lam. Ill. 187. Poir. 15. "Leaves egg-shaped, obtuse, crenate near the summit, corymbs lateral and terminal; calyxes ten-friated." A shrub twelve or fifteen feet high; branches zig-zag, smooth, cinereous, pubescent on their upper part. *Leaves* alternate, petioled, scabrous on both sides, marked on the upper surface with small whitish joints, a little pubescent underneath when young; petioles pubescent, half the length of the leaves. *Flowers* yellowish; peduncles very short; calyxes whitish, strongly striated, four-toothed, a little scabrous at the edges; tube of the corolla the length of the calyx; border open, with six, seven, or eight divisions; filaments eight; filaments erect, filiform, villous at the base; anthers oval, compressed; style the length of the filaments. *Drupe* whitish, egg-shaped; not terminated by a recurved point, four-celled, two of the cells frequently abortive. Found by Dombey at Huanca and in the neighbourhood of Lima, where it is very common. La Marck enquires whether it may not be the myxa of Linnæus, excluding all the synonyms; but there can be no ground for the conjecture, as Linnæus certainly referred to a plant of the old continent. 3. *C. obliqua*. Willd. 2. Phyt. 1. 4. tab. 4. fig. 1. (*C. myxa* γ . Poir.) "Leaves roundish, heart-shaped, nerved, veined, oblique. Nearly allied to *C. myxa*, but the leaves are quite entire and the calyxes not striated. A native of the East Indies. 4. *C. monoica*. Willd. 3. Roxb. Coromand. 1. 43. tab. 58. "Leaves roundish, egg-shaped, toothed, veined, scabrous; corymbs axillary, monœcious." *Leaves* three inches long or more, two inches broad, alternate, very scabrous, acute; petioles about one-third of the length of the leaves. *Flowers* white, small, in axillary or terminal corymbs, which are shorter than the leaves; corolla funnel-shaped, with five egg-shaped obtuse divisions; filaments within the tube of the corolla; filaments awl-shaped, enlarged at the base, anthers lanceolate. *Drupe* yellowish, globular, point-d, filled with a glutinous pulp. A native of forests on the coast of Coromandel. 5. *C. ferrata*. Juss. Poir. 3. "Leaves heart-shaped, acutely serrated; panicle terminal." *Branches* erect, cylindrical, smooth and even. *Leaves* about three inches long and two broad, alternate, petioled, egg-shaped, acute or somewhat acuminate, irregularly serrated, membranous, dark green above, yellowish-green underneath; nerves simple, alternate. *Flowers* in a cyme, somewhat conical, panicle, a little leafy at the base of its first branches, small, white; calyx and border of the corolla five-lobed; filaments five. A native of the East Indies; described from a dried specimen without fruit in the herbarium of Jussieu. 6. *C. subcordata*. Lam. Ill. (189). Poir. 4. (*Novella nigra*, seu *taamari*; Rumph. Amb. 2. 226. tab.

77?) "Leaves somewhat heart-shaped, entire, even on the upper surface; calyx cylindrical." A tree. *Branches* spreading, tufted, smooth. *Leaves* from four to six inches long or more, and nearly as many broad, alternate, slightly pubescent underneath along the principal nerves. *Flowers* in short, loose, terminal racemes, large, white with a reddish tinge; calyx tubular, smooth, three-toothed; corolla funnel-shaped, wrinkled or plaited; tube at least twice the length of the calyx, much enlarged near the top; border with six or seven roundish lobes; filaments six or seven; anthers versatile; style shorter than the filaments. *Drupe* the size of a hazel-nut, four-celled; some of them abortive. Discovered by Commerçon in the Praslin Islands in the East Indies. 7. *C. collococca*. Linn. Sp. Pl. 5. Mart. 6. Poir. 5. Willd. 14. (*C. chretoides*; Lam. Ill. 1902? *C. foliis rugosis*; Brown Jam. 167. *Cerafa* affinis; Sloan. Jam. 169. hist. 2. 95. tab. 203. fig. 2. *Cerafa americana*; Pluk. Phyt. tab. 158. fig. 1.) "Leaves oblong-ovate (cordate-ovate; fylt. nat.) quite entire; flowers in corymbs; calyxes tomentous on the inner side." A middle-sized tree. *Trunk* divided near the top into spreading branches. *Leaves* alternate, petioled, acute, wrinkled. *Flowers* yellowish-green, in loose somewhat-paniced terminal corymbs; peduncles branched, very unequal; corolla funnel shaped, with five deep divisions. *Drupe* bright red, the size of a small cherry, with a sweetish clammy pulp. A native of the West Indies, where the fruit is a favourite food of turkies and other poultry. In Jamaica it is called clammy cherry, or turkey-berry tree. 8. *C. biflora*. Willd. 15. (*C. collococca*; Aub. Guian. 1. 219. tab. 86. *C. nodosa*; Lam. 1905. Poir. 8.) "Leaves oblong, attenuated both ways, pubescent; flowers in terminal and axillary corymbs; peduncles hirsute." *Leaves* narrower than those of the preceding species. *Stem* and *peduncles* hirsute. *Corymbs* dense, somewhat umbel-
 not dichotomous-divaricate. *Fruit* white, oblique, acuminate. A native of Cayenne and Guiana. 9. *C. tetrandra*. Lam. Ill. 1909. Poir. 11. Willd. 16. Aubl. Guian. 1. 222. tab. 87. "Leaves egg-shaped, somewhat heart-shaped, acute, scabrous underneath; corymb or cyme terminal; flowers tetrandrous." A tree forty or fifty feet high, with spreading branches. *Leaves* eight or ten inches long, three or four broad, alternate, entire or slightly undulated, nerved; petioles an inch long. *Flowers* greenish; common peduncle forked, dichotomous at the summit, and branched; calyx top-shaped, with four roundish acute lobes; corolla funnel-shaped; tube short, border expanding; four-lobed; filaments four. *Drupe* whitish, round; nuts three or four-celled; somewhat oval, wrinkled, enveloped in a white gelatinous substance. A native of Cayenne and Guiana. 10. *C. tetraphylla*. Lam. Ill. 1908. Poir. 6. Willd. 18. Aubl. 1. 422. tab. 85. "Leaves four in a whorl, inversely egg-shaped, quite entire; peduncles lateral, many-flowered." A shrub six or seven feet high, with knotty branches. *Leaves* nearly sessile, firm, nerved, a little reticulated, smooth on both sides. *Flowers* white, sessile, on long common peduncles; calyx with five acute teeth; corolla funnel-shaped; tube narrowed at the base; border five-lobed; filaments longer than the corolla. *Drupe* yellowish, the form and size of an olive; not very hard, generally one-celled. A native of Guiana, on sandy soil near the sea. 11. *C. gerajantbur*. Linn. Sp. Pl. 2. Mart. 4. Lam. 1903. tab. 96. fig. 2. Poir. 7. Jacq. Stimp. Amer. 43. tab. 175. fig. 16. Brown Jam. 170. tab. 29. fig. 3. "Leaves lanceolate-egg-shaped, quite entire; panicle terminal; calyxes tomentous, ten-friated." A considerable tree. *Branches* spreading, cylindrical, clothed on the upper part with a thickish cinereous down. *Leaves* alternate, smooth, coriaceous, on short petioles. *Flowers* rather large, white,

white, permanent, shrivelling; principal branches of the panicle furnished at the base with narrow sessile bractes; pedicels short, unequal, three-flowered; calyx oblong, funnel-shaped, slightly toothed; corolla twice the size of the calyx, with four, five, or six almost oval obtuse divisions; filaments fastened to the tube of the corolla, from the base to the middle; anthers incumbent, yellow; germ oblong, striated; style shorter than the stamens; stigmas thick, obtuse, yellow. A native of Jamaica, where it is esteemed one of the best timber-trees. 12. *C. flavescens*. Poir. 9. Aubl. 1. 226. tab. 89. (C. fermentosa; Lam. Ill. 1097.) "Leaves ovate-oblong, acuminate, smooth, quite entire; racemes lateral; drupes obtuse." A shrub, producing from the roots several woody, farmentous stems, eight or nine feet long, spreading upon the neighbouring plants and trees. *Leaves* alternate, petioled, nerved, reticularly veined, six or seven inches long, and three broad. *Flowers* yellowish, in lateral racemes, on a rather long common peduncle; calyx with five or six deep, roundish, acute divisions; corolla funnel-shaped; tube enlarged above the calyx; border with four or six round, spreading lobes; stamens five or six; anthers arrow-shaped; germ greenish. *Drupe* purplish; nut enveloped with a dry and firm membrane. *Seeds* affording a glutinous matter. A native of Cayenne and Guiana. 13. *C. spinescens*. Linn. Mant. 206. Mart. 2. Lam. 1004. Poir. 10. Willd. 4. "Leaves egg-shaped, acute, serrated, scabrous; petioles becoming thorns." *Branches* stiff, erect, tomentous, ferruginous. *Leaves* alternate, tomentous underneath; petioles very short, jointed, breaking off at the joint when the leaves fall, the part that remains sharpening into a thorn, as in volkammeria. *Flowers* in axillary, simple, or biid racemes, equal in length to the leaf; calyx campanulate, with five obscure teeth; corolla campanulate, five-toothed, twice the length of the calyx; stigmas acute. *Drupe* black, sessile, about the size of gooseberries. 14. *C. toqueve*. Lam. 1911. Poir. 12. Willd. 10. Aubl. Guian. 1. 228. tab. 90. "Leaves cordate-ovate, acuminate, quite entire, villous; racemes compound." A much-branched, spreading shrub, five or six feet high; branchlets brittle, villous, rusted. *Leaves* from four to six inches long, three or four broad, alternate, nearly sessile, rough and villous above, tomentous and pale green underneath. *Flowers* white, in axillary and terminal racemes; common peduncle long, villous, leafless; calyx almost tubular, five-toothed; tube of the corolla short; border spreading, with five roundish lobes; stamens five; filaments the length of the corolla; germ a little villous at the summit. *Drupe* yellowish, fleshy, one-celled. A native of Guiana. 15. *C. macrophylla*. Linn. Sp. Pl. 4. Mart. 5. Lam. 1001. Poir. 13. Redouté Pl. Muf. Par. Annals of Museum of Nat. Hist. vol. i. Annals of Botany, 1. 127. (Colococcus platyphyllus; Brown Jam. 168. Prunus racemosa foliis maximis; Sloan. Jam. 184. Hist. 2. 130. tab. 221. fig. 1.) "Leaves ovate-oblong, villous, veined, very large; racemes forming a corymb; calyx cup-shaped." A tree from forty-five to sixty feet high. *Trunk* never more than sixteen inches thick; branches cylindrical, villous while young, several times two or three-forked, diverging, and declined towards the earth. *Leaves* from six to thirteen inches long, from three to seven broad, alternate, deflexed, clothed with short rough scattered hairs, entire, or edged with small sharp teeth; nerves obliquely transverse, prominent underneath; petiole short, cylindrical, channelled. *Flowers* white; calyx oval, villous, with five upright, straight, obtuse teeth; tube of the corolla cylindrical, entirely villous; segments of the border elliptical, deflexed, a little curled, rounded at the tip; stamens five, longer than the corolla; anthers versatile, with two cells separated at the base, and attached to the fila-

ments by their backs; gem oval, acute. *Drupe* red, spherical, about the size of a pea, two-celled. A native of Jamaica. 16. *C. sebifera*. Linn. Sp. Pl. 3. Mart. 3. Lam. 1898. tab. 96. fig. 1. Poir. 14. Willd. 5. Bot. Mag. 794. Bot. Rep. tab. 157. (C. foliis tuberculatis; Jacq. Amer. 42. C. nucis juglandis folio; Plum. Gen. Amer. 105. C. foliis amplioribus; Brown Jam. 202. Sebifera feabra; Dill. Elth. 341. tab. 255. fig. 331. Caryophyllus spurius; Sloan. Jam. 136. Hist. 2. 20. tab. 64. Catal. Car. 2. 91. tab. 91. Novella nigra; Rumph. Amb. 2. 226. tab. 75. Brown Fl. Ind. 59.) "Leaves egg-shaped, somewhat repand, scabrous; calyx cylindrical." A shrub seven or eight feet high. *Stems* several, erect, smooth, cylindrical, branched. *Leaves* alternate, on short petioles, slightly serrated when young, the older ones more or less repand, the upper ones entire. *Flowers* deep yellow or scarlet, in large terminal racemes; pedicels one, two, or three-flowered; calyx with three divisions near the top; corolla funnel-shaped; border with five oval, obtuse, crenulate divisions; stamens five; stigmas recurved. *Drupe* inversely pear-shaped; nut deeply furrowed. A native of the East and West Indies. It is not improbable that the above quoted synonyms refer to more than one species; but no botanist has hitherto found sufficiently discriminating specific characters. The East Indian plants have yellow, the West Indian scarlet flowers. 17. *C. africana*. Lam. 1806. (C. sebifera β ; Poir. Willd. Sebifera alpini; Lam. Wanzey; Bruce's Travels, 5. 57, with a figure.) "Leaves roundish-oval, entire; panicle terminal; calyxes top-shaped; nut of the drupe triquetrous." A tree. *Trunk* dividing into four or five thick branches, about three feet and a half from the ground. *Flowers* snow-white, funnel-shaped, entire, and folded back at the margin. A native of Abyssinia. 18. *C. aspera*. Willd. 6. Forst. Prod. 109. "Leaves egg-shaped, acuminate, rough; flowers in cymes, wrinkled." A native of the island of Tongatabu. 19. *C. dichotoma*. Willd. 7. Forst. 110. "Leaves oblong-egg-shaped, scarcely crenate; corymbs dichotomous." A native of New Caledonia. 20. *C. subvisifolia*. Poir. 16. "Leaves ovate-lanceolate, obtuse, wrinkled, very rough, reticularly veined underneath; racemes lateral." *Branches* smooth, striated, cinereous, or yellowish, somewhat pubescent when young. *Leaves* two inches long, one inch broad, alternate, very firm, coriaceous; petioles two or three lines long, short, firm, rough. *Racemes* stiff, villous, beset with whitish hairs. Native country unknown, communicated by Dupuis to Jussieu, and preserved in his Herbarium. 21. *C. domingensis*. Lam. 1900. "Leaves egg-shaped, entire, rough, whitish underneath; panicle terminal; calyxes cylindrical." *Branches* dark brown, thick, angular, very rough. *Leaves* from six to eight inches long, four or five broad, alternate, thick, coriaceous, nerved, reticularly veined; petioles almost cylindrical, short, thick, very rough. *Flowers* in panicle racemes, shorter than the leaves; racemes unequal, erect, cylindrical, stiff, scabrous, a little pubescent; pedicels one-flowered. A native of St. Domingo. 22. *C. levigata*. Lam. Ill. 1912. Poir. 18. "Leaves egg-shaped, veined, shining; panicles lateral; stamens villous near the base." *Branches* slender, filiform, cinereous, cylindrical, knotty. *Leaves* alternate, petioled, rather small, quite entire, obtuse, or a little acute, narrowed at the base, coriaceous, smooth on both sides, reticularly veined. *Panicles* short, but longer than the leaves, smooth, branched; calyxes smooth, short, striated; corolla open, somewhat campanulate; border five-lobed. A native of the West Indies. 23. *C. senegalensis*. Juss. MSS. Poir. 19. "Flowers tetrandrous; leaves membranous, egg-shaped, acute, smooth; racemes short." A tree about twenty feet high. *Branches* dark brown, slender, cylindrical, quite smooth.

smooth. *Leaves* alternate, four or five inches long, about three inches broad, thin, nerved, and reticularly veined; petioles two inches long and more, smooth, compressed. *Flowers* in panicle racemes, scarcely longer than the petioles; pedicels very short, one-flowered; calyx with three divisions; corolla with four divisions half way down. Brought from Senegal by Adanson. 24. *C. exaltata*. Lam. II. 1910. Poir. 21. "Leaves egg-shaped, acute at the base, rough; corymb terminal; flowers quinquefid." A large tree. *Branches* smooth, striated. *Leaves* about four inches long and two broad, alternate, quite entire, obtuse, somewhat acuminate, c-riaceous, almost shining; petioles very short, striated, slightly compressed. *Corymb* a little longer than the leaves; pedicels very short, thick, one-flowered, calyx short, smooth, campanulate, with five small acute teeth. *Drupe* globular, the size of a pea, two-celled. A native of Guiana. 25. *C. nervosa*. Lam. III. 1906. Poir. 22. "Leaves alternate and opposite, ovate-oblong, acuminate, nerved; panicle short; bractes avale-flaped." A tree. *Branches* cinereous, thick, angular, rough. *Leaves* from eight to ten inches long, four or more broad, alternate, entire, smooth, deep green and shining above, pale yellow underneath; nerves strong, oblique, parallel, a little branched or confluent towards the edges of the leaf; petioles very short, thick, knotty at the base. First divisions of the panicle almost dichotomous; branches short, thick, almost woody, smooth; calyxes smooth, with five short oval divisions. A native of Guiana. 26. *C. rotundifolia*. Poir. 23. Ruiz and Pav. Flor. Peruv. 2. 24. tab. 148. Prunus Sebestena; Pluk. Almag. 306. Phytog. tab. 217. fig. 2. "Leaves roundish and oval, crenate, scabrous; peduncles corymbodichotomous." A shrub about twelve feet high. *Stems* straight, often almost procumbent, cylindrical; branches numerous, very long, supple, zig-zag, villous when young. *Leaves* from two to three inches long, and two broad, alternate, petioled, wrinkled, veined, rough, rather hispid. *Flowers* yellow, large; calyx tubular, striated, with five short acute teeth; corolla funnel-shaped; tube the length of the calyx, dilated at the orifice; border with five plaited, oval, acute divisions; filaments awl-shaped, villous at the base; anthers oval-oblong, concave; germ oval, acuminate; style the length of the filaments. *Drupe* whitish, half enveloped by the calyx and a viscid pulp; nut oval, acuminate, five-furrowed, two-celled. The fructification often varies from six to eight in the number of its parts. A native of Peru, in dry sandy ground, and by the sides of the roads. 27. *C. dentata*. Poir. 24. "Leaves egg-shaped, angularly-cut, toothed; panicle dichotomous, large, divaricate, branches petioled, hirsute." *Branches* a little zig-zag, brown or cinereous, cylindrical, rough, clothed with short stiff whitish hairs. *Leaves* from three to five inches long, from two to four broad, alternate, rough with small whitish points and deep green above, paler and yellowish underneath; some scarcely toothed, others moderately cut, a little angular, with short acute teeth; nerved and reticularly veined; petioles about an inch long, slender, cylindrical, villous. *Flowers* white, almost campanulate; panicle terminal; ramifications numerous, growing gradually shorter, stiff, pubescent; pedicels very short, one-flowered; calyx short, almost campanulate; tube of the corolla short, dilated at the orifice; border large, very open, with five or six very short lobes. A native of Curaçao. 28. *C. micrantha*. Mart. 11. Poir. 25. Willd. 12. Swartz. Prod. 47. Flor. Ind. Occid. 1. 460. "Leaves elliptical, acute, entire, membranous, veined; racemes compound, loose." *Branches* cinereous, a little twisted, wrinkled, smooth. *Leaves* alternate, coria-

ceous, quite entire, deep green and almost shining above, paler underneath, obtuse or somewhat acuminate; petioles short, striated. *Flowers* very small; calyx very short, smooth, striated. A native of Jamaica on woody mountains. 29. *C. sinensis*. Lam. 1914. Poir. 26. "Leaves oblong, obtuse, villous at the axils of the nerves; panicles shorter than the leaves." *Branches* slender, filiform, smooth, somewhat striated, cylindrical, slightly compressed near the summit. *Leaves* two or three inches long, half an inch broad, alternate, quite entire, a little narrowed at the base; petioles filiform, less than an inch long, smooth. *Flowers* whitish, in lateral and terminal panicles; calyx whitish green, short, open, campanulate after the time of flowering, smooth, four or five-lobed, obtuse at its orifice; corolla funnel-shaped, lobed, about twice the length of the calyx. *Drupe* small, oval, nut two-celled. A native of China. 30. *C. indica*. Lam. II. 1913. Poir. 27. "Leaves egg-shaped, petioled, naked; flowers panicle; tube of the corolla entirely concealed in the calyx." *Branches* smooth, cylindrical, long. *Leaves* from one to four inches long, from one to two broad, alternate, quite entire, obtuse or somewhat obtuse, membranous, smooth, nerved and reticularly veined; petioles an inch and half long, slender, supple. *Flowers* in long lateral and terminal branched panicles; branches alternate, terminated by small pendulous racemes; pedicels short, unequal; calyx whitish, campanulate, smooth, lobed and appearing gnawed at the edge, very open after the time of flowering; corolla small; border short, open. *Drupe*s small, oval, two-celled. A native of the East Indies; discovered by Sonnerat. 31. *C. elliptica*. Mart. 12. Poir. 28. Willd. 12. Swartz. Prod. 47. Flor. Ind. Occid. 1. 461. "Leaves oblong, attenuated at the tip, entire, somewhat coriaceous; racemes compound, diffuse; drupes acuminate." A large tree with spreading branches. *Leaves* alternate, smooth on both sides, shining, nerved and veined; petioles semi-cylindrical, channelled underneath, smooth. *Flowers* white, in terminal racemes, almost sessile, unilateral; calyx coriaceous, elliptical, tubular, smooth, from two to five-cleft; tube of the corolla enlarged at its base, scarcely longer than the calyx; border with five linear, lanceolate, reflexed divisions; filaments bearded; anthers oblong, inclining, glandular at the summit; germ oblong; style cylindrical. *Drupe* about six lines long, supported by the enlarged very open calyx; nut wrinkled. A native of Jamaica and St. Domingo. 32. *C. patagonula*. Mart. 7. Willd. 17. Hort. Kew. 1. 259. (Patagonula americana; Linn. Sp. Pl. Lam. III. 271. Pl. 66. Poir. Dill. Elth. 306. tab. 226. fig. 293.) "Leaves oblong-lanceolate, smooth on both surfaces; upper part ferrated; branchlets hairy." A shrub, with the habit partly of privet and partly of alaternus. *Stem* straight, cinereous, spotted with white; ends of the branches covered with long hairs. *Leaves* alternate, obtuse or acute, entire and narrowed into a petiole at the base. *Flowers* in a kind of terminal corymb; calyx very small, but much enlarged after the time of flowering, with five deep divisions; corolla wheel-shaped; tube very short; border flat, with five oval acute divisions; filaments five, as long as the corolla; anthers simple; germ oval, acute; style permanent, the length of the filaments. *Fruit* an oval, acuminate capsule? A native of Patagonia.

This species, we believe, was first referred to cordia by Mr. Dryander in Hortus Kewensis. Linnæus made it a separate genus, partly on account of the enlargement of the calyx during the ripening of the fruit; but this is a circumstance common to other species of cordia; and partly

on account of the fruit which appears to be a capsule; it is, however, not sufficiently known, and Juskie doubts whether it be really a capsule.

CORDIA retusa; Vahl. Mart. See *EHRETIA lutea*.

CORDIA, in *Gardening*, comprises plants of the flowering shrubby exotic kind: of which the species most cultivated is the fleshy or rough leaved cordia. (*C. alliodora*.) See the preceding article. It is of a beautiful scarlet colour, making a fine appearance. A small piece of the wood thrown on a pan of lighted coals perfumes the whole house with a most agreeable smell. It is said to be from the juice of the leaves combined with that of the fruit of a species of fig, that the fine red colour with which they dye their cloths in Otalcaite is manufactured.

Method of Culture. This is a plant which is raised by sowing seeds obtained from the West Indies as soon as possible after they arrive, in pots of light earth, plunging them in a common hot bed or bark bed, and when the plants have two or three months' growth pricking them out singly in small pots, replunging them in the hot bed, to forward their rooting afresh; being afterwards constantly continued in the stove or hot house. They require frequent watering in the summer season.

These are plants which are very ornamental in stove collections, where they can only be kept.

CORDIAL. See *CARDIAC*.

CORDIAL waters. See *Compound WATERS*.

CORDERI, NICCOLO, in *Biography*, called likewise by the Italians Il Franciofino, because a native of France, was born in Loraine in the year 1567. He came to Rome in his childhood, and applied himself with unremitting assiduity to the study of design and modelling, as well from the finest remains of ancient art, as from the life. He soon became a sculptor of considerable ability and eminence, inasmuch that he was more than once honoured by the visits of the pontiffs Clement VIII. and Paul V. while at work. Amongst his principal performances, which are enumerated by Baghione, are four large statues in a chapel at Santa Maria Maggiore, representing David, Aaron, St. Bernardo, and St. Athanasius. This artist died at Rome in the year 1612, and was buried at the church of the Trinita del Monte. Baghione.

CORDERIERS, Fr. rope-makers. There is an immense number of them employed in France for the use of the artillery. But there was a certain class of them who enjoyed barracks under part of the fortification of the arsenal on the river Seine and had the privilege of working there, under the walls of the arsenal, on condition of being always in readiness to furnish cordage for the artillery.

CORDILLERAS, in *Geography*. See *ANDES*.

CORDON, in *Fortification*, is a row or layer of stones, rounded on the outside towards the ditch, and placed between the termination or upper part of the slope of the wall or revetement, and that part of it, which is on the outside of the parapet and stands perpendicularly. The cordon serves to prevent this difference between the lower and upper part of the revetement, from being offensive to the eye, and is at the same time ornamental.

The cordon of the revetement of the rampart is often on a level with the terre-plain of the rampart. Certain writers are of opinion, that it might be placed to more advantage some feet lower, particularly when there is a wall in front of the parapet, and a space between them for going the rounds and titling them from the enemy's side.

CORDON, in *Military Operations and History*, is a chain

of posts, or an imaginary line of separation, between two armies either in the field or in winter-quarters, or for covering a particular frontier or tract of country.

CORDON, in *Geography*, a small island in the Pacific ocean, near the west coast of Nicaragua, at the entrance of the bay of Realejo.

CORDON-JAUNE, the order of, or of the yellow sring, in France, was instituted by the Duke de Nevers in 1606, and abolished the same year by Henry IV. of France.

CORDON, in *Ornithology*, a name given by Buffon to the *AMPELIS cotinga* of Gmelin, and the purple-breasted chat-tier of Pennant and Latham.

CORDONA, or *CARDONA*, in *Geography*, a mountain of Valencia in Spain, is composed entirely of rock salt, 4 or 500 feet high and about 3 miles in circumference: Mr. Bowles informs us, that there are no traces of gypsum near this mountain, as in most similar instances is the case. In the climate of Spain, this mass of salt remains undissolved by the rains, or the waters of a river which washes it. Mr. Townsend carried a fragment of this salt with him through Spain, without the least sign of deliquescence, but on his return to England he soon found it surrounded by a pool of water, owing to the coldness and humidity of our atmosphere. In Spain this rock-salt, like the fluor-spars of Derbyshire, is employed to make snuff-boxes, vases, and other ornaments and trinkets.

CORDOVA, ADRIANO of, in *Biography*, so called from the place of his nativity, a considerable town in Spain, was a barefooted Carmelite who applied himself to historical painting with success. It is regretted, however, that from a too great modesty or diffidence of his own powers, he was induced to deface so many of his pictures as soon as he had finished them. The few that remain are at Cordova, the most remarkable of which is a Crucifixion with St. John, Mary Magdalene, and other figures of half length, in the manner of Rafael Sadelen, in the convent of the Carmelites. This artist died at Cordova in the year 1630. Cumberland.

CORDOVA, or *Cordona*, in *Geography*, a city of Andalusia in Spain, forming a kind of semi-circular amphitheatre on the right bank of the Guadalquivir, in an extensive and fertile plain at the foot of that ridge of mountains, named the Sierra Morena, 84 miles N.E. of Seville; 112 N. of Malaga; 210 S.W. of Madrid, in N. lat. 37° 40'. It is the ancient *Corduba*, the first Roman colony in Spain, and probably on that account called *Colonia Patricia*, or simply *Patricia*, as appears from an inscription on an antique marble in the church of St. Marina:

D. M. S.

M. Lucretius. Verna Patriciensis. Ann. LV.

Pius in Suos. H. E. S.

Sit T. T. Levis.

Cordova has been styled the mother of men of genius. From the very foundation of this city it was the seat of learning and sciences. Strabo says, that the ancient books of the Turdetani, their poetry, and their laws written in verse, were preserved at Cordova. Its academy was celebrated for rhetoric and philology; it had also a Greek professorship. The elder Seneca, and Lucius Annaeus Seneca, preceptor to Nero, were born at Cordova, as well as Lucan the poet, whose grandfather Aicius Lucanus, celebrated for his eloquence, studied here. So did Gallo, another famous orator; Portius Lado, of whose works there remains one harangue; and Manlius, master of the elder Seneca. Tully, in his oration for the poet Archias, men-

tions several poets of Cordova who were established at Rome among others, Sextilius Henna, of whose writings there is only one elegy extant, in which he laments the death of the Roman orator.

After the fall of the Roman empire, Cordova was subject to the dominion of the Goths, until the Gothic monarchy of Spain was overthrown by the Saracens, under the command of Tarik. A Roman captive and proselyte who had been enfranchised by the caliph of Damascus, assaulted Cordova with seven hundred horse. He surprised the town, and drove the Christians into the great church, where they defended themselves above three months; and of all the Spanish military chiefs the governor of Cordova is recorded as the only one, who fell, without conditions, a prisoner into the hands of the Saracens.

Abdelaziz, the son of Musa, to whom the administration of Spain, under the caliph of Damascus, was confided, conceived the design of erecting an independent throne at Cordova; but no sooner was a suspicion of his intentions diffused than a powerful conspiracy was formed against him. As he was repairing alone to the mosque of Cordova, he was attacked and murdered by the conspirators.

On the assassination of Abdelaziz, Ayub assumed the administration of Spain. He was soon removed by the superior favour or merit of Alahor, who, like Abdrame one of his successors, vainly attempted the conquest of the west.

Under twenty successive lieutenants of the caliphs, Spain imbibed, in a few generations, the manners of the Arabs; and by assuming the name of Spaniards, the Arabs asserted their original claim of conquest.

In the mean time the rival houses of Ommijah and of Abbas, the uncle of Mahomet, convulsed the east by their pretensions, from the Indus to the Euphrates. Their contest was decided on the banks of the Zeb. Mervan XIV., and last caliph of the house of Ommijah, was forced to yield to the enthusiasm of the Abbassides, conducted by Abdallah the uncle of his competitor. The vanquished caliph crossed the Euphrates, and without halting in Palestine, pitched his last camp on the banks of the Nile, where he was attacked by Abdallah, and the lance of an Abbasside terminated the reign and life of Mervan.

In the proscription of the Omniades, a royal youth of the name of Abdalrahman above escaped from the rage of his enemies, and was received on the coast of Andalusia with open arms. The Arabian chiefs, who revered the memory of the immediate successors of Mahomet, drew their sabres in his support. The defeat of the Zeb was avenged on the banks of the Guadalquivir; that river was swelled with the bodies of the slaughtered Abbassides; and the throne of the victorious Abdalrahman was established at Cordova in the year 755 of our era.

During a prosperous reign of thirty years, Abdalrahman I. encouraged agriculture, commerce, and the arts. Cordova became the centre of industry, of politeness, and of genius. His son Hassam, who succeeded him, not only patronized, but was even a proficient in the arts. He finished the famous mosque, which had been begun by his father, and threw over the Guadalquivir a bridge which remains a lasting monument of his skill.

Under the second Abdalrahman a perpetual supply of pure water was conducted through pipes and aqueducts into the heart of Cordova, and numerous mosques augmented its magnificence.

Learning flourished under Alkaham the second. He founded the university of Cordova, and the birth-place of

the Senecas, and the Lucans, asserted again its pretensions to literary fame. He collected to immense a quantity of manuscripts, that before the end of his reign the royal library is reported to have contained the almost incredible number of six hundred thousand volumes, of which the catalogue alone filled forty-four.

But the pomp of the third Abdalrahman, who reigned from the year 912 til 961, appears still more incredible. His wives, concubines, and black eunuchs, amounted to six thousand three hundred persons. He was attended to the field by a guard of twelve thousand horse, whose belts and scimitars were studded with gold. To perpetuate the name of his favourite Sultana, he constructed, three miles from Cordova, the palace and gardens of Zehra or Arizapha. The edifice was supported by above a thousand columns of the finest marble; the walls of the hall of audience were incruited with gold and pearls. A formidable army secured the prosperity which his dominions derived from his wife administration. The royal city of Cordova contained six hundred mosques, nine hundred baths, and two hundred thousand houses. Eighty large cities, three hundred towns, and twelve thousand villages obeyed his sway, and yet, in less than fifty years after his decease, the kingdom of Cordova was dissolved, and the house of Ommijah overwhelmed.

His son, Alkaham the second, whom we have already mentioned as the founder of the university of Cordova, died in 976, and left the throne to Hassam his son, a feeble infant, and the reins of administration to the celebrated vizir Mahomet Abenamiir, who from his valour acquired the surname of Almanzor or the Defender. He successfully struggled against civil and foreign commotion, and at his death, his renown was respected in his descendants. The office of vizir became hereditary in his family. His son ruled with a power as absolute as that of the caliphs; their insolence provoked the ambition of other chiefs; the exclusive pretensions of the house of Ommijah were disregarded, the grandson of the great Abdalrahman was plunged into a dungeon, and the glory of the throne of Cordova, which under the Omniades had shone with such a lustre, during a little more than two centuries, was overshadowed by a long night. The limits of the Saracen dominions gradually receded. Several petty principalities were formed on the ruins of their empire, which was at length confined within the boundaries of Grenada.

In the mean time the university of Cordova preserved for a long period of years the reputation which it had acquired under Alkaham II. It was at Cordova that Avenpace and Algazel, two sages mentioned by St. Thomas, taught moral philosophy; that Aliai Cobacena and Aliaben Rezel acquired their profound erudition; and that Abenzuel, the great astrologer and physician, firmamed the Wife, received his education. Within its walls were formed those thirty philosophers and physicians, who arranged the works which, under the name of Avicenna, were dedicated to prince Galatalai, to whom they have been falsely attributed.

Among the learned Moors, to whom Cordova gave birth, are Albeimarcar, Abramo, Meluco, Rachez Almanzor, known by a number of curious works, and a history of the conquest of Spain, Aben Regid who likewise wrote on the division and conquest of Spain, and Averiges, called, by way of eminence, the commentator.

Cordova has preserved nothing of its ancient grandeur, except a vast enclosure filled with houses half in ruins. Its population, from 300,000, which it was in the time of the Moors, is reduced to 15,000. Its long, narrow, and ill-

paved streets are almost deserted: most of the houses are uninhabited; and the multitude of churches and convents which it contains, are besieged by a crowd of vagabonds covered with rags. Although the art of softening leather and giving a brilliant polish to its surface was invented here, Cordova has but a few tan-yards. Its industry is confined to some manufactures of woollen cloth, ribbands, laces, and hats. Rents and provisions are low; and the value of estates has fallen one half in the course of the century.

The bishop of Cordova is suffragan of the archbishop of Seville. His annual income exceeds 3000*l.* sterling. St. Raphael, the patron of Cordova, has a magnificent gilt statue at one of the gates, which forms a singular contrast with the wretchedness that reigns within the town.

The only remarkable edifice of Cordova is its famous cathedral, which formerly served as a mosque to the Moors, and still retains the name of Mezquita. It forms a long square of one hundred and fifty-eight paces by one hundred and thirty-eight, and is well lighted, but too low. About six hundred columns of blackish marble placed in Quincunx are well preserved; but they do not reach the ceiling; they are scarcely more than ten or twelve feet high, and have neither base nor capital; they are joined to each other by two arches placed one above the other, covered with plaster, and supported with stone work whitened over. The result of the whole is not altogether agreeable to the eye, and the cathedral is more remarkable for its oddity than for any very striking beauties, though nothing would equal its magnificence were the height proportioned to the extent. Its exterior presents only a massy and irregular edifice with enormous square pillars.

By the side of the cathedral is a small grove, the fascinating remains of the tasteless luxury of the Moors. It is planted with orange-trees, the tufted foliage of which serves as an asylum to great numbers of birds, and hangs over several fountains which constantly cool the air.

The ancient palace of the Moors has been converted into stables, in which one hundred stallions are usually kept. Their genealogy is carefully preserved; the name and age of each are written over the stall in which he stands. The beautiful horse of Cordova is reckoned the most perfect. There is a curious manuscript in the Escorial marked D.CCC.XCVII on horfes and horfemanship, written by a Moorish general, and dedicated to the third king of the race of Bennefaret, who reigned in the year 1301.

The country round Cordova abounds in oranges and lemons, and produces excellent wine. Gibbon's Rome. J. Talbot Dillon's Travels through Spain, second edit. 4to. London, 1782. Bourgoing's Tableau de l'Espagne. Peyron's Essays on Spain. F. A. Fischer's Travels in Spain, in 1797 and 1798.

Archbishop Roderic Ximenes, in his "Historia Arabum," informs us, that Cordova was paved so early as the middle of the ninth century, or about the year 850, by Abdalrahman II. the 4th Spanish caliph. This prince, who knew the value of the arts and sciences, and who favoured trade so much, that in his reign abundance prevailed throughout the whole land, caused water to be conveyed into this city, which was then his capital, by leaden pipes, and ornamented it with a mosque, and other elegant buildings.

Cordova, a province of South America, being, by the new division of 1782, an intendancy of the viceroyalty of Buenos Ayres, about 100 leagues in length, and 70 in breadth, intersected by several chains of mountains, and watered by several rivers. This district is chiefly celebrated

for woollen manufactures, being seated on the eastern side of a grand and high branch of the Andes.

Cordova, a neat clean town, in the above-mentioned district, distant 156 miles from Buenos Ayres, and pleasantly situated near a wood, at the foot of a branch of the Andes. This town was founded about the year 1530, by Juan Nuñez de Prado; and in 1570 erected into an episcopal see. Its chapter consists of the bishop, dean, archdeacon, chanter, rector, and treasurer; but it has neither canons nor prebendaries. Cordova is situated between the river Primero, so called because it is the first of five in the neighbourhood, which flow in the same direction, and a hill, on a level but sandy soil, so that the rains speedily pass, though the vapours be unwholesome. The city approaches a square form; but the cathedral is irregular, from the want of symmetry in the towers. There are many good and strong houses in the city, but seldom high, though the roofs be elevated; and there are three convents, and two colleges, one of which the Franciscans have absurdly styled the university. Few places of equal extent can display equal wealth; all the inhabitants, Spaniards as well as Creoles, being noted for activity and industry. The chief trade is in mules, which are brought from the southern provinces; and having fed them in the fields, they conduct them to the fair of Saïta, where they are sold to merchants from Peru, at 8 or 10 dollars each; but some send them, on their own account, to be sold in the Peruvian markets, the value being proportioned to the distance. The inhabitants may be 600; and the slaves, mostly of different mixtures, do not procure their freedom so easily as in other parts of America. As meat is very cheap, and the slaves weave and make their own clothes, they are at once easily maintained, and very useful; nor do they wish for freedom, being neither fatigued nor oppressed. The female slaves are excellent washer-women, and go into the river with the water above their middle; nor are they deficient in other kinds of industry. The ladies of Cordova are meanly clothed, and careful observers of the customs of their ancestors; whence the slaves are not permitted to wear any cloth but that manufactured in the country. The wine, and a considerable part of the grain, are procured from Mendoza; while brandy is brought, in leathern bags or bottles, from S. Juan de la Frontera, 30 leagues to the N.W. of Mendoza, on the northern extremity of the province of Cuyo. N. lat. 31° 30'. W. long. 63° 15'.

Cordova, *Mountains of*, are a chain passing N. and S. on the W. of that province, regarded by some as a branch of the Andes, and said to be covered with perpetual snow. These mountains, according to Helms, sometimes present red and green granite, and gneiss, while the grand chain of the Andes consists of argillaceous schistus. As the ridge of mountains becomes gradually higher, the population increases; but at Ramanso, 60 miles from Cordova, they again branch, and so far from one another, that from that place to Tucuman the traveller passes through a saline plain, 70 Spanish miles in length, and for the most part barren and desert, from which the mountains are seen at a distance. The whole ground is covered with a white incrustation of salt; and bears no plants except the "salsola kali," which grows here to the height of four Parisian yards. The decayed town of "St. Jago de Estero" is situated in this plain.

Cordova, a considerable town of North America, in Mexico, the chief article of its trade being sugar, for which it has 33 mills. Eitalla says, there are 260 families of Spaniards, 126 of Meltizos, and 273 of Mexican Indians. Thierry describes Cordova as a large town, with numerous domes, towers, and steeples, and a large square in the centre,

with Gothic arcades on three sides, the cathedral filling the fourth, and a fountain of delicious water in the middle. The streets are wide, straight, and paved, and the houses mostly of stone; but the inhabitants are indolent. The situation is in a kind of natural passage towards the province of Mexico; the vegetation being rich and beautiful, on a soil of red clay, from 10 to 15 feet in depth, producing all the fruits of the two hemispheres. N. lat. $19^{\circ} 15'$. W. long. $97^{\circ} 40'$.

CORDOVA, *New*. See CUMANÁ.

CORDOUAN, *the Tower of*, an extremely well-constructed pharos or light-house, at the mouth of the river Gironde, in France; 66 miles N.W. of Bourdeaux, and 15 miles S.W. of La Rochette; in N. lat. $45^{\circ} 35' 15''$. It was rebuilt by Louis XIV. in the year 1665. The formidable mass of rocks on which it stands is formed by the reefs that skirt the shore. The tower itself is 160 feet high, the great lantern 15; and from 200 to 350 pounds of pit-coal are consumed in it every night. The watchmen are generally relieved every fortnight; they take care, however, to provide themselves with at least one month's provisions, because the boats cannot approach the rocks but when the sea is perfectly calm. F. A. Fischer's Travels in Spain, Letter vi.

CORDUBA, CAVR. FRANCESCO, in *Biography*, a painter and engraver of Italy, by whom we have a set of 44 etchings, middling sized upright plates, from the fountains in the gardens about Rome, embellished by figures much in the style of Callot. He marks his plates thus: "Eques Franc. Corduba del et Sculp." Strutt. Heinecken.

CORDUBA, in *Botany*, Clus. See ASPARAGUS *albus* and *Aphyllus*.

CORDUBA, now Cordova, in *Ancient Geography*, a town of Spain, S.E. of Mellaria, upon the river Batis. It was in this town, as Strabo informs us, that the Romans fixed their habitation, when they first entered Spain. But if it be true that it was founded by Marcellus, as Strabo himself says, we are led to imagine, that from the time when the Romans first inhabited it to the period when Macellus conducted a colony hither, it could not have been very considerable. However, Silius Italicus says, that it subsisted from the time of the second Punic war. However this be, it was from the epoch of Marcellus that it bore the title of a patrician colony, from his having established in it families of this order. Corduba was the first place which the Romans had in Spain, distinguished by the appellation of *Conventus*, and with the privilege of coining money. It afterwards became so considerable, that Strabo compares it, with regard to its commerce, with Gades; and he also extols the extent and fertility of the adjacent country. It was no less celebrated for its literary reputation, as it was the residence of the two Senecas, and of the poet Lucan. On some medals, bearing the name of Corduba, we see on one side a well-dressed female head, and on the other a winged figure, holding a cornucopia; but the greatest number of medals belonging to this city are inscribed with "Colonia Patricia." It is probable that it was called by the first name before the establishment of the colony, and afterwards by the other. See CORDOVA.

CORDUENA, a town of Armenia. See GORDUENA.

CORDULA, or CORDYLA, *Portus*, a port of Asia in Pontus, upon the Euxine sea, according to Arrian, who places it between mount *Sacer* and *Hermonassa*, S.E. of *Trapezus*.

CORDUS, or SORDUS, the name given to an ancient people of Gallia Tarragonense, who dwelt in the vicinity

of the Pyrenées, upon the coast of the Mediterranean sea.

CORDUS, AULUS CREMUTIUS, in *Biography*, a senator and historian of Rome, during the reigns of its first two emperors. In his history of the civil wars, and of the reign of Augustus, he refers to C. Cassius, and denominates him "the last of the Romans." For this offence he was impeached, and put on his trial; during which he manfully vindicated his cause, and in his defence exclaimed, "Posterity will pay to every man his due honour, nor, if I am condemned, will there be wanting those who will cherish the memory, not only of Brutus and Cassius, but of me also." This was not the effusion of an enthusiast, but the confidence to which his virtue and talents gave him a just claim. His prediction has been abundantly fulfilled; and it affords us pleasure, at the distance of nearly two thousand years, to record the heroism of a man who did not disdain to fear the arm of power, and who held in contempt the tyrant Sejanus, whose name has descended with as much infamy attached to it, as that of Cordus has with unsullied honour. Foreseeing that he should be condemned by the tribunal appointed to hear his cause, he resolved to put an end to his life, by abstaining from his daily food. On the fourth day, finding himself well nigh exhausted by hunger and debility, he sent for his beloved daughter, Marcia, from whom he had concealed his intention, and embracing her with tender affection, apologized for keeping this only secret from her, adding, "I am now half-way on the road, and you neither ought to call me back, nor can do it." She departed; and while his accusers and judges were debating what course to pursue, he breathed his last in peace. The senate ordered his books to be burnt; and though some copies were spared, which his daughter caused to be made as public as possible, yet nothing now remains except an eulogy of Cicero, preserved in the *Suafioria* of M. Seneca. Of their value an estimate may be formed by the character given of them by Seneca. Speaking to Marcia, he says, "You have well deserved of Roman literature, and of posterity, to whom will descend a faithful record of events, which cost the author so dear: you have well deserved of himself, whose memory will live and flourish, as long as it is thought worth while to know the history of Rome; as long as there shall remain any one, who shall wish to recur to the acts of his ancestors, any one who shall be desirous of knowing what a Roman once was; what, when all necks were bowed beneath the Sejanian yoke, was the character of an unconquerable spirit, free in his head, his heart, his hands." Rom. Hist.

CORDUS, EBRICIUS, by Melchior Adam called *Henry Urban*, celebrated for his skill in medicine and in poetry, was a native of Simmerhays in Hesse. To assist himself in the prosecution of his studies, he employed some of his early years in instructing the sons of some of the neighbouring gentry. In performing this office, he had the good fortune to attract the notice of Erasmus. In 1521 he went to Italy, where he attached himself in a particular manner to the study of botany; collecting and examining a number of rare plants, and diligently comparing them with the descriptions of them left by Dioscorides. At Ferrara he took the degree of doctor in medicine, which he afterwards taught at Erfurt and Maipurg. In 1535 he went to Bremen, where he spent the small remainder of his life, which terminated, when he was only of a middling age, in the year 1538. He was author of several, and some very valuable, works. His "Treatise on the English Sweating Sickness" was published at Fribourg, in 1529, 4to.; and in 1532, he gave a Latin version

version of the Theriaca, and Alexipharmica of Nicander. His "Botanologicon, five Collogium de Herbis," was printed at Colonia, in 1534, which is commended by Haller, and was several times reprinted; and his "De Abusu Uroscopie," in 1546, at Frankfort. His Latin poems were published in the *Deliciae Poet. Germ.* His son,

CORDUS, VALERIUS, who followed in the steps of his father, and who acquired a still greater portion of fame for his botanical researches, was born February 18th, 1515. The early part of his education he received under his father, who sent him for further improvement to Wittenberg, and other German universities. Applying almost exclusively to the study of botany, he ranged over the neighbouring countries, in search of plants, of which he made a considerable collection, many of them not before known or noticed. In 1542 he went to Italy, and visited the universities of Padua, Pisa, Lucca, and Florence; every where conversing with the most eminent of the professors. In his way to Rome, he had the misfortune to be wounded in his leg, by the kick of a horse; but not thinking it dangerous, and continuing his excursions, in search of plants, the wound, by the time he arrived at Rome, was so much inflamed as to occasion a fever, which put an end to his life in September, 1544, when he was only 29 years of age. He left several works, among them a "History of Plants," many of them never before described. It was published by Conrad Gesner. Also, "Annotations on Dioscorides;" "Dispensatorium Pharm. omnium quæ in usu sunt Noriberge;" "De Spermate Cati, vulgi dict." &c. Haller Bib. Botan. Eloy Dict. Hist. Gen. Bing.

CORDWAINERS, or CORDINERS, the term whereby the statutes denominated *shoe-makers*.

The word is formed from the French *cordonnier*, which Menage derives from *cordonan*, a kind of leather brought from *Cordoua*, whereof they formerly made the upper-leathers of their shoes. Others derive it from *corde, rope*, because anciently shoes were made of cords; as they still are in some parts of Spain, under the name of *alparagates*. But the former etymology is better warranted: for, in effect, the French workmen, who prepared the *cordouas*, are still called *cordouanniers*.

In Paris they have two pious societies, under the titles of *Freres Cordonniers, Brothers Shoemakers*, established by authority towards the middle of the seventeenth century; the one under the protection of St. Crispin, the other of St. Crispianus, two saints who had formerly honoured the profession. They live in community, and under fixed statutes and officers; by which they are directed both in their spiritual and secular concerns. The produce of their shoes goes into a common stock, to furnish necessaries for their support; the rest to be distributed among the poor.

By stat. 1. Jac. I. c. 22. the masters and wardens of the cordwainers company in London are to appoint searchers and triers of leather; and leather is not to be sold before it is searched and sealed. See COMPANY.

CORDYLA, in Botany, Lour. Cochinch. Bosc. Dict. Hist. Nat. class and order, *monadelphia decandria*.

Gen. Ch. *Cal.* campanulate, with four acute divisions. *Cor.* none. *Stam.* Filaments twenty four, united at the base. *Pist.* Germ superior; style one; stigmas simple. *Peric.* Berry pedicelled, oval, acute, one-celled. *Seeds* six, oval.

Sp. C. *parvifolia*. A large tree. *Leaves* small, oblong, emarginate, smooth. *Flowers* in small, lateral, solitary tufts. A native of the eastern coasts of Africa.

CORDYLA, in Ichthyology, an American fish, the *Scomber cordylus* of Gmelin, the *Guara tereba* of Margraave, and the *Trachurus brasiliensis* of Ray.

CORDYLINA, in Botany, Roy. See *DRACENA draco*, and *YUCCA gloriosa et draconis*.

CORDYLOCARPUS, (from *κορύνω*, a club, and *καρπος*; fruit, alluding to the form of the siliqua,) Willd. 1248. Desfont. (Sinapi; Encyc.) Class and order, *tetralinamia siliquosa*. Nat. Ord. *Sinapisifera*, Linn. *Crucifera*, Jussl.

Gen. Ch. *Cal.* four-leaved, caducous; leaves linear, nearly clove. *Cor.* four-petalled, cruciform, open; claws the length of the calyx; border oval, quite entire. *Stam.* Filaments six, erect, filiform; two lateral ones shorter; anthers almost erect, small, oval. *Pist.* Germ superior, cylindrical, swollen at the upper end; style very short; stigma obtuse. *Peric.* Siliqua jointed; the last joint dilated, globular, swollen, terminated by the permanent style. *Seeds* several, convex, somewhat compressed, oblong.

Eff. Ch. Calyx nearly close. Siliqua cylindrical, jointed; the last joint more distinctly separated.

Sp. 1. *C. muricatus*. Poiret in Encyc. 1. Willd. 1. Desf. Atl. 2. 72. tab. 152. "Siliques one-celled, spreading; last joint mucrate; leaves partly lyrate." *Root* annual. *Stems* about two feet high, erect, scabrous, hispid, especially on the lower part, slightly striated, branched; branches alternate, axillary. *Leaves* smooth, or clothed with a few distant hairs; lower ones oblong, or elliptical, decurrent; some quite entire, others lyrate; upper ones lanceolate, alternate, slightly sinuated, or a little toothed. *Flowers* alternate, almost sessile, in a terminal raceme; calyx smooth, or somewhat villous, coloured; corolla pale yellow. *Siliques* smooth, or a little villous. *Seeds* four or five. Discovered by Desfontaines about Mayane, in the kingdom of Algiers. 2. *C. levigatus*. Willd. 2. Poir. 2. (Sinapi græcum; Tournef. Cor. 17. It. 1. 398. tab. 35. *Erucaia alexpeica*; Gært. 298. tab. 143. fig. 9. Vent. Jard. de Cels. tab. 64.) "Siliques two-celled, pressed; terminal joint smooth; leaves pinnatifid." *Stem* a foot high, erect, quite smooth; branches alternate, widely spreading. *Leaves* somewhat fleshy, alternate, smooth, petioled; segments linear, entire, channelled. *Flowers* in terminal upright racemes; corolla purple, or pale red. A native of the islands of the Archipelago.

CORDYLUS, in Ancient Geography, a town of Asia, placed by Steph. Byz. in Pamphylia.

CORDYLUS, in Zoology, a species of lizard, the *LACERTA cordylus* of Gmelin and Linnæus, with a short verticillated tail, denticulated scales, and a smooth body. It is found in Asia and Africa. Its body is livid or blackish.

CORE, in Rural Economy, a name applied to a disorder incident to sheep, occasioned by the presence of small flat worms situated in the liver. The greatest chance of removing this complaint is by changing the sheep into a more airy and dry pasture.—It also signifies the heart of the wood of trees, and likewise of some sorts of fruit, as the apple, pear, &c.

CORE Bank, in Geography, a narrow island of America, on the coast of N. Carolina, about 40 miles long, and scarcely 2 broad. N. lat. 34° 22' to 34° 55'. W. long. 76° 26' to 76° 50'.

CORE Sound lies on the coast of N. Carolina, south of, and communicating with, Pamlico.

COREA, or COREE, in Ancient Geography, a place at which Palestine commenced on the northern side, according to

to Josephus; who says it was near Scythiopolis and a fortress named Alexandrium.

COREA, in *Geography*, called by the Chinese *Kao-li*, and by the Manchew Tartars *Sol-bo*, a kingdom of Asia, in the form of a peninsula, extended between China and Japan, and every where surrounded by the sea, except towards the north, where it is connected with Chinese Tartary, which bounds it on the north; it is bounded on the east by the sea and isles of Japan; on the south by the straits of Corea, separating it from Japan, and by the ocean; and on the west by the Yellow sea, which parts it from China. This kingdom is commonly reckoned to be 200 leagues in length from N. to S. and 100 in breadth from E. to W. The great number of shoals and sand-banks which surround the coasts of this peninsula, render access to it by sea equally dangerous and difficult. Its least distance from Japan is only 25 leagues. The origin of the Coreans is very obscure. It appears, however, that this peninsula was at first inhabited by different tribes, which composed several states; and that, in process of time, they united under the same government, and formed one kingdom, which was called *Kao-li*. The Coreans were most probably of Tartarian extraction. This kingdom is governed by a sovereign, who exercises absolute authority over his subjects, although he himself is a vassal and tributary of the emperor of China. On every succession to the crown, the prince receives on his knees the investiture of his states, granted, or at least, confirmed by the emperor, and distributes among the emperor's envoys the sum of 800 taels, and several other customary presents. The minister of Corea afterwards repairs to Pe-king, to prostrate himself before the emperor, and present him the tribute. The princes, who have espoused the king, cannot assume the title of queen, until she has received it from the court of Pe-king.

The Japanese conquered this kingdom about the end of the 16th century; but the Coreans, assisted by the Tartars, who had subdued China, drove them from their country. The Manchewes, thus masters of Corea, endeavoured to compel their new subjects to shave their heads, alter their manner, and to adopt the Tartar dress. This innovation irritated their minds, and occasioned a general revolt throughout the kingdom of Corea, which was at length appeased by the prudent attention of the reigning family. The interior geography of this kingdom is little known: we are informed, however, that it is divided into eight provinces, containing 40 districts, 33 cities of the first class, 58 of the second, and 70 of the third. King-kitan, or Kinka-tao, situated in the province of King-hi, is the capital of the whole kingdom, and the ordinary residence of the sovereign. This prince is absolute master of all the wealth of his subjects, which he inherits after their death. He is very rigid in the administration of justice; and particular punishments are appointed for murder, robbery, and adultery. Every seventh year all the freemen of the different provinces are obliged to go to court in rotation, and to keep guard round his person for two months; so that, during this year, the whole country is in motion and under arms.

The Coreans are well-formed, ingenious, brave, and tractable. They are fond of dancing and music, and peculiarly docile in acquiring the sciences, which they are said to study with ardour. Men of learning are distinguished from other classes of people by two plumes of feathers, which they wear in their caps. When merchants prefer any books for sale to the Coreans, they shew their respect by dressing in the richest attire, and burn perfumes before they treat concerning the price. The northern Coreans are of a larger size, and more robust than those of the south; they are addicted to arms and become excellent soldiers; using, in combat, cross-

bows and very long fabres. The Coreans do not inter their dead till three years after their decease; they wear mourning for a father or mother three years, and for a brother three months. When they perform the ceremony of interment, they place around the tomb the clothes, chariot, and horses of the deceased, and any thing else of which he was fond when alive; all which they leave to be carried away by those who assisted at the funeral. Their houses consist only of one story, and are very ill built; in the country, they are of earth, in cities, generally of brick; but they are all thatched with straw. The walls of their cities are constructed after the Chinese manner, with square turrets, battlements, and arched gates. These people have borrowed their writing, dress, religious worship, ceremonies, belief of the transmigration of souls, and the greater part of their customs, from the Chinese. Their language, however, is different. (See CHINA.) Their women are subject to less restrictions than those of China; and they also differ from the Chinese with regard to their marriage ceremonies. In China, fathers and mothers often marry their children without their consent and even without their knowledge; but in Corea, the contracting parties choose for themselves, nor do they consult the inclinations of their parents, or allow them to interpose any obstacles in the way of their union. The principal productions of Corea are wheat, rice, and ginseng. This country also produces gold, silver, iron, fossil salt, castor and fable's skins, a beautiful yellow varnish, the splendour of which is almost equal to gilding, and which distils from a tree resembling the palm tree, small horses about three feet high, and white paper. Small brushes for painting are made here of the hair of a wolf's tail, which are much esteemed in China. The paper of Corea, of which a considerable quantity is annually imported into China, is made of cotton; it is as strong as cloth, and those who write upon it make use of a small hair brush or pencil: without the precaution of rubbing it over gently with a little alum-water, it would not bear the ink of European pens. With this paper the Coreans partly pay the tribute due to the emperor, supplying the palace with it every year. The Chinese purchase it, not for the purpose of writing, but for filling up the squares of their shew-windows, because, when oiled, it resists the wind and rain much better than theirs; they also use it as wrapping-paper; and it is likewise serviceable to their tailors, who rub it between their hands till it becomes as soft and flexible as the finest cotton cloth, instead of which they often employ it in lining clothes. If it be too thick for the purpose intended, it may be easily split into two or three leaves; and these leaves are even stronger, and less liable to be broken, than the best paper of China.

The sea-coasts of Corea abound with fish; many whales are found there every year towards the north-east, several of which, it is said, bear in their bodies the darts and harpoons of the French and Dutch, from whom they have escaped in the northern extremities of Europe. If this be true, it seems to indicate the existence of a passage from thence into the seas that lead to the north of America. We refer the reader for farther information with regard to this country to Du Halde and Grofier.

COREA, *Strait of*, that part of the sea which separates the southern part of the continent of Corea from the Japan islands, between N. lat. 24° and 36°, and E. long. 130° and 132° 30'. The channel, *Sy's Prouse* (*Voyage*, vol. ii. p. 17, Eng. ed.), that separates the coast of Japan from the continent may be 15 leagues wide, but it is reduced to 10 leagues by rocks which uninterruptedly border the southern coasts of Corea, from Quelpaert, and which continued, till we had doubled the S. E. point of that peninsula, so that we

were able to keep very close to the continent, distinguish the houses and towns on the coast, and reconnoitre the bays. We saw, says Peroué, on the summits of the mountains some fortifications exactly similar to European forts. It is highly probable the principal means of defence, employed by the Coreans, are directed against the Japanese. This part of the coast is very favourable to navigation, for there appears no cause of danger; and at 3 leagues in the offing the depth of water is 60 fathoms over a muddy bottom; but the country is mountainous, and appears very arid. The snow was not entirely melted in some hollows (May, 1787); and the soil seemed but little susceptible of cultivation. The habitations, however, are very numerous. We counted a dozen sampans, or junks, sailing along the coast, and seeming in no respect to differ from those in China, their sails being also made of matting. See DAGELET, *Island of*.

COREATIS, in *Ancient Geography*, a place of India, near the mouths of the Indus, according to Arrian.

CORED, in *Geography*, a town of Egypt; 16 miles N.E. of Belbeis.

CORED *Herrings*. See HERRINGS.

COREGGIO, in *Biography*. See CORREGGIO.

COREGLIO, in *Geography*, a town of Italy, in the state of Lucca; 15 miles N. of Lucca.

COREGONI, in *Ichthyology*, a division of the SALMO, including those with scarcely conspicuous teeth.

COREIA, in *Antiquity*, a festival in honour of Proserpine, named *Corce*, *Korn*, which, in the Molossian dialect, signifies a beautiful woman.

CORELLA, in *Geography*, a town of Spain, in Navarre, on the Alhama; 6 leagues from Tudela.

CORELLI, ARCANGELO, in *Biography*. The performance and compositions of this admirable musician, form an æra in instrumental music, particularly for the VIOLIN, and its kindred instruments, the *tenor* and *violoncello*, which he made respectable, and fixed their use and reputation, in all probability, as long as the present system of music shall continue to delight the ears of mankind. Indeed, this most excellent master had the happiness of enjoying part of his fame during mortality; for scarce a contemporary musical writer, historian, or poet, neglected to celebrate his genius and talents; and his productions have contributed longer to charm the lovers of music by the mere powers of the bow, without the assistance of the human voice, than those of any composer that has yet existed. Haydn, indeed, with more varied abilities, and a much more creative genius, when instruments of all kinds are better understood, has captivated the musical world in, perhaps, a still higher degree; but whether the duration of his favour will be equal to that of Corelli, who reigned supreme in all concerts, and excited undiminished rapture full half a century, must be left to the determination of time, and the increased rage of depraved appetites for novelty.

Corelli was born at Fusignano, near Imola, in the territory of Bologna, in February 1653. He is said by Adami to have received his first instructions in counterpoint from Matteo Simonelli of the Papal chapel; but the general opinion is, that his master on the violin was Giambatista Bassani, of Bologna. It has been said (Life of Handel, 1760, p. 46.) without authority, that Corelli went to Paris in the year 1672, but was soon driven thence by the jealousy and violence of Lulli. That he visited Germany after he had finished his studies, we are assured by Gaspar Printz (Satyr. Tomponill, 3ten. Theil. p. 227.) who informs us, that he was in the service of the duke of Bavaria, in 1680. Soon after this period, he seems to have returned to Italy, and

settled at Rome, where, about 1683, he published his first "Twelve Sonatas." In 1685, the second set appeared, under the title of "Balletti da Camera," which, the same year, gave rise to a controversy between the author and Paolo Colonna, concerning the diatonic succession of fifths, between the first treble and the base of the allemand in the second sonata. In 1690, Corelli published the third opera of his sonatas; and in 1694, the fourth, which, consisting of movements fit for dancing, like the second, he called "Balletti da Camera."

In the works of the poet Guidi, published at Verona, 1726, it is recorded that, in 1686, when our king James II. piously sent an ambassador to pope Innocent XI. to make a tender of his duty as a faithful son of the Romish church, at a grand academia which Christina queen of Sweden, then a proselyte, and resident in the Alma Città di Roma, gave on the occasion, the music was composed by Bernardo Pasquini, and the band, amounting to one hundred and fifty performers on bowed-instruments, *instrumenti d' arco*, led by Arcangelo Corelli.

About this time, when the opera was in a very flourishing state at Rome, Corelli led the band as principal violin.

But his solos, the work by which he acquired the greatest reputation during his life time, did not appear till the year 1700, when they were published at Rome, under the following title: "Sonate à Violino, e Violone, ò Cembalo, Opera quinta, Parte prima, Parte seconda, Preludii, Allemande, Corrente, Gighe; Sarabande, Gavotte e Follia." This work was dedicated to Sophia Charlotta, electress of Brandenburg. His great patron at Rome was cardinal Ottoboni, the general encourager of polite arts and learning, to whom, in 1694, he dedicates his "Opera Quinta," and in whose palace he constantly resided, *col spetioso carattere d' attuale servitore* of his eminence, as he expresses himself in the dedication.

Crescimbeni (Comment. della Volg. Poesia, vol. i. chap. xi. Roma 1702.) speaking of the splendid and majestic academia, or concert, held at cardinal Ottoboni's every Monday evening, says, that this performance was regulated by Arcangelo Corelli, that most eminent professor of the violin: *famosissimo professore di violino*.

In 1708, we have an honourable testimony of his high rank in the profession, given at Venice in the first edition of the "Armonico pratico al Cembalo," by Francesco Gasparini, who calls him, "virtuosissimo di violino, e vero Orfeo di nostro tempo," (cap. vii.) And Adami, in speaking of Simonelli, Corelli's first master in counterpoint, says, that he made many scholars, "among whom, the most celebrated was the famous Corelli, the chief glory of the age, with the fame of whose five works, already published, the world is filled; and the sixth, consisting of concertos, which he is now (1711) polishing for the press, will complete his immortality."

A very particular and intelligent friend, upon whose judgment and probity we have a most perfect reliance, having had a conversation with Geminiani about five or six years before his death, and a friend of his at that time having had in meditation the writing a history of music, he committed to paper, when he got home, the chief particulars of his conversation, supposing they might be of some use to his friend; but as the plan he had in view has been long laid aside, we have been favoured with the anecdotes and particulars that were obtained from Geminiani, which, as they chiefly concern Corelli, and were communicated by one of his most illustrious scholars, who heard and saw what he relates; we shall insert them here.

"At the time that Corelli enjoyed the highest reputation,

his fame having reached the court of Naples, and excited a desire in the king to hear him perform; he was invited, by order of his majesty, to that capital. Corelli, with some reluctance, was at length prevailed on to accept the invitation; but, lest he should not be well accompanied, he took with him his own second violin and violoncello. At Naples he found Alessandro Scarlatti, and several other masters, who entreated him to play some of his concertos before the king; this he for some time declined, on account of his whole band not being with him, and there was no time, he said, for a rehearsal. At length, however, he consented; and in great fear performed the first of his concertos. His astonishment was very great to find that the Neapolitan band executed his concertos almost as accurately at sight, as his own band, after repeated rehearsals, when they had almost got them by heart. *Si suona*, (says he to Matteo, his second violin) *à Napoli!*

“After this, being again admitted into his majesty’s presence, and desired to perform one of his sonatas, the king found one of the adagios so long and dry, that being tired, he quitted the room, to the great mortification of Corelli. Afterwards, he was desired to lead in the performance of a masque composed by Scarlatti, which was to be executed before the king; this he undertook, but from Scarlatti’s little knowledge of the violin, the part was somewhat awkward and difficult: in one place it went up to F; and when they came to that passage, Corelli failed, and was unable to execute it; but he was assisted beyond measure to hear Petrillo, the Neapolitan leader, and the other violins, perform that which had baffled his skill. A song succeeded this in C minor, which Corelli led off in C major; *ricominciamo*, said Scarlatti, good-naturedly. Still Corelli persisted in the major key, till Scarlatti was obliged to call out to him, and set him right. So mortified was poor Corelli with this disgrace, and the general had figure he imagined he had made at Naples, that he stole back to Rome in silence.

“It was soon after this, that a hautbois player, whose name Geminiani could not recollect, acquired such applause at Rome, that Corelli, disgusted, would never play again in public. All these mortifications, joined to the success of Valentini, whose concertos and performance, though infinitely inferior to those of Corelli, were become fashionable, threw him into such a state of melancholy and chagrin, as was thought, said Geminiani, to have hastened his death.”

This account of Corelli’s journey to Naples is not a mere personal anecdote, as it throws a light upon the comparative state of music at Naples and at Rome, in Corelli’s time, and exhibits a curious contrast between the fiery genius of the Neapolitans, and the meek, timid, and gentle character of Corelli, so analogous to the style of his music.

In 1712, his concertos were published in a beautiful edition, engraved at Amsterdam, by Estienne Roger and Michael Charles le Cene, and dedicated to John William, prince palatine of the Rhine; but, alas! the author survived the publication of this admirable work but six weeks; the dedication bearing date at Rome, the 3d day of December 1712, and he died on the 18th of January 1713!

He was buried in the church of the Rotunda or Pantheon, in the first chapel on the left hand of the entrance of that beautiful temple, where a monument, with a marble bust on it, was erected to his memory, near that of the great painter Raphael, by Philip William, count palatine of the Rhine,

under the care of Cardinal Ottoboni; on which is the following inscription:

D. O. M.
 Archangelio Corellio a Fusignano
 Philippi Willelmi Comitiss Palatini Rheni
 S. R. I. Principis ac Electoris
 Beneficentia
 Marchioni de Laderburg
 quod eximius Animi Doctus
 et Incomparabili in Muncis modulis peritia
 fummis Pontificibus apprime curas
 Italice atque externis Nationibus Admirationi fuerit
 indulgente Clemente XI P. O. M.
 Petrus Cardinalis Ottobonus S. R. E. Vic. Cam.
 et Calliarum Protector
 Lyrici Celeberrimo
 inter Familiars suos jam diu adscito
 ejus Nomen Immortalitari commendaturus
 M. P. C.
 Vixit Annos LIX. Mens X. Dies XX.
 Obiit. IV. Id. Januarii Anno Sal. MDCCXIII.

During many years after his decease, there was a kind of commemoration of this admirable musician in the Pantheon, by a solemn service, consisting of pieces selected from his own works, and performed by a numerous band, on the anniversary of his funeral. A solemnity which continued as long as his immediate scholars survived, to conduct and perform in it. The late Mr. Wiseman, who arrived at Rome before the discontinuance of this laudable custom, assured us that his works used to be performed, on this occasion, in a slow, firm, and distinct manner, just as they were written, without changing the passages in the way of embellishment. And this, it is probable, was the way in which Corelli himself used to play them.

Of the private life and moral character of this composer, little new information can now be acquired or expected; but if we may judge of his equanimity and natural disposition by the mildness, sweetness, and even tenor of his musical ideas, his temper must have endeared him to all his acquaintance, as much as his talents.

Indeed, the account that is given of his dying worth 6000*l.* besides a valuable collection of pictures, and bequeathing them all to his patron Cardinal Ottoboni, does more honour to his parsimony and gratitude, than judgment; a musician leaving money to a cardinal, while he had a relation or necessitous friend in the world, seems to favour more of vanity, than true generosity. And the cardinal, himself, manifested his opinion of this bequest, by keeping only the pictures, and distributing the rest of Corelli’s effects among his poor relations, to whom they naturally appertained.

To attempt to give a character here of Corelli’s compositions, which have been so long heard and universally admired, may to many of our readers appear wholly useless; yet as they are thrown aside as antiquated lumber by some, and regarded as models of perfection by others, our wish to rank each musician in his true place, with equity and fairness, inclines us to make a few reflexions on the genius and works of this master, before we quit the subject.

As Corelli originally titled the second and fourth opera of his sonatas, “*Balletti da Camera*,” from the dancing and familiar movements contained in them; the first and third set, from their gravity of style and movement, may be called “*Sonate da Chiesa*.” The same distinction may be made with propriety in his concertos, and even solos; the first

eight of the former, and six of the latter, being much more solemn and ecclesiastical than the rest.

With regard to the intrinsic worth of his four books of sonatas at present, notwithstanding the exquisite pleasure they may have afforded ourselves and others, during youth, it is very much diminished by the general improvement of melody, knowledge of the bow, and boldness of modulation, which have freed invention from former shackles, and generated new ideas and effects. Indeed, during the time of Corelli, and long after, every one who knew the mechanical laws of harmony, however ignorant of the violin, set about composing sonatas, solos, and concertos, for it; but the great masters of that instrument, whose genius and invention have kept pace with their hands, have now nearly crushed all such infipid and impotent attempts.

Corelli's solos, as a classical book for forming the hand of a young practitioner on the violin, has ever been regarded as a most useful and valuable work, by the greatest masters of that instrument. We were told by Mr Wiseman at Rome, that when he first arrived in that city, about twenty years after Corelli's decease, he was informed by several persons who had been acquainted with him, that his "Opera Quinta," on which all good schools for the violin have been since founded, cost him three years to revise and correct. Tartini formed all his scholars on these solos; and Signor Gardini has told us, that of any two pupils of equal age and disposition,

if the one was to begin his studies by Corelli, and the other by Geminiani, or any other eminent master whatever, he is sure that the first would become the best performer.

The concertos of Corelli seem to have withstood all the attacks of time and fashion with more firmness than any of his other works. The harmony is so pure, so rich, and so grateful; the parts are so clearly, judiciously, and ingeniously disposed; and the effect of the whole, from a large band, so majestic, solemn, and sublime, that they preclude all criticism, and make us forget that there is any other music of the same kind existing.

Geminiani, according to our friend's memorandums, whence an extract has already been given, asserted that "Corelli availed himself much of the compositions of other masters, particularly of the masses in which he played at Rome; that he acquired much from Lulli, particularly the method of modulating in the *legatura*, and from Bononcini's famous *Camilla*." This was not very intelligible; nor does the charge appear well founded; as Lulli has made but little use of the *legatura*. With these masses we are unacquainted; but we find frequent imitations of the more natural passages of Scarlatti, particularly in the beautiful adagio of his eighth concerto, in which there is a great resemblance to a movement in a cantata which was set by Scarlatti in 1704, eight years prior to the publication of Corelli's concertos.



Geminiani's character of Corelli, upon the whole, however, seems very just; he said, that "his merit was not depth of learning, like that of Alessandro Scarlatti; nor great fancy, or rich invention in melody or harmony; but a nice ear and most delicate taste, which led him to select the most pleasing harmonies and melodies, and to contract the parts so as to produce the most delightful effect upon the ear." At the time of Corelli's greatest reputation, Geminiani asked Scarlatti what he thought of him, who answered, that "he found nothing greatly to admire in his composition, but was extremely struck with the manner in which he played his concertos, and his nice management of his band, the uncommon accuracy of whose performance gave the concertos an amazing effect even to the eye as well as the ear;" for, continued Geminiani, "Corelli regarded it as essential to the *ensemble* of a band, that their bows should all move exactly together, all up, or all down; so that at his rehearsals, which constantly preceded every public performance of his concertos, he would immediately stop the band if he discovered one irregular bow."

There seems some justice in Geminiani's opinion, that Corelli's continual recourse to certain favourite passages betrays a want of *resource*. They were so many *bar rests* for his invention. All the varieties of Corelli's harmony, modulation, and melody, might perhaps be comprised in a narrow compass. The musical index to his works would not be long.

Indeed Corelli was not the inventor of his own favourite style, though it was greatly polished and perfected by him. Corelli's concertos, though posthumous, were published

three years before those of Corelli; and we know not how long they had been composed, or how often performed, previous to publication.

For a model of his graver sonatas in the first and third set, he certainly had those of Bassani in his mind; and for the lighter sort, he had many models. His solos seem drawn from his own source more entirely than any of his other productions.

There was little or no melody in instrumental music before Corelli's time. And though he has much more grace and elegance in his *cantilena* than his predecessors, and slow and solemn movements abound in his works; yet true pathetic and impassioned melody and modulation seem wanting in them all. He appears to have been gifted with no uncommon powers of execution; yet, with all his purity and simplicity, he condescended to aim at difficulty, and manifestly did all he could in rapidity of finger and bow, in the long unmeaning allegros of his first, third, and sixth solos; where, for two whole pages together, common chords are broken into common divisions, all of one kind and colour, which nothing but the playing with great velocity and neatness could ever render tolerable. But like some characters and indecorous scenes in our best old plays, these have been long omitted in performance.

Indeed his knowledge of the power of the bow, in varying the expression of the same notes, was very much limited. Veracini and Tartini greatly extended these powers; and we well remember our pleasure and astonishment in hearing Gardini, in a solo that he performed at the oratorio, 1769,

play an air at the end of it with variations, in which, by repeating each strain with different bowing, without changing a single note in the melody, he gave it all the effect and novelty of a new variation of the passages.

However, if we recollect that some of Corelli's works are now more than a hundred years old, we shall wonder at their grace and elegance; which can only be accounted for on the principle of ease and simplicity. Purcell, who composed for ignorant and clumsy performers, was obliged to write down all the fashionable graces and embellishments of the times, on which account his music soon became obsolete and old-fashioned; whereas the plainness and simplicity of Corelli have given longevity to his works, which can always be modernized by a judicious performer, with very few changes or embellishments. And, indeed, Corelli's productions continued longer in un fading favour in England than in his own country, or in any other part of Europe; and have since only given way to the more fanciful compositions of the two Martinis, Zaneffi, Campioni, Giardini, Bach, Abel, Schwindl, Boccherini, Stamitz, Haydn, Mozart, and Pleyel.

After the publication of Corelli's works, the violin seems to have increased in favour all over Europe.

CORENDELIN, in *Geography*, a town of Switzerland, in the canton of Soleure; 10 mile. N. of Soleure.

CORENTIN, a considerable river of South America, in Dutch Guiana.

COREOPSIS, in *Botany*, (from *κορη*, a bug, and *opsis*, appearance, alluding to a fancied resemblance between the seed and the insect.) Linn. gen. 981. Schreb. 1325. Willd. 1538. Gert. 1037. Juss. 188. Vent. 2. 528. (Cariope; Enc.) Class and order, *syngenesia polygama frutricina*. Nat. Ord. *Compositæ oppositifoliae*. Linn. *Corymbiferae*, Juss.

Gen. Ch. *Cal.* many-leaved, generally double, sometimes simple, and somewhat imbricated. *Cor.* compound; florets of the disk numerous, hermaphrodite, fertile, tubular, five-toothed; florets of the ray female, abortive, ligulate, spreading, large. *Stam.* Filaments five, capillary, very short. *Pist.* Germ compressed; style filiform; stigma bifid. *Recep.* generally chaffy. *Seeds* solitary, compressed, crowned with a two or three-horned border.

This genus differs from *bidens* in having a ray, and from *verbena* in having the florets of the ray barren.

Sp. 1. *C. ferulifolia*. Willd. 1. Jacq. Hort. Schœn. 3. 65. tab. 373. "Leaves bipinnate; pinnule linear-lanceolate, with ribs half their breadth." *Root* perennial; outer-leaves of the *calyx* numerous, reflexed. A native of Mexico. 2. *C. verticillata*. Linn. Sp. Pl. 1. Mart. 1. Willd. 2. Bot. Mag. 156. (*C. foliis verticillatis*; Gron. Virg. 131. *Chrysanthemum*; Pluk. Mant. 48. tab. 344. fig. 4.) "Leaves decomposed-pinnate; segments filiform." *Root* biennial. *Stem* from a foot and half to three feet high, erect, striated. *Leaves* sessile, opposite, but often appearing to grow in whorls in consequence of being cut to the base into linear segments, which are curved in various directions. *Flowers* terminal; florets of the disk brown; of the ray yellow; calyx short; outer leaves narrow, loose, shorter than the others. A native of Virginia and Louisiana. 5. *C. delphinifolia*. Lam. 2. (*Ceratophyllum Delphinii foliis*; Vaill. act. 1720. Ehret. pict. tab. 9. fig. 1.) "Leaves tripartite-pinnate; segments linear, channelled on the upper surface." Nearly allied to the preceding, but constantly distinguished from it by its foliage and habit. *Root* perennial. *Stem* a foot and half high, erect, smooth, striated. *Leaves* opposite, connate, sessile, divided at the base into three pinnate segments. *Flowers* terminal; florets of the disk brown, on a somewhat prominent receptacle; of the ray yellow, acute, entire, or bifid;

outer scales of the calyx narrow, loose, obtuse. A native of Virginia. It may perhaps be doubted which of the last two is the *verticillata* of Linnæus. 4. *C. tenuifolia*. Willd. 3. Ehret. Beitr. 7. 168. "Leaves three or five in a whorl, pinnate; pinnæ linear, three-parted or undivided; disk the same colour with the ray." *Root* perennial. A native of Carolina. Willdenow supposes this species to be the *verticillata* of La Marek; but he cannot be right, if it have the disk and ray of the same colour; for La Marek, who described from a living plant, expressly says, that the disk of his *verticillata* is brown, and its ray yellow. It is on this circumstance alone, that the separate existence of *tenuifolia* seems to depend. 5. *C. coronata*. Linn. Sp. Pl. 2. Mart. 2. Willd. 4. (*Ceratophyllum foliis pentapteris*; Vaill. act. 1720. 328. *Bidens pentaphylla*; Plum. Sp. 10. ic. 53. fig. 2.) "Leaves pinnate, serrated, marked with lines, smooth." *Root* annual. The plant is altogether that of *Bidens frondosa*; but it has the flowers of *C. verticillata*, with a large ray of eight striated, oval florets. A native of Virginia. 6. *C. trichosperma*. Willd. 5. Mich. am. 2. 139. "Leaves pinnate, lanceolate; serrated, smooth; scales of the outer calyx ciliate-serrated." A native of Upper Carolina, in moist ground. 7. *C. aristata*. Willd. 5. (*C. aristata*; Mich. am. 2. 1. 140.) "Leaves pinnate, serrated, pubescent; horns of the seed very long, divaricated." A native of North America in the country of the Illinois. 8. *C. leucorhiza*. Mart. 18. Lour. Coch. 508. "Leaves pinnate; pinnæ five, serrate-gashed; ray six-flowered; seed three-horned." *Root* spindle-shaped, fleshy, white. *Stem* a foot and half high, herbaceous, erect, quadrangular, grooved. *Leaves* quinate, lanceolate. *Flowers* entirely saffron-coloured, few together, on terminal peduncles; florets of the ray six; egg-shaped, quite entire; horns of the seed beset with inverted bristles; calyx erect, many-leaved. A native of China. 9. *C. mitis*. Willd. 7. Mich. amer. 2. 140. "Lower leaves bipinnatifid; upper ones linear, three-parted; seeds naked." *Calyx*s generally simple, sometimes somewhat calycel. A native of marshes in Carolina. 10. *C. leucantha*. Linn. Sp. Pl. 6. Mart. 3. Lam. 6. (*Bidens leucantha*; Willd.) "Leaves pinnate, serrated; florets of the ray of a different colour from those of the disk." *Root* annual. *Stem* three or four feet high, quadrangular, smoothish; the opposite sides channelled; branches opposite. *Pinnæ* five, seldom three, egg-shaped, undivided, smooth, equal, even; the three outer often confluent, almost decurrent by the outer side, quite entire at the tip; petioles channelled, connected on both sides by villous hairs. *Flowers* terminal, alternate, two or three, on length peduncles; inner scales of the calyx five; outer five, smaller, more distinctly separated; florets of the ray five, egg-shaped, three-toothed, three-nerved underneath; disk small, convex, yellow. *Seeds* three-horned, hispid backwards. Linn. A native of Virginia. La Marek thinks it not distinct from *C. coronata*. 11. *C. odorata*. Lam. 7. (*C. chrysantha*; Linn. Sp. Pl. 5. Mart. 4. Willd. 7. *Bidens americana triphylla*; Plum. Sp. 10. ic. 53. fig. 1.) "Leaves ternate, serrated, smooth; floret of the ray of a different colour." *Root* sweet-scented, whitish, fibrous. *Stem* about three feet high, quadrangular, smooth, sweet-scented. *Leaves* opposite; generally composed of three egg-shaped, acute, smooth, toothed-loblets. *Flowers* terminal, solitary; florets of the ray white; of the disk yellow, resembling the common camomile. *Seeds* two-lobed; receptacle almost hemispherical. Plum. MSS. A native of the West Indies, and South America. Linnæus, in his specific character, describes the ray as similar in colour to the disk, and if he had not quoted Plumier as his

only synonym, we should have thought La Mèrc referred to a different plant. 12. *C. biternata*. Willd. 19. Lour. Coch. 508. "Leaves twice ternate, ovate-lanceolate, serrated; panicle diffuse; ray six-flowered." *Stem* two feet high, herbaceous, quadrangular, four-grooved. *Flowers* entirely yellow. *Seeds* with two branched horns. *Receptacle* flatfish, naked. A native of China about Canton. The naked receptacle is inconsistent with the generic character. 13. *C. aurea*. Mart. 13. Willd. 9. Hort. Kew. 3. 252. "Leaves ferrated; root ones three-parted; stem ones triid or entire, lanceolate-linear." *Root* perennial. A native of North America. 14. *C. tripteris*. Linn. Sp. Pl. 9. Mart. 5. Lam. 3. Willd. 10. (C. virginianum, folio anagradis; Moris. Hist. 3. 21. tab. 3. fig. 44.) "Lower stem leaves pinnated, upper ones ternate, uppermost simple, petioled; leaflets lanceolate-linear." *Root* perennial. *Stems* three or four feet high (six or seven; Mill.) erect, cylindrical, smooth, branched near the summit. *Flowers* solitary, in a loose corymbus, with a yellow ray and brown disk; florets of the ray pointed, entire or with two teeth. A native of Virginia. 15. *C. fenifolia*. Willd. 11. Mich. am. 2. 138. "Leaves quite entire, ternate, sessile." A native of sandy hills in Carolina. 16. *C. alba*. Linn. Sp. Pl. 8. Mart. 6. Lam. 8. Willd. 12. (C. scandens; Brown. Jam. 321. *Chrysanthemum americanum*, cicris folio glabro; Herm. par. tab. 124. Pluk. alm. 101. tab. 160. fig. 3.) "Leaves generally ternate, wedge-shaped, ferrated." *Root* perennial. *Stems* a foot and half long, slender, incapable of supporting themselves, branched. *Leaves* often quinate, smooth. *Flowers* terminal, peduncled; florets of the ray about eight, white; sometimes with a tinge of purple, rather large; those of the disk orange-yellow. *Seeds* two-horned. A native of St. Cruz, one of the Antilles. 17. *C. foetida*. Mart. 20. Willd. 13. Cav. ic. 1. 55. tab. 77. "Leaves heart-shaped, three-lobed, acuminate, ferrated; middle lobe longer." *Root* annual. *Stem* six feet high, erect, cylindrical, branched, clothed with a short glutinous nap. *Leaves* glutinous, fetid, opposite; petioles long, connate at the base. *Flowers* in a corymb, entirely yellow; calyx-leaves sixteen, ovate-acute, keeled; eight outer ones blackish-green, hirsute, glutinous; florets of the ray eight, three-nerved, somewhat emarginate. *Seeds* inversely egg-shaped, obscurely three-sided, compressed, with two white capillary horns. A native of Mexico. 18. *C. reptans*. Linn. Sp. Pl. 3. Mart. 7. Lam. 9. Willd. 14. Smith spicil. 20. tab. 22. (*Chrysanthemum trifoliatum* scandens; Sloan. Jam. 125. Hist. 1. 261. tab. 154. fig. 2, 3.) "Leaves ferrated, egg-shaped; upper ones ternate; stem creeping." *Root* annual, small, fibrous. *Stem* five feet high, weak, climbing, square at the base, somewhat cylindrical above, striated, branched. *Leaves* opposite, acute, veined, soft, slightly downy, bright green, paler underneath; petioles channelled, hairy. *Flowers* entirely gold-coloured; peduncles from three to five, from the axils of the top leaves, erect, cylindrical, striated, hairy, single-flowered; sometimes with two or three lanceolate bractes at the base; calyx nearly cylindrical; a few of the outer leaves spreading; florets of the ray four-toothed, veined; anthers half excluded, brown; germ linear, ciliate at the edges, stigmas downy above, obtuse. Smith. A native of Antigua. 19. *C. heterophylla*. Willd. 15. Cav. ic. 3. 34. tab. 268. "Leaves scabrous; those from the root, panduriform, repand; on the stem, lanceolate, ferrated, attenuated at the base, nearly sessile." A native of Mexico. 20. *C. baccata*. Linn. jun. Supp. 380. Mart. 8. Lam. 11. Willd. 16. "Leaves egg-shaped, ferrated; seeds resembling a berry." *Stem* eight

feet high, herbaceous, erect. *Leaves* opposite, petioled, three-nerved. *Flowers* yellow, peduncled, often three together, terminal; calyx-leaves sixteen, lanceolate, recurved, the length of the disk; florets of the ray three-toothed. *Seeds* naked, nearly globular, black, somewhat tetragonous, fitting on a convex receptacle and forming an aggregate not unlike the compound berry of rubus; down none. A native of Surinam. The naked seeds exclude it from this genus, independent of the peculiar structure of the fruit. 21. *C. auriculata*. J. Inn. Sp. Pl. 7. Mart. 9. Lam. 4. Willd. 17. Mich. Amer. 2. 138. (*Chrysanthemum hirsutum virginianum*; Pluk. Alm. 101. tab. 83. fig. 5. and tab. 242. fig. 4.) *C. virg. trifoliatum*; Moris. Hist. 3. 20. tab. 3. fig. 45.) "Leaves quite entire, egg-shaped; lower ones ternate." *Root* perennial. *Stem* a foot and half or two feet high, filiform, cylindrical, slightly villous, a little branched towards the top. *Leaves* opposite, connate; lower ones with two small leaves at the base which make them appear auricled, smooth above, slightly villous underneath; petioles channelled. *Flowers* entirely yellow, terminal; florets of the ray eight, large, five-toothed. A native of Virginia. 22. *C. lanceolata*. Linn. Sp. Pl. 10. Mart. 10. Lam. 5. Willd. 18. Mich. Am. 2. 137. (*Bidens succisa* folio; Dill. Eth. 55. tab. 48. fig. 56. B. caroliniana; Mart. Cent. tab. 26.) "Leaves lanceolate, quite entire, ciliated." *Root* biennial. *Stems* several, a foot and half high, decumbent at the bottom, thence rising obliquely. *Root-leaves* long, spread on the ground, thickish, narrowed towards the base, resembling those of scabiosa succisa. *Flowers* large, yellow; peduncles long, smooth; florets of the ray eight or nine, deeply four-toothed. *Seeds* with three horns. A native of Carolina. 23. *C. crassifolia*. Mart. 14. Willd. 19. Hort. Kew. 3. 253. "Leaves inversely egg-shaped, oblong, obtuse, quite entire, pubescent." *Root* perennial. A native of Carolina, flowering from August to September. 24. *C. latifolia*. Willd. 20. Mich. Amer. 2. 137. Lam. Illust. tab. 794. fig. 2? "Leaves egg-shaped, acuminate, crenate-toothed; seeds naked." A native of Carolina, on high mountains. 25. *C. angustifolia*. Mart. 15. Willd. 21. Hort. Kew. 3. 253. "Leaves a ternate, linear-lanceolate, quite entire, even surfaced; florets of the ray oblong, triid; middle segment larger." A native of Carolina and Florida. 26. *C. alata*. Willd. 22. Cav. ic. 3. 30. tab. 260. "Stem winged; leaves a ternate, scabrous, roundish egg-shaped, wedge-shaped at the base, triplinerved." *Root* perennial. A native of Mexico. 27. *C. alternifolia*. Linn. Sp. Pl. 11. Mart. 12. Lam. 10. Willd. 24. Jacq. Hort. 2. tab. 110. Gart. tab. 171. fig. 9. (*Chrysanthemum virginianum*, alato caule. Moris. Hist. 3. 25. tab. 7. fig. 75, 76. Pluk. Alm. 100. tab. 159. fig. 3.) "Leaves lanceolate, ferrated, alternate, petioled, decurrent." Linn. "Stem winged; leaves lanceolate, on short petioles, ferrated; flowers in corymbs; florets of the ray lanceolate." Willd. *Root* perennial. *Stems* several, from five to seven feet high or more, erect, firm, simple. *Leaves* about five inches long, rugged on both sides, of a dirty green colour, narrowed at the base; the lower ones three or four together or two opposite; the rest alternate. *Flowers* yellow, in a terminal corymb; calyx many-leaved, spreading very much; florets of the ray distant, two-horned. A native of North America, from Canada to Virginia, flowering in October and November. 28. *C. ovata*. Willd. 23. Cav. ic. 3. 41. tab. 280. "Stem winged; leaves alternate, oblong, nearly sessile, ferrated; flowers in corymbs; florets of the ray elliptical." *Root* perennial. Very similar to the preceding, perhaps only a variety. A native of Mexico. 29. *C. proserna*. Willd. 25. Hort. Kew. 3. 253. "Leaves elliptical, acuminate, ferrated, petioled,

toiled, veined, decurrent; lower ones whorled; upper ones alternate." *Root* perennial. A native of North America, flowering in September and October. Professor Martyn conjectures that this is the *alternifolia* of Linnæus, and that the *alternifolia* of Hærtus Kewensis is a different plant. 30. *C. radiata*. Mill. Mart. 17. "Leaves linear-lanceolate, sharply serrated, opposite; ray of the flower large, entire." *Root* annual. Stems four feet high, erect. Leaves from three to four inches long, three quarters of an inch broad, acuminate, on short petioles. Flowers two from each of the upper joints of the stem, opposite; peduncles, long, slender, bearing two or three pairs of small leaves or bractes, one-flowered; florets of the ray seven, oval, entire; of the disk numerous, dark-coloured. A native of South Carolina, flowering in August; raised by Miller from seeds sent by Dr. Dale.

COREOPSIS *Bidens*; Linn. See *BIDENS cernua*.

COREOPSIS *foliis linearibus integerrimis*; Gron. See *RUBRICA angustifolia*.

Propagation and Culture. Most of the perennial species are hardy and may be readily increased by parting the roots. The second and fourteenth require a light loamy earth and sunny exposure. The annuals should be sown in a hot-bed and afterwards transplanted into a warm border.

COREOPSIS, in *Gardening*, contains plants of the flowering herbaceous perennial kind; of which the species cultivated are the whole leaved *coreopsis*, or tick seed sun-flower. (*C. verticillata*.) The three leaved *coreopsis*. (*C. tripteris*.) The alternate leaved *coreopsis*. (*C. alternifolia*.) The span leaved *coreopsis*. (*C. lanceolata*.)

Method of Culture. The mode of propagation in these plants is easily effected, either by slipping or dividing the roots in autumn when the stalks decay, planting them out where they are to remain, keeping them clear from weeds, and cutting down the stalks annually in autumn when they begin to decay. The third and fourth sorts may be rendered more forward by the use of a hot-bed. All these plants are well calculated for the more large borders and clumps, introducing them in the vacant spaces between shrubs, as they exhibit a plentiful bloom till late in the autumnal months.

CORESIUM, in *Ancient Geography*, a lake or marsh in the island of Crete. Steph. Byz.

CORESSUS, one of the four towns of the island of Cos, according to Suidas. Ptolemy calls it *Cereffus*; Strabo, and also Steph. Byz. denominate it *Coriffa*.

CORESSUS, or *Corefus*, a name given by Xenophon, Diodorus Siculus, &c. to a high mountain of Asia Minor in Ionia, about 40 stadia from the city of Ephesus. At the foot of this mountain was a town of the same name, called by Steph. Byz. *Coriffos*, which he represents as a town of Ephesus, because of its dependence upon it. He says that it derived its name from the following circumstance. Diana, having been delivered of Latona, and having brought her hither asked of the people of the country to whom this place belonged? they replied "Κορη, κορ;" Virgin, it is yours. In this fable is traced the etymology of the name.

CORETA, in *Betany*, Brown. See *CORCHORUS siliquosus*.

CORETT, in *Ichthyology*, the name of a large East Indian fish of the tunny kind, and suspected to be no other than the common tunny, or *SCOMBER Thynnus*. It grows to six or seven feet long. Its eyes are large, and their irises yellow; its tail is broad and forked, and in colour of a yellowish green; its belly-fins are yellowish, and its belly of a fine bright glossy blue, with a silvery cast. It is generally caught with hooks, and is a very fine tasted fish. Ray.

CORETUM, in *Ancient Geography*, a gulf of Palus-Mæotis, according to Pliny; who says that a mountain of

rocks separated this gulf from the lake of Boges, into which the river Hypanis discharged itself.

COREVA, or *COREBA*, a place of Africa propria, on the route from Turburba to Tacape, between Valli and Musti, according to Antonine.

COREUR, a town of India on this side of the Ganges, according to Ptolemy. It is thought to be the same with *Cereura*.

CORFE CASTLE, in *Geography*, is an ancient market-town, situated near the centre of the Isle of Purbeck in Dorsetshire, England; at the foot of a range of hills, on a rising ground, declining to the east. Its origin must undoubtedly be attributed to the castle, which existed previous to the year 980: though the town itself does not appear to have been of any importance till after the conquest, it being wholly unnoticed in Domesday book. The manor and castle seem always to have defended together. Though this is an ancient borough by prescription, it was not incorporated till 15th Eliz., when Sir Christopher Hatton obtained a charter, investing the inhabitants with liberties similar to those of the Cinque-ports, with various other privileges: these were confirmed by James I. and Charles II. The government of the town is vested in a mayor, and eight barons who have served the office of mayor. The earliest return to parliament was in 14 Eliz.; the right of election is possessed by all persons within the borough who are seized in fee, in possession, or reversion, of any messuage, or tenement, or corporal hereditament, and in such as are tenants for life or lives, and in want of such freehold, in tenants for years, determinable on any life or lives, paying rent and lot. The town consists chiefly of two streets of stone buildings. The church, a large ancient fabric, comprises a nave, chancel, two aisles, and a large embattled tower: twelve irregular arches support the roof, and four pillars, in the Saxon style, but all different, are connected with the porch. The number of houses in the late return was 152; and of inhabitants 741; many of whom find employment in the neighbouring clay-works and stone quarries; and a few in knitting stockings. A weekly market is held on Thursdays. This town is 116 miles S.W. from London. The district which includes Corfe castle, and is about ten miles in length and eight in breadth, contains twelve or thirteen Sunday schools, distributed through the different parishes; each being governed by a committee of the principal inhabitants, subject to the superintendance of a general committee who meet at Corfe castle as occasion may require. The average number of children who attend these schools is about 400. Dorsetshire was one of the first counties in which Sunday schools were established. Some excellent regulations, relative to the general management of these institutions, may be seen in Hutchins's Dorset, vol. i. p. 308, 2d edit.

The castle at Corfe "stands a little north of the town, opposite to the church, on a very steep rocky hill, mingled with hard, rubbly chalk-stone, in the opening of those ranges of hills that inclose the east part of the isle. Its situation between the ends of these hills deprives it of much of its natural and artificial strength, being so much commanded by them, that they overlook the tops of the highest towers; yet its structure is so strong, the ascent of the hill on all sides but the south is steep, and the walls so massy and thick, that it must have been one of the most impregnable fortresses in the kingdom before the invention of artillery. It was of great importance in respect to its command over the whole isle; whence our Saxon ancestors justly styled it Corfe gate, as being the pass and avenue into the best part of the isle." (Hutchins's Dorset, i. 280.) The castle is separated from

the town by a strong bridge, of four very high, narrow, semi-circular arches, crossing a deep moat, now dry. The bridge leads to the gate of the first ward, which remains nearly entire, probably from the thickness of the walls, which, from the outward to the inner facing, is in some parts full nine yards. On the higher part of the hill, at some distance from the centre of the fortress, stands the keep or citadel, which still retains nearly its original height, and commands a very extensive prospect to the north and west.

The precise period when the castle was built is uncertain; but from concurrent circumstances its erection is ascribed to King Edgar. That it did not exist previously to the year 887, when the nunnery at Shaftesbury was established, is certain, from an inquisition taken 54 Hen. III.; wherein the jurors returned, "that the abbess and nuns at Shalton (Shaftesbury) had, without molestation, before the foundation of the castle at Corfe, all wrecks within their manor of Kingston, in the isle of Purbeck."

Between two and three miles eastward of Corfe, is *Nine Barrow Down*, an eminence so named from nine large barrows situated on it in a line, supposed to be of British construction. The whole number of barrows on this down are sixteen of various dimensions; most of them circular, and very regularly shaped. A shallow trench surrounds eight or ten; and near them is a hollow or cavity. The highest part of the down rises 642 feet above low water mark.

At a small distance, north west of Corfe, is *Grange or Creech Grange*, the seat of John Bond, Esq.; it anciently was part of the possessions of the abbeys of Bindon, and the occasional residence of the Abbot. Hutchins's History of Dorsetshire.

CORFINIUM (*S. Pelino*), in *Ancient Geography*, a town of Italy, the capital of the Peligni, situated at a small distance from the Aterisus, on a delightful plain surrounded by mountains. In the time of the Social war, A. U. C. 662, the allies fortified it, and made it a place of arms. During the civil wars, Cæsar obliged Domitian to retire hither, besieged him there, and took the place.

CORFU, in *Geography*, the ancient CORCYRA (which see), an island of the Mediterranean, at the mouth of the Adriatic, near the coast of Albania, about 15 leagues long and 8 wide. In ancient times the inhabitants of this island formed a powerful republic; in succeeding times it belonged to the king of Naples; and it was afterwards sold for 30,000 ducats to the Venetians, who maintained a fleet of galleys in the port, and a strong garrison to defend this and the neighbouring islands. It was seized by the French in 1797; and by an article in the treaty of Campo Formio, in 1797, the French republic was allowed by his majesty, the emperor, king of Hungary and Bohemia, to possess, in full sovereignty, the six adjacent Venetian islands of the Levant, viz. Corfu, Zante, Cephalonia, St. Maurice, Cerigo, and other islands dependent on them, together with all the six adjacent establishments in Albania, which are situate lower down than the gulf of Ladrino. In 1799 this island was taken by the Russians, and, together with Cephalonia and Zante, &c. constitute an independent republic under the protection of Russia.

This island is said to contain about 50,000 persons, and is divided into four bailiwicks or governments. The religion of Corfu is partly that of the Latin and partly that of the Greek church. The latter has for its chief a proto-papa, or head-priest, elected in an assembly of the clergy and nobility; he is immediately dependent on the patriarch of Constantinople, and possesses all the episcopal powers. His office lasts five years, and he then returns to the class of ordinary

papas, with the privilege of wearing a crimson girdle. His revenue is confined to the perquisites of his office, the amount of which he continues to increase, as an indemnity for the expence he incurred in procuring his nomination. To the cathedral there are canons attached, as to that of the Latin church; but they have no fixed prebend. The only advantage accruing from their canonicate is that of being at the head of the clergy, together with the honour of wearing a violet girdle, and a small tassel of the same colour to their hats. The number of churches in Corfu is very considerable. Each officiating priest is annually elected by the assembled parishioners; but he has no fixed salary. Most of the churches, especially those in the country, have been built by private persons, who, as proprietors, nominate the papa. The richest of these churches is that in which are deposited the relics of St. Spiridon, to whom the Greeks pay a peculiar devotion; and the festival of this saint is celebrated with the greatest pomp. The night between Holy Thursday and Good Friday is remarkable for the number of processions which perambulate the city.

In the isle of Corfu are several convents of men and women, which tend very much to oppress the inhabitants. The ignorance of the Greek clergy, especially in the rural parts, is so great as to be proverbial; the most learned among them being hardly capable of writing and reading their own language.

The air of this island is healthy, the land fertile, and the fruit excellent. Oranges, citrons, the most delicious grapes, honey, wax, and oil are very abundant. Some places are mountainous and barren, and good water is scarce. Salt forms a great part of its riches.

CORFE, the capital of the fore-mentioned island, the seat of a bailiff, a provost, a captain, &c. and the see of an archbishop. It is fortified, and defended by two fortresses; the town has a good harbour and a considerable trade. N. lat. 39° 42'. E. long. 20° 2'.

CORGA, a country of India, near the coast of Malabar, bounded on the N. and E. by the Mysore country, on the S. by the country of the Nayrs, and on the W. by the sea.

CORGATHEA, in *Ancient Geography*, a town of India, according to Ptolemy.

CORGOLOIN, in *Geography*, a town of France, in the department of the Côte d'Or, and district of Beaune; 5 miles N. of Beaune.

CORI, anciently *Coria*, a town of Italy, in the Campagna di Roma; 10 miles S. of Palefrino.

CORIA, or CURIA, in *Ancient Geography*, a town of the isle of Albion, in the country of the Damii, according to Ptolemy. The conjectures about the situation of this place are various and doubtful; but, upon the whole, that of Mr. Baxter seems to be the most probable, who places it at Kirkintilloch, a place of great antiquity, upon the wall, about 6 miles from Glasgow.—Also, a town of Albion, belonging to the Otadeni, and supposed to be Corbridge in Northumberland by Camden and Baxter; but Horsley imagines it to have been situated much farther north, probably at Jedburgh, and suspects it to have belonged to the Gadeni.—Also, a place of Greece, in the Peloponnesus; near the town of Helice, according to Ælian.—Also, a town of Italy, near Rome. See CORI.

CORIA, in *Geography*, a town of Spain, in the province of Estremadura, the see of a bishop. It contains two churches, two convents, and two hospitals; near it are medicinal springs; 90 miles E. of Toledo, and 110 E. S. E. of Madrid. N. lat. 39° 36'. Long. 10° 28' E. of Peak of Teneriffe.—
Also,

—Alfo, a town of Spain, in the country of Seville, on the Guadalquivir; 7 miles from Seville.

CORIACO, a town of S. America, in the province of Cumana, on a gulf to which it gives name; 40 miles E. of New Cordova. It contains about 6500 perfons.

CORIALLUM, in *Ancient Geography*, a place of Gaul, in the *Lyonnensis fecunda*; near the cape de la Hogue, according to d'Anville.

CORIANDEK, in *Agriculture*, the name of a plant which is cultivated in the field by the farmer in some diftricts, though not to any very great extent. In both Effex and Kent it is, however, occasionally met with as a field crop.

In its culture it is advised, that the feed fhould be fown in the autumnal feafon, on rich, friable land, which has been well prepared by tillage; and that when the plants have rifen above the furface of the ground, they fhould be hoed out to the diftance of about four inches every way, clearing them well from all forts of weeds. It is fuppofed that by this management they will become ftrong, and produce a greater quantity of good feed.

The advantages of cultivating this fort of crop are thus fitted in the fourth volume of the Letters and Papers of the Bath Society.

Sowed ten perches of land with coriander feed, the foil a good fandy loam.

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		£.	s.	d.
Three ploughings	- - - -	0	1	6
Sowing and harrowing	- - - -	0	0	1
Four pounds of feed, at 3 d.	- - - -	0	1	0
Harvefting	- - - -	0	0	3
Rippling	- - - -	0	1	0
Rent	- - - -	0	2	0
		<hr/>		
		0	5	10
<i>Produce.</i>				
		£.	s.	d.
87 pounds of coriander feed, at 3 d.	-	1	1	9
Deduct expences	0 5 10	<hr/>		
		0	15	11

or 15 l. 18 s. 4 d. per acre.

The author of the paper obferves, that he has fince made feveral larger experiments in this article, but that none has proved fo good a crop as the preceding, yet all of them fuch as to afford a good profit. There is a ready fale for the feed with the diftillers, druggifts, and confectiioners. The former purchafe very large quantities: the price varies from 16s. to 42s.

According to Mr. Vancouver, in his Account of Effex Husbandry, the mode of cultivation is thus performed. "The culture of coriander, which has been much attended to in the neighbourhood of Tolthunt Darcy, is, he fays, thus managed: old lay-ground is ploughed in the beginning of March, and after the furface is completely pulverized, the feed is fown fourteen pounds to the acre; three hoeings and fetting out the plants four inches fquare will coft one guinea per acre. Average produce, 10 *cwt.* per acre, 12s. per *cwt.* This is confidered to be a very good preparation, after once ploughing, for wheat; and as the land is generally ploughed in two yard ridges, or fitches of eight furrows wide, a row of beans is generally planted with the coriander, on each fide

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of the open furrows between the fitches, and are ufually harvefted at the fame time.

"It is frequently the cafe in this diftrict to cultivate a triple fort of crop, confifting of coriander, carraway, and tealf.

"When (fays the above writer) carraway is fown with the coriander, from the care and attention neceffarily beftowed on diftinguifhing the plants, the hoeing feldom cofts lefs than one guinea and a half per acre; but the carraway is not regularly fet out for a crop till after the coriander is harvefted, at which time a very expenfive hoeing becomes indifpenfably neceffary.

"Tealfe is fometimes cultivated in the fame field, the feed being fown with the coriander and carraway; but as neither the carraway nor tealfe come completely and regularly the fecond year, both crops are ufually allowed to ftand for the third fummer. This is eftemed good management for old coarfe pature grounds, which, after three ploughings, are commonly fown with wheat, and then clean chalked."

The following directions are given for this culture, by Mr. Sewell of Maplehead: "about the beginning of March, plough fome old pature land; if it has been pature for a century, the better; and the foil fhould be a very ftrong clayey loam. Mix 12 *lbs.* of carraway, 10 *lbs.* of coriander, and 12 *lbs.* of tealfe feeds together, which is fufficient for one acre; fow direftly after the plough and drefs (he fuppofes harrow) the land well. When the plants appear of fufficient ftrength to bear the hoe (which will not be until about ten weeks after fowing), it muft not be omitted, and in the courfe of the fummer it will require three hoeings, and one at Michaelmas; each will be about 8s. per acre. The coriander is annual, and is fit to cut about the beginning of July: it fhould be left in the field after cutting, and thrufhed on a cloth, in the fame manner as rape feed.

"About April following, your tealfe and carraway will want a good hoeing, done deep and well, and another hoeing about the beginning of June; thefe two hoeings are to be done at 7s. per acre each. The carraway will be fit to cut the beginning of July, and muft be thrufhed in the fame manner as coriander. The tealfe will not be ready till the middle of September, when thofe heads which are beginning to turn brown are cut off the ftem, with a ftalk a foot long, and 25 of them are tied in a bunch, 24 of the bunches are fixed on a fmall ftick, and called a row, 240 of which make a load in bulk, equal to a ton of hay from the meadow. The work of cutting and bunching the tealfe can only be done by thofe who have been well acquainted with and learned the mode; it muft be looked over, and the heads cut at feveral times, as they ripen. The tealfe and carraway are perennial, and fome of the plants do not perfect their feeds till the third or fourth year, though in general you have a crop the fecond year, and the feeds that are fcattered from the crop the fecond year often come to perfection the fourth year; he has known inftances of this being continued for feven years. The ufual way is to plough direftly after the crop is gathered the third year, and fow wheat, of which commonly a good crop is obtained, the land being in fine order, from the turf being rotted, and the repeated hoeings. See TEASEL.

"The firft appearance of tealfe, after it is fown, is much like a lettuce, coriander like a parifup, and carraway like carrots. The produce of carraway has often been, on the very rich old lays in the hundreds or low lands of the county, 20 *cwt.* per acre. There is always a demand for it in the London market, fometimes fo low as 12s. per *cwt.* and it has been up to 50s. per *cwt.*; moftly on an average at 21s.

5 B

Cori-

Coriander is also very productive on good land, often producing 24 *cwt.* per acre, sometimes not more than 6 or 7 *cwt.*, the price being sometimes 30s. per *Cwt.*, often 10s. as 10s., average in general about 16s., London market. Teasel is used only amongst the manufacturers of ordinary cloth and baizes, to raise the wool on them that covers the thread. As we have a large business of that kind carried on in this part of the country, we have a regular demand for teasel; the average price 12l. per load, the produce sometimes a load per acre, often not more than one-fourth of a load. The land can only be filled with plants, and the more one kind predominates, the less must reasonably be expected of the crop that succeeds. It is mostly sown on land so strong, as to require being a little exhausted to bring it fit for bearing corn. In most of the land sown with carraway and coriander the teasel is omitted, as being a more troublesome and uncertain crop, and generally the product of carraway is much greater without than with teasel.

"In many parts of this district there are gardening-farmers who travel about and contract for breaking up old grass-land, in order to grow carraway. The farmer ploughs to a great depth, and does whatever horse-work is wanted, finding the land also at a rent of 15s. per acre on some farms, and the produce is divided. It is reckoned a more profitable way of breaking up grass than for common crops; but, much depending on a variable price, is reckoned hazardous; though the carraway men have intelligence enough among themselves to aim at not overstocking the market.

"It is observed, that the coriander is always the first crop, the carraway being sown with it as clover is with barley to succeed it; and it is left from three to six years, according to the success; great hoeing is bestowed on it to keep the land clean: when it returns to the farmer, if there be twine he follows, if not, he sows wheat. With some farmers their half receipt from 30 acres has varied from 180l. to 300l. a year."

CORIANDER, in Botany. See CORIANDRUM.

CORIANDRUM, (κοριανδρον, or κοριαννον; Theophras. Dioscor. Coriandrum; Plin. Supposed to be so called from κορις, a bug; the bruised leaves smelling like that offensive insect.) TOURN. Cl. 7. § 3. gen. 2. Linn. gen. 356. Schreb. 488. Willd. 552. Gært. 109. Juss. 220. Vent. 3. 16. Class and order, *pentandria monogynia*. Nat. Ord. *Umbellate*, Linn. *Umbelliferae*, Juss.

Gen. Ch. *General umbel* flat. *Partial umbel* generally with abortive flowers in the centre. *General involucre* one-leaved, or none. *Partial involucre* going half way round; or none. *Calyx* proper five-toothed, standing out. *Cor.* Petals five, equal or unequal, emarginate, inflexed. *Stam.* Filaments five; anthers roundish. *Pist.* Germ inferior; styles two, distant; stigmas capitate. *Peric.* none. Fruit spherical, dividing into two. *Seeds* two, concave.

Eff. Ch. Petals inflexed, emarginate. *General involucre* one-leaved or none; partial, going half way round, or none. Fruit spherical, or scrotiform.

Sp. 1. *C. sativum*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Gært. tab. 22. fig. 2. Lam. Illust. Pl. 196. fig. 1. Woodv. Med. Bot. tab. 181. Eng. Bot. Pl. 67. Bauh. Pin. "Fruit globalar." *Root* annual, strong-scented. *Stem* about a foot and half high, erect, smooth, slightly striated, cylindrical, generally branched and divaricated. *Leaves* compound; lower ones pinnated; leaflets roundish-wedge-shaped, lobed and toothed; upper ones twice-ternate; segments linear. *General and partial umbels* many-rayed. *General involucre* of one linear leaf; *partial involucre* from three to five-leaved, going half way

round; leaves lanceolate. *Flowers* white, tinged with red; proper calyx very conspicuous; outer petals of the outer flowers large, forming a kind of ray round the umbel. *Fruit* obsoletely ribbed, aromatic. A native of the southern parts of Europe and of China; naturalized in Suffolk about Ipswich, and in some parts of Essex. Every part of the plant, when fresh, has a very offensive smell; but the dried seeds have a tolerably grateful smell, with a moderately warm and slightly pungent taste. They are stomachic and carminative, and are commonly sold by the confectioners enrobed with sugar. When taken in large quantities they are said to be deleterious, but Dr. Withering asserts that he has known six drams of them taken at once, without any remarkable effect. They give out their virtue totally to rectified spirit, but only partially to water. The Edinburgh college use them in the bitter infusion and the preparations of sena, to cover the disagreeable taste, and prevent the gripping tendency of those medicines. 2. *C. testiculatum*. Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Ill. Pl. 196. fig. 2. Willd. 2. (*C. minus testiculatum*; Bauh. Pin. 158. Pluk. alm. 120. tab. 169. fig. 2.) β. *C. sylvestre foetidissimum*; Bauh. Pin. 158. "Fruit didymous." *Root* annual. *Stem* scarcely a foot and half high, angular, branched. *Leaves* once or twice pinnated; leaflets deeply cut into narrow acute segments. *Umbels* small, often simple. *Partial involucre* none, outer petals not forming a ray. *Seeds* separating below, almost cohering above, a little wrinkled, but not striated. A native of the south of Europe.

Propagation and Culture.—Both species are raised from seeds sown in the autumn, in an open situation, on a bed of good fresh earth. When the plants are come up, nothing farther is necessary but to hoe them to about four inches distance every way, and to keep them clear from weeds. The first species is cultivated in Essex, mingled with carum carui, or caraway; both solely for the sake of the seeds. See CARUM CARUI. To prevent the largest and best part of the seed being lost, women and children are employed to cut every plant separately, and to put it immediately into a cloth, in which it is carried to some convenient part of the field, and there threshed upon a sail-cloth. The produce of an acre is from ten to fourteen hundred weight. See CORIANDER, in *Agriculture*.

CORIARIA, (so called from its use in tanning hides.) Lin. Gen. 1129. Schreb. 1540. Juss. 441. Vent. 43. Redoul; Enc. Class and order, *diacis decandria* (Polygamia; Gowan.) Nat. Ord. undetermined.

Gen. Ch. *Flowers* dioicous, sometimes monoicous or polygamous. *Male*. Cal. Perianth very short, five-leaved; leaves somewhat egg-shaped, concave. *Cor.* Petals (Gland. Juss.) five, very small, placed on a disk on the outside of the filaments. *Stam.* Filaments ten, very short; anthers erect, oblong, with two cells separate at the base. *Female* Cal. like the male. *Cor.* Petals, as in the males, converging. *Stam.* as in the males, but abortive. *Pist.* Germs five, compressed, united; styles long, bristle-shaped; stigmas simple. *Peric.* none. *Seeds* five, kidney-shaped, covered by the succulent petals which take the appearance of a berry; Linn. (*Peric.* Capsules five, connivent, small, one-seeded, not delincent, covered on the side by the enlarged and thickened glands, making the fruit look like half a berry; Juss.)

Eff. Ch. Calyx five-leaved; corolla five-petalled; anthers ten, almost sessile. Styles five. Seeds five, covered by the succulent petals.

Sp. 1. *C. myrsifolia*. Linn. Sp. Pl. 1. Mart. 1. Poir. 1.

Lam. Ill. Pl. 822. (*Rhus myrtifolia monspeliaca*; Bauh. Pin. p. 414.) "Leaves almost sessile, ovate-oblong, flowers in racemes." A shrub four or five feet high. *Stems* smooth, cinereous; branches opposite, loose, flexible; young ones quadrangular. *Leaves* opposite, entire, smooth, acute, green on both sides, nerved, smaller on the flowering branches. *Racemes* simple, terminating the young lateral branches; bractes foliary, small, awl-shaped; peduncles twice the length of the bractes; calyx and corolla pale green; flowers sometimes monoicous, and sometimes hermaphrodite. A native of the south of France, and of Africa about mount Atlas. 2. *C. ruscifolia*. Linn. Sp. Pl. 2. Mart. 2. Poir. 2. Feuill. Peruv. 3. 17. tab. 12. "Leaves cordate egg-shaped, sessile." A tree from twenty to twenty-five feet high. *Trunk* the thickness of a man, branched from the bottom. *Leaves* an inch and half long, an inch broad. *Leaves* opposite, ternate on the young branches, almost embracing the stem. *Flowers* as in the preceding species. A native of Chili. 3. *C. microphylla*. Poir. 3. "Leaves very small, egg-shaped, obtuse, nearly sessile; flowers spiked, lateral." A shrub. *Stems* quadrangular; branches numerous, crowded, filiform, flexible, short. *Leaves* four or five lines long, three broad, opposite, firm, entire, slightly heart-shaped, green above, paler underneath, nerved. *Flowers* on small filiform peduncles, with solitary acute bractes. A native of Peru. 4. *C. sarmatosa*. Mart. 3. Poir. 4. Forst. Flor. Aust. 7. "Leaves cordate egg-shaped, on short petioles; stem procumbent, diffuse. A native of New Zealand.

CORIARIO. See ARTO LEONE.

CORIBRASSUS, in *Ancient Geography*, an episcopal town of Asia, in Pamphylia.

CORICANI. See CORIANTI.

CORICÆ *insule*, small islands between the island of Crete and the Peloponnesus. Pliny.

CORICEON *promontorium*, a promontory S. of the peninsula of Ionia, which advances towards the isle of Chios, in which is found Erythræ.

CORICEUM, in *Antiquity*, the undressing-room belonging to the GYMNASIUM.

CORIDERVA, in *Geography*, a rock situated about 2½ miles S.W. from Ila, one of the western islands of Scotland.

CORIDIS FOLIO, in *Botany*; Herm. See LINEARIA.

CORIDOR, is used, in *Architecture*, for a gallery, or long aisle, around a building leading to several chambers at a distance from each other, sometimes wholly inclosed, and sometimes open on one side.

CORIDOR, or *Corridor*, in *Fortification*, the same as the *covert-way*, which see.

CORIDORGIS, in *Ancient Geography*, a town of Germany, situated on the Danube, between Medoitanium and Phurgifates. Ptolemy.

CORIENTES, in *Geography*, a cape of Mexico, or New Spain, on the N. Pacific ocean. N. lat. 20° 50'. W. long. 105° 30'.—Also, a cape of south America, on the coast of Peru, in the Pacific ocean. N. lat. 4° 50'.—Also, a cape of Africa, on the eastern coast in the Indian sea. S. lat. 24° 15'. E. long. 33° 31'.—Also, the name of the south-westernmost point of the island of Cuba. N. lat. 21° 38'. W. long. 84° 30'.

CORIENTES, *Los*. See CORRIENTES.

CORILLA, in *Biography*, the Arcadian name given to the celebrated *Improvvisatrice*, Maria Maddalena Morelli

Fernandez, of Pistoia; honoured at Rome with the laurel crown, 16 Feb. 1776, in the same manner as Petrarca, Tasso, and Peretto, had been before. An account of this transaction, beautifully printed at Parma, by Budoni, in 1779, contains her diploma and all the discourses, poems, sonnets, &c. written on the occasion, with the examination which she underwent, concerning her knowledge of the most important subjects upon which she was required to *Improvvisare*, or treat extemporaneously, in verse publicly at the Campidoglio in Rome. The Italian title of this narrative is, "Atti della solenne coronazione fatta in Campidoglio della insigne poetessa D-na. Maria Maddalena Morelli Fernandez Pistoiese, Tragli Arcadi Corilla Olimpica." Twelve members of the Arcadian academy were selected out of 30, publicly to examine this new edition of a *Tenth Muse*, which has been so often dedicated to ladies of poetical and literary talents. Three several days were allotted for this public exhibition of poetical powers on the following subjects: sacred history, revealed religion, moral philosophy, natural history, metaphysics, epic poetry, legislation, eloquence, mythology, fine arts, and pastoral poetry.

In the list of examiners there appear a prince, an archbishop, three monsignors, the pope's physician, abati, avvocati, all of high rank in literature and criticism. These, severally, gave her subjects, which, besides a readiness at versification in all the measures of Italian poetry, required science, reading, and knowledge of every kind. In all these severe trials, she acquitted herself to the satisfaction and astonishment of all the principal personages, clergy, literati, and foreigners then resident at Rome; among the latter was our sovereign's brother, the duke of Gloucester.

Near 50 sonnets by different poets, with odes, canzoni, terze rime, ottave, canzonette, &c. produced on the subject of this event, are inserted at the end of this narrative and description of the order and ceremonials of this splendid, honourable, and enthusiastic homage, paid to poetry, classical taste, talents, literature, and the fine arts.

This renowned lady merits some notice as a musician, as well as poetess; as she sung her own verses to simple tunes with a sweet voice, and in good taste. She likewise played on the violin; but at Florence, where we saw and heard her, in 1770, she was accompanied on the violin by the celebrated and worthy pupil of Tartini, Nardini. At this time she was not more than 30; and had a pleasing, dignified, and intelligent countenance. See in the music pl. No. the two airs to which she sung at Florence, extempore verses on subjects given.

CORIM. See HASTA *militaris*.

CORINÆUM, in *Ancient Geography*, a promontory of Asia Minor in Ionia; part of mount Mimas.

CORINDIUR, a town of India, on this side of the Ganges. Ptolemy.

CORINDUM, in *Botany*. TOURN. See CARDIOSPERMUM.

CORINE, in *Zoology*, the ANTILOPE *Corinna* of Gmelin, has very slender, short, smooth, straightish horns, bent slightly into the form of a lyre; the upper parts of the body are yellowish-tawny, the under parts white, with a dusky stripe along the sides, and two lines on each side of the face, the upper one white and the other black. This animal, which inhabits Senegal, is less than a roe; the neck, body, and flanks are of a tawny-yellow colour, the insides of the thighs and belly are white, and a dark line, along the sides, divides the two colours; the knees are tufted with hair;

the ears are large; the horns are about six inches long, almost upright, bending a little outwards in the middle, and somewhat approaching at the tips, the lower parts being furrowed with circular wrinkles. This species resembles the kevel in colour, size, swiftness, and mulky odour; but differs very much from it in the figure of the horns; though Gmelin, after Pallas, suspects that it is the female of that species.

CORINEA, in *Ancient Geography*, a country of Asia, in Armenia Major. Ptolemy places it between the sources of the Tigris and Euphrates, and to the south of Thospitide.

CORINEUM, a town situated on the southern coast of the isle of Cyprus, between Citium and Salamis. It was episcopal, and called by Hierocles, in his *Notitia*, Coren.

CORINIUM, a town of Albion, belonging to the Dobuni, and allowed to be Cirencester in Gloucestershire.—Also, an ancient town of Illyria on the Adriatic gulf; supposed to be the present *Cori*.

CORINTH, CORINTHUS, a city of Greece in the Peloponnesus, upon a gulf of the same name. This city was the capital of a small state, situate on the isthmus of Corinth, having the bay of that name, now called "Golfo di Lepanto," and the isthmus or neck of land, which joins Peloponnesus to the continent, on the north; Sicyon, on the west; the gulf of Saron, on the east; and the kingdom of Argos, on the south. Its utmost extent from east to west was about half a degree, and from north to south, about half that space. It had no rivers of any note; but abounded with mountains, the chief of which was called "Acrocorinthum," at the foot of which the city of Corinth was built, and on the top stood the citadel. It was also famed for the fountain Pyrene, sacred to the muses; though others place this fountain on the hill Helicon, and most others again, on that of Paranaüs.

Corinth is said to have been founded by Sisyphus, the son of Æolus, and grandfather of Ulysses, about the year of the world 2490, as some say, or according to others 2500; B. C. 1507, and about six years before Deucalion's flood, B. C. 1503. The ancient name of this city is said to have been Ephyra, which it took from a nymph of that name, reported to have been the daughter of Oceanus and Tethys, or, according to others, of Myrmex, the wife of Epimetheus, the son of Japetus, and brother of Prometheus. At this time it was but an inconsiderable town, though it rose afterwards to be the metropolis of the kingdom, and one of the noblest and most opulent cities in Greece.

Corinth, the new name of this city, has been variously derived; some have deduced it from the Greek *κορῖνος*, *fecundity* or *abundance*, implying the opulence of the place; but the ancient inhabitants trace the origin of the appellation to Corinthus, the son, as some have said, of Jupiter, or, according to others, of Marathon, and brother of Sicyon. However, most authors ascribe the name, as well as the building, or rebuilding of it, to Corinthus, the son of Pelops. Corinth was also called "Heliopolis," or the city of the Sun, probably, as Gronovius conjectures, from the ruggedness and barrenness of its situation and territory, for such, as Strabo tells us, it really was.

Corinth, besides the citadel already mentioned, had two port-towns, *viz.* Lecheum situate on the bay of Corinth, and Cenchrea on that of Samos, and connected with the city by a double wall of about 12 stadia or half a league in length; distant from the city 70 stadia or about 3 leagues. These were the only two havens; and, indeed, the only two cities of any note, next to Corinth, that belonged to this territory. These were so well situated for naval commerce,

and so near the metropolis, that they made ample compensation for the barrenness of the soil. These two naval roads which opened a way into the Ionian and Ægean seas, might easily have gained for them a superiority, if not a command, over all Greece, if this advantageous situation had not inclined them more to commerce than war. For their citadel being almost impregnable by nature, and commanding both seas, they could easily cut off all communication betwixt one half of Greece and the other; so that it was not without reason called one of the fetters of Greece. But being led by their genius and disposition to improve their advantages more for navigation and commerce than for martial exploits, they became in process of time so exceedingly opulent, that the little influence they had over the other states was owing rather to their wealth than their valour. By the gradual increase of their opulence, partly from commerce, and partly from the influx of strangers that flocked hither from Europe and Asia, their city became at length one of the most considerable and splendid in Greece; being adorned with a great variety of sumptuous buildings, such as temples, palaces, theatres, porticos, cenotaphs, baths, and other edifices; all enriched with a beautiful kind of columns, capitals, and bases, from which the CORINTHIAN order took its name, together with numberless statues executed by the most famous artists. Such indeed were its wealth, magnificence, and excellent situation, that it was thought by the Romans equally worthy of empire with Carthage and Capua. It would carry us far beyond our limits minutely to describe even the principal edifices that adorned this famous city; but in order to enable the reader to form some judgment of its extent and magnificence, we shall recite some few particulars, referring to Pausanias "in Cor." for a more ample account. We have already observed that this city was seated at the foot of a high hill, on which stood the citadel. To the south it was defended by the hill itself, which is there extremely steep. Very strong and lofty ramparts protected it on the other sides. Its circumference was 40 stadia, or about 1½ league; but as the walls extended along the sides of the hill, and surrounded the citadel, it might be reckoned upon the whole at 85 stadia or near 3½ leagues. The road to the citadel had so many windings, that the summit could not be attained, without passing through an interval of 30 stadia. The situation of the citadel and its ramparts rendered it so strong, that it could only be taken by treachery or famine. At the entrance was the temple of Venus, with the statue of the goddess clad in brilliant armour, and accompanied by another of the god of love, and a third of the sun, who was adored in this place before the worship of Venus was introduced. In the way to the citadel was a chapel dedicated to the Egyptian Isis, and another to the Pelagian Isis. Two others were dedicated, one to Serapis of Canopus, and the other to another Serapis. The spring Pyrene, where Bellerophon is said to have found the horse Pegasus, was ornamented with sumptuous embellishments, consisting of several caves in form of grottoes, all covered with white marble, from which the cold and limpid water of that fountain fell into a large basin. The forum was decorated with temples and statues; the theatre was a grand and beautiful edifice of white marble, in which the assembly of the people deliberated on affairs of state, and the musical contests and other entertainments were exhibited at the festivals. The stadium, or course, was also constructed of white marble. The temple of Neptune was a grand building; its avenue was lined on one side with the statues of all those athletes who had won the prize at the ISTHMIAN games (which see), and on the

the other with stately pines planted in regular rows. The temple itself, though not very spacious, was adorned with a multitude of brazen Tritons, or sea-gods. Here were also the chariots of Neptune and of his wife Amphitrite, drawn by horses covered all over with gold, except their hoofs, which were of ivory. The two deities were carved in a standing posture, and Neptune had young Palemon riding on a dolphin by his side. The bases of the chariots were likewise adorned with curious basso-relievos, and the temple itself with a multitude of other embellishments. Diana of Ephesus was also exhibited in a public place together with two gilt wooden statues of Bacchus. Fortune also had a temple, and her statue was made of Persian marble; and near this temple was that which was dedicated to the mother of all the gods. There were several other statues; among which we may select an Apollo, surnamed Clarus, in bronze; a Venus by Hermogenes of Cythera, two Mercuries, three statues of Jupiter, a Minerva in bronze, mounted on a pedestal, the basso-relievos of which represented the Muses. The city of Corinth abounded with public baths, the number of which was augmented by the emperor Adrian; but those of Neptune, constructed by Eurycles of Sparta, were the most famous. The temple of Venus at Corinth is said by Strabo to have been so rich, that it maintained more than 1000 courtezans, who were devoted to her service, and which drew hither a multitude of strangers. The festivals of the Aphrodisia were celebrated in this city by harlots, as we learn from Athenæus (Deipnos. l. xiii. c. 6.); who also informs us, that they who supplicated the goddess Venus, promised to dedicate some females to her rites, and they obtained what they requested.

At first the commerce of Greece was carried on by land, and entered or left the Peloponnesus by the road of the isthmus. The Corinthians took occasion to impose a duty on the transit of all commodities, and derived from this duty a certain degree of opulence. In order to avoid the dangers of the sea, proverbially stormy, between the isle of Crete and Cape Malea in Laconia, merchants chose to transport their goods to the seas terminating at the isthmus. Thus, the merchandize of Italy, Sicily, and the western nations, was landed at the harbour of Lecheum; and that from the islands of the Ægean sea, the coasts of Asia Minor, and of the Phœnicians, at the port of Cenchrea. In process of time, commodities were conveyed by land from one harbour to the other, and means contrived for transporting even the vessels. Corinth, having thus become the mart of Asia and Europe, continued to collect duties on foreign merchandize, covered the sea with ships, and formed a navy to protect her commerce. Her industry was excited and encouraged by success; she built ships of a new form, and first produced (triremes) galleys, with three branches of oars. Her naval force procured her respect; all nations poured their productions into her emporium. The sea was covered with reams of paper, and sailcloth, brought from Egypt, ivory from Libya, the leather of Cyrene, incense from Syria, Phœnician dates, Carthaginian carpets, corn and cheese from Syracuse, pears and apples from Eubœa, Phrygian and Thessalian slaves, together with a multitude of other articles which were continually brought into the ports of Greece, and particularly into those of Corinth. The games of the isthmus also drew together to this city a prodigious number of spectators. These resources increasing the wealth of the state, workmen of every kind were protected, and exerted themselves with new emulation.

Corinth abounded not only with warehouses, but with

manufactures of her own. Among other articles, the inhabitants made coverlets for beds, which were much sought after by foreign countries; she also collected a great number of the pictures and statues of the best masters. Her manufactures of brass and earthen ware were held in great estimation. Although Corinth possessed no copper-mines, her workmen contrived, by mixing that which she received from foreign countries, with a small quantity of gold and silver, to compose a metal extremely brilliant, and almost proof against rust. (See *Æs.*) Of this they made cuirasses, helmets, small figures, cups, and vessels; no less esteemed for the workmanship than for the material, which were enriched with foliage and other chased ornaments. Those on their pottery were equally beautiful.

The women of Corinth were admired for their beauty, and the men were distinguished by their love of gain, and of licentious pleasure. Venus was their principal deity; and the courtezans consecrated to her service, attended, in the time of public calamities and imminent danger, at the sacrifices, and walked in procession with the other citizens, singing sacred hymns. The Corinthians, indeed, were so much devoted to traffic and luxury, that they very much neglected the encouragement of the liberal arts and sciences, and also of that thirst for glory and conquest, so much valued by their neighbours. Nevertheless, they cultivated a good discipline, both in peace and in war; and this their opulence, with its effects on their disposition and conduct, rendered absolutely necessary. Though they seldom, if ever, engaged in war, with a view of enlarging, but chiefly for the purpose of defending their territories, protecting some neighbouring state, or maintaining the liberty of Greece; yet this small kingdom furnished many brave and experienced officers to the other Grecian cities, who were frequently preferred to their own generals. The Corinthians were, in reality, the greatest assertors of liberty; and though they remained for some centuries under a monarchical government, yet they always manifested an aversion from tyranny, and an inclination to assist those who were oppressed.

We have already observed, that Sisyphus was supposed to be the founder of the Corinthian monarchy; which is said to have continued in the lineal succession of his family, for seven or eight generations; till it became extinct, or till it was expelled the kingdom by Alæthes, one of the Heraclidæ, about thirty years subsequent to their return, about B. C. 1074, in whose family the kingdom of Corinth remained for a long interval, between three and four hundred years. Royalty was at length abolished, and the sovereign power was intrusted to 200 citizens, one of whom presided over the rest under the appellation of "Prytanis," about the year B. C. 779. About the year 659 B. C., Cyprius terminated this aristocracy, by usurping the sole government, and restored the monarchy, which he retained for about thirty years. He was succeeded by his son Periander, who held the government for 44 years. Having banished his son Lycophron to the island of Corcyra, the capital of which had been built by the Corinthians, in the year B. C. 703, Periander was reduced to the necessity of recalling him, but his proposals were received by the exiled son with indignation. He finally, however, resolved to abdicate the crown, and confine himself to Corcyra, whilst his son, quitting that island, assumed the reins of government at Corinth. But the Corcyreans, dreading the arrival of Periander, defeated this project by putting Lycophron to death. Tormented by impotent rage, Periander died at 80 years of age, after a reign of 44 years. As soon as he had closed his eyes, the Corinthians destroyed every monument, and even the flight-

est traces of tyranny. His successor reigned only three years; and after this short interval, the Corinthians, joining their troops to those of Sparta, established a government which subsisted for a long period, and which approached nearer to an oligarchy than a democracy, as no affairs of importance were submitted to the arbitrary decision of the multitude. In the year 439 B. C. a war commenced between Corinth and Corcyra; and in the year 435 B. C. the Corinthians were defeated at sea by the Corcyreans, aided by the Athenians. And this contest between Corinth and Corcyra, brought on the Peloponnesian war. In the year 395 B. C. the Athenians, Thebans, Argives, and Corinthians, formed an alliance against the Lacedæmonians, and this gave occasion to the Corinthian war. For an account of the assistance which Corinth afforded to the Syracusans, see the article TIMOLEON. By the peace of Antalcidas B. C. 387, the Corinthians were obliged to withdraw their garrison from Argos, which then became free and independent. When Alexander entered Babylon, the Corinthians sent ambassadors to offer him the freedom of their city; and after first treating the offer with contempt, he was afterwards induced to accept it with joy, when he was told, that this honour had been conferred only on Hercules. When Aratus of Sicyon, prætor of the Achæans, had taken possession of the citadel of Corinth, B. C. 243, the Corinthians were prevailed upon to enter into the Achæan league; and about the same time they issued a decree, that the Romans should be admitted to celebrate the Isthmian games, with the same privileges as the Greeks. At a subsequent period, B. C. 146, they insulted the Roman deputies, commissioned by Metellus to appease the troubles occasioned in Peloponnesus by the Achæan league; but upon the arrival of the consul Mummius, Corinth was besieged; and after the defeat at the battle of Leucopetra, the consul entered the city, and abandoned it to be plundered by the soldiers. All the men who were left in it were put to the sword, and the women and slaves sold; and after the statues, paintings, and richest moveables, were removed, in order to their being carried to Rome, the houses were set on fire, and the whole city was consumed. From that time the Corinthian brass, which was in reputation long before, became yet more famous; for it is pretended, that the gold, silver, and brass, which were melted, and which ran together in this conflagration, formed a new and precious metal. The walls were afterwards demolished, and raised to their former foundations. This dreadful calamity was inflicted by order of the senate, for punishing the insolence of the Corinthians, who had violated the law of nations, in their treatment of the ambassadors sent to them by Rome. The booty taken at Corinth was sold, and it produced a considerable sum; no part of which Mummius reserved for himself, but consigned the whole to Rome, for the purpose of being laid out in adorning the city. Amongst the paintings, it is said there was a piece drawn by Apollides, the most celebrated painter in Greece, which represented Bacchus; the beauty of which was not known to the Romans, for Polybius had the mortification to see it used by the soldiers as a table, upon which they played at dice. In the sale of the booty, it was adjudged to Attalus for 600,000 sesterces, or about 3625*l.* sterling. Many other statues and paintings of the most excellent masters, preserved in the wreck of Corinth, were transported to Rome. Upon Polybius's return into Peloponnesus, he had the painful and mortifying sight of the destruction and burning of Corinth, and the affliction of finding his country reduced into a province of the Roman empire. Corinth remained in a ruined and desolate state for

many years. At length Cæsar, after he had subdued Africa, and whilst his fleet lay at anchor at Utica, gave orders for rebuilding Carthage; and soon after his return to Italy, he likewise caused Corinth to be rebuilt. Strabo and Plutarch agree in ascribing the rebuilding of Carthage and Corinth to Julius Cæsar; and Plutarch remarks this singular circumstance with regard to these two cities, that as they were taken and destroyed in the same year, they were rebuilt and reoccupied at the same time. Under the eastern emperors, Corinth was the see of an archbishop, subject to the patriarch of Constantinople. Roger, king of Naples, obtained possession of it under the empire of Emanuel. It had afterwards its own sovereigns, who ceded it to the Venetians, from whom it was taken by Mahomet II., in the year 1458. The Venetians retook it in 1687, and held it till the year 1715, when they lost it to the Turks, in whose possession it has remained ever since.

CORINTH, in *Modern Geography*, *Corinto*, or *Coranto*, a town of Greece, in the Morea, situated near a narrow isthmus of the same name, which joins the Morea to the rest of Greece, between the gulf of Lepanto and that of Engia. It was formerly, as we have shewn in the preceding article, a very rich and powerful city. At present it contains about 13 or 14 hundred inhabitants; each house has a garden, planted with orange and other fruit trees. It is 46 miles E. of Athens or Atini, and 342 S.W. of Constantinople. N. lat. 38°. E. long. 22° 50'.

CORINTH, a township of America, in Orange county, in Vermont, W. of Bradford, containing 578 inhabitants.

CORINTH, *Isthmus of*, in *Ancient Geography*, the neck of land which joins Peloponnesus (the present Morea) to the upper part of Greece, and which is computed to be about six miles wide. As this forms an obstacle to the passage from the Ionian to the Ægean sea, it has been frequently proposed to dig a canal through it, forming a junction between these seas, and thus preventing the circumnavigation of the Peloponnesus. Pliny, who mentions this project, and who, without being superstitious, represents it as a rash attempt, alleges the unhappy end of four princes who set about it, *viz.* Demetrius of Phalera, Julius Cæsar, Caligula, and Nero. When Nero undertook this business, superstition discouraged the attempt; and it was said, that, at the first stroke into the earth, blood gushed out, that groans issued from the subterranean caverns, and that phantoms had appeared to the inhabitants of those parts. Nero, however, despised these idle tales, and determined to proceed. He encouraged the Pretorian soldiers in their work by personal assistance, and flattering hopes of success. The number of workmen whom he collected from all parts, and from all the gaols in the empire, was immense; and Vespasian, as Josephus informs us, furnished him with 6000 Jews, selected from a much greater number whom he had imprisoned. The work was begun on the side next the Ionian sea, at the port called Lecheum, and in 75 days an interval of four stadia was dug; and this was about the tenth part of the breadth of the isthmus. On the last of these days, Nero sent an order to discontinue the work. Two reasons were alleged for this change of opinion and purpose. By some it was said, that certain Egyptian mathematicians, whom the emperor had consulted, having taken the level of the two seas, east and west of Peloponnesus, found the waters of the Ionian higher than those of the Ægean sea; so that there was ground for apprehending that, if a communication were opened by a canal across the isthmus, the island of Ægina, and the low lands on the side of the Ægean sea, would be overflowed and destroyed. But this allegation is a mere pretence;

pretence; because these two seas do actually communicate fourth of Peloponnesus, and therefore their waters must be on a level. Considering the pertinacious temper and extreme vanity of Nero, it is very probable that he would have persecuted, notwithstanding every objection of mathematicians, if he had not been alarmed by reports from Italy, where disturbances arose in consequence of his absence, and which made it necessary for him to return, so that he abandoned his enterprise. The news of a conspiracy at Rome terrified him exceedingly, and hastened his return. For an account of the games celebrated on this illustrious, see *ISTHMIAN Games*.

CORINTH, Gulf of, now the gulf of Lepanto, commencing, as some of the ancients have said, at the isles called *Oxie*, having to the N. the mouth of the river *Achelous* and the *Echinades*, and to the S. the promontory called "*Araxum Promontorium*;" but, according to others, the gulf of Corinth denotes that portion of water forming a strait to the S. by the point called "*Rhium*," and to the N. by that called "*Anti-Rhium*." This gulf extends eastward as far as *Bœotia*. In the interior part, it forms two small gulfs; the one, advancing to the N., between parts of the *Loeride* and *Phocide* territories, called, after the town of *Croica* to the N.E., "*Criffæus Sinus*;" the other was formed by the most eastern part of the gulf, and was called "*Alcyonium Mare*."

CORINTHIAN BRASS. See *Æs Corinthium*.

CORINTHIAN Order, in *Architecture*. This is generally enumerated as the third of the Grecian orders, and forms the ultimate term of richness and elegance proper to that style of architecture.

The Corinthian order is principally distinguished by its capital, which may be described as consisting of a bell-shaped body, covered with an abacus of a quadrilateral plan, with convex sides; two tiers of leaves surround the lower part of the capital, between which little stalks or cauliculi rise up to the corners of the abacus, and those bending over form four volutes, and other volutes or ornaments occupy the centre of each side. Considerable varieties occur in ancient buildings; but this may be taken as a general analysis, which will include all Corinthian capitals.

The account, given by Vitruvius, of the origin of this order, has been already detailed in the article *GROÏL ARCHITECTURE*. It must, however, be observed, that the Egyptian buildings present many capitals of a bell-form, decorated with leaves, which bear a sufficient resemblance to the Corinthian capital, to justify a suspicion that this composition may have been derived from the imitation of an Egyptian model.

Callimachus, to whom the invention of the Corinthian capital is attributed, is supposed to have lived about the 6th Olympiad, or 540 years before the Christian æra, which would give a very high antiquity to this order; but the first distinct account we have been able to find of its introduction in any building, is the following from *Pausanias*, l. viii. The ancient temple of *Minerva* at *Tegea*, in *Arcadia*, having been destroyed, a second edifice was erected, under the direction of *Scopas*, far exceeding in splendour and magnificence every building of the kind in the *Peloponnesus*. In this structure the three orders of architecture were employed. Within the enclosure were galleries supported by Doric and Corinthian columns, surrounding the hypæthæos or open area of the cella; and on the outside of the temple were porticoes of the Ionic order. This building may be dated in the fourth century B. C. To judge from the extant remains of this order in Greece, which are comparatively neither numerous nor important, we should

say, that it had never obtained a degree of favour equal to the other two orders; but in the buildings of Rome, and in works in other countries under Roman influence and direction, quite the contrary is the case; and it is to these sources that we are to look for the best examples of the Corinthian order.

Vitruvius, l. 3. c. 1. in treating of this order, observes that Corinthian columns, excepting in their capitals, have their symmetry the same as the Ionic; but the height of the capital renders them proportionally taller, and more graceful: for the height of the Ionic capital is only a third part of the thickness of the column, whereas that of the Corinthian is the whole diameter of the shaft. The other members, which are placed above the column, are taken from the Doric or Ionic orders; for the Corinthian has no entablature peculiar to itself, but has either triglyphs, mutules in the cornice, and guttae in the cymatium, as in the Doric manner; or else, according to the Ionic disposition, the frieze is ornamented, and dentils are placed in the cornice: so that by these two orders, joined with a different capital, a third order is produced.

The preceding observation of Vitruvius, that the Doric entablature was sometimes applied to Corinthian columns, is in itself very extraordinary, and is not supported by any antique examples; but the remark respecting the Ionic entablature is found to be strictly true in a number of instances, as we shall proceed to shew by the description of the following examples:

A temple at *Jackly*, near *Mylasa*. In this building there is a cornice, with dentils, a swelled frieze, an architrave, with three plain facias, and an Attic base.

The arch of *Adrian* at *Athens*. A cornice, with dentils, a plain frieze, an architrave, with two plain facias, and an Attic base.

A building called the *Incantada* at *Salonica*, the ancient *Thessalonica*. A cornice, with dentils, a swelled frieze, ornamented with flutings, an architrave, with three plain facias, an Attic base.

The temple of *Vesta* at *Tivoli*. A plain cornice, with uncut dentil-band, an ornamented frieze, an architrave, with two plain facias, and an Attic base.

The temple of *Antoninus* and *Faustina* at *Rome*. A plain cornice, with uncut dentil-band, ornamented frieze, an architrave of two facias, divided by an *Aitragal*, and an Attic base.

The portico of *Septimius Severus* at *Rome*. A plain cornice, with a small uncut dentil-band, a plain frieze, an architrave of three facias, divided by mouldings.

In all these instances, the entablature and base are entirely similar to those commonly observed in the Ionic order, from which those Corinthian examples only differ in the form of the capital; but in the examples which remain to be cited, it will appear that the Romans attempted to give the Corinthian order a more distinct character, by appropriating to it a peculiar entablature and base, and thus made a complete order of what might be previously regarded, as Vitruvius appears to consider it, in the light of a composite invention.

The Portico of the *Pantheon*. A cornice, with mouldings, and an uncut dentil-band, a plain frieze, an architrave of two facias, divided by mouldings, and a Corinthian base.

The temple of *Peace* at *Rome*. A cornice, with mouldings and dentils, a plain frieze, and an architrave of three facias, divided by mouldings.

The three columns of the *Campo Vaccino*, supposed to belong

belong to a temple of Jupiter Stator. A cornice, with modillions and dentils, a straight frieze, an architrave of three facias, divided by mouldings, and a Corinthian base.

The temple of Jupiter Tonans at Rome. A cornice, with modillions and dentils, a straight frieze, and an architrave of three facias, divided by mouldings.

The arch of Constantine. A cornice, with modillions and dentils, a plain frieze, an architrave of three plain facias, and an Attic base.

A temple at Ephesus, supposed by Chandler to be the temple erected, by permission of Augustus, to the god Julius. A cornice, with modillions and dentils, a swelled and ornamented frieze, an architrave of three facias, divided by mouldings, and an Attic base.

The temple at Nîmes called the *Maïson Quarré*. A cornice, with modillions and dentils, a straight frieze, an architrave of three facias, divided by mouldings, and an Attic base.

To render this account of the progressive improvement in the Corinthian order more complete and satisfactory, some instances may be given, in which the alteration remains imperfect, having only taken place partially, with a great resemblance to Ionic forms.

A portico at Athens, supposed by Stuart to be the ancient Poikile. This building presents a cornice, with mutules of two square faces, an architrave, with two plain facias, and an Attic base.

The frontispiece of Nero at Rome. A cornice, with mutules of the same form as the last mentioned, an ornamented frieze, and an architrave of two facias, divided by an ogee.

In these two instances, there are no dentils or dentil-bands in the cornices; and the mutules, by their situation and shape, appear rather to be a variation from the proper Ionic dentil than a new member.

Considering the Corinthian order in its most complete state, we find it possessed of a peculiar entablature distinguished from that of the other orders by a cornice with modillions and dentils, a straight frieze, and an architrave of three facias divided by mouldings. The column is marked by its capital, and also by a peculiar base called the Corinthian base. This description is wholly applicable to the three columns of the campo Vaccino, which are probably the most complete and beautiful examples of the order extant. See *Plate 29*.

Of the modern architects, who have treated of this order, Palladio makes the column $9\frac{1}{2}$ diameters high, and gives only one-fifth part of this altitude to the entablature, which consists of a cornice with modillion and dentils, a straight frieze, and an architrave of three facias divided by Astragals. The base is Attic. Scamozzi's design bears a great general resemblance to Palladio's, but he gives ten diameters to the column. The entablature is one-fifth of this height, the cornice has modillions, only the architrave consists of three facias divided by Astragals, and the base is Attic. Serlio, in his Corinthian order, has followed Vitruvius in giving it an Ionic entablature with dentils, and in the proportion of the capital. The column is nine diameters high, and has a Corinthian base. Vignola's is a grand and beautiful composition in which he has chiefly imitated the three columns. He gives the column ten diameters in height with a Corinthian base. The entablature is one-fourth of the height of the column, the cornice has modillions and dentils; a plain frieze, and an architrave of three facias divided by mouldings.

The following Table will exhibit the proportions of some of the principal examples of the Corinthian order, premising that the different members are measured by the diameter at the bottom of the shaft, which is divided into sixty minutes.

	Height of Column.	Height of Capital.	Architrave.	Frieze.	Cornice.
Portico of the Pantheon	9D 34 $\frac{1}{2}$ '	57 $\frac{1}{2}$ '	12 $\frac{1}{2}$ '	39 $\frac{1}{2}$ '	54'
Temple of Veita at Rome	10D 58'	77 $\frac{1}{3}$ '			
Temple of Veita at Tivoli	9D 21 $\frac{1}{4}$ '	57'	30'	37 $\frac{1}{2}$ '	32 $\frac{1}{2}$ '
Temple of Antoninus and Faustina	9D 31 $\frac{1}{2}$ '	68 $\frac{1}{2}$ '	43 $\frac{1}{2}$ '	40 $\frac{1}{2}$ '	52 $\frac{1}{2}$ '
Three Columns Campo Vaccino	10D 6 $\frac{1}{2}$ '	66 $\frac{1}{2}$ '	43 $\frac{1}{2}$ '	43 $\frac{1}{2}$ '	69 $\frac{1}{2}$ '
A Building at Rome, commonly called the Basilica of Antoninus	10D 11 $\frac{1}{2}$ '	69 $\frac{1}{2}$ '	43 $\frac{1}{2}$ '	32 $\frac{1}{2}$ '	
The Arch of Constantine	9D 37'	55 $\frac{1}{2}$ '	45'	40'	58 $\frac{1}{2}$ '
The Temple at Ephesus	10D 15'	64'	48'	45 $\frac{1}{2}$ '	48'
The Temple at Jackly Poikile at Athens	9D 31'	63'	43 $\frac{1}{2}$ '	40'	48'
The Arch of Adrian at Athens	9D 32'	64 $\frac{1}{2}$ '	39 $\frac{1}{2}$ '	34 $\frac{1}{2}$ '	38 $\frac{1}{2}$ '
The Incantada at Salonica	9D 52'	72'	41'	38 $\frac{1}{2}$ '	46'
Palladio	9D 31'	66 $\frac{1}{2}$ '	46'	41 $\frac{1}{2}$ '	42 $\frac{1}{2}$ '
Scamozzi	9D 30'	70'	38'	28 $\frac{1}{2}$ '	47 $\frac{1}{2}$ '
Serlio	10D 70'	70'	40'	32'	48'
Vignola	9D 60'	60'	30'	37'	39'
	10D 70'	70'	45'	45'	60'

"The Corinthian order," says Sir William Chambers "is proper for all buildings where elegance, gaiety, and magnificence are required. The ancients employed it in temples, dedicated to Venus, to Flora, Proserpine, and the nymphs of fountains; because the flowers, foliage, and volutes with which it is adorned, seemed well adapted to the delicacy and elegance of such deities." This account, though plausible in theory, is wholly unfounded, and is, in fact, a mere modern refinement. The Romans, in borrowing their architecture from Greece, appear to have particularly appropriated the Corinthian order, they found it possessed of an ornamental character adapted to the splendour and magnificence of their taste, and used it indiscriminately on all occasions, and in the temple of any deity in the same manner that the early Greeks used the Doric, and the Ionians the Ionic order. Thus the Romans erected Corinthian temples to Jupiter, Neptune, and Mars; and the Greeks built the temples of the same deities of the Doric order. The temples of Minerva at Athens and at Sunium are Doric; the temple of Minerva at Priene is Ionic. The temple of Jupiter Olympius at Elis, was of the Doric order; the temple of the same god, erected by Adrian at Athens, is Corinthian. The orders of architecture are national. Thus the numerous temples of the Grecian colonies in Sicily and Italy are uniformly Doric, marked by the most severe and massy simplicity. The cities of Ionia present the best examples of a chaste and elegant Ionic; while the magnificent structures of Balbec and Palmyra, are wholly of the Corinthian order, and in the most florid style of ornament.

CORINTHIANS, *Epistles to the*, in *Biblical History*, are two letters, addressed by the apostle Paul to the inhabitants of Corinth,

Corinth, including both Gentile and Jewish converts, and comprehended in the sacred canon of the New Testament. Some have inferred from 1 Cor. v. 9, that the apostle had written another epistle to the church at Corinth; but Dr. Whitby (*in loc.*) observes, that no fathers ever ascribed to St. Paul more than 14 epistles, including that to the *Hebrews*; nor does Eusebius mention any third epistle to the Corinthians, amongst the true, controverted, or spurious writings which pass under his name. Moreover, no Christian writer ever cited any thing from this supposed epistle; and all the Greek scholiasts declare, that the apostle speaks in these words, "not of another, but of this very epistle," which, says Dr. Whitby, "is sufficient to justify the version I have given of these words, I had written, or was writing, in this epistle." Besides, his supposed epistle to Laodicea is cited as a book expanded by St. Jerom; his epistles to Seneca are in like manner cited by St. Jerom and St. Austin; the acts of Paul are cited, and rejected by Origen and Eusebius; but none of them make any mention of more than two epistles to the church of Corinth.

The *first epistle* was written about three years after the apostle had left Corinth, to preach the gospel in other parts of Greece; and it was written at Ephesus, as appears from ch. xvi. 8, 9, 19, and Acts, xviii. 18, 19, according to Pearson and Mill in the year 57, the third of the emperor Nero; but, according to Lardner's computation of St. Paul's times and travels, in the spring of the year 56, and this was also the opinion of Lefant and Beaufobre. This epistle was written in answer to some important inquiries proposed by the Corinthians, and for the purpose of correcting the various irregularities and disorders, of which they were guilty. The first article under the head of abuses, with which they were chargeable, related to the parties and factions into which they had fallen, and the opposition which was made by some of them to St. Paul's apostolical mission. The first four chapters comprehend this first head. The second topic which the apostle considers was the case of a notorious offender in the Corinthian church, who had been guilty of most scandalous incest with his father's wife. (See chap. v.) The third article which the apostle exhibits against the Corinthians is, that by a covetous and litigious temper they were led, in violation of the rules of Christian prudence and charity, and sometimes in opposition to the principles of justice, to prosecute their brethren in the heathen courts. (Chap. vi. 1—11.) In the fourth place, the apostle cautions them against the sin of fornication, to which, in their Gentile state, they had been much addicted, and which some seem to have reckoned among things that were indifferent, or to consider as of inferior enormity; introducing useful reflections on matters of indifference, and illustrating the heinous evil of fornication from views peculiar to the Christian religion. (Chap. vi. 12. to the end.) As Corinth was conveniently situated for commerce, it abounded in riches, and was furnished with all the accommodations, elegancies, and superfluities of life. Hence, by too natural a consequence, the inhabitants were led into luxury, lewdness, and all manner of vice; so that they became infamous even to a proverb. Thus, Κορινθία γυνί, a Corinthian woman, is, in the language of the ancients, a lewd prostitute, according to the proverb (cited in Erasmus, *Adag. Cent. 7. p. 633. 720.*) ἡ κορινθία ἑκαστα χροστειλασται, *at Corinthia videris corpore questum salutura.* And Κορινθιαζου, Κορινθιαζουσαι, is *luxurians, fornicationibus indulgere.* (Hesych. *Plavor.*) We have already observed (from Strabo) that there was in it a temple dedicated to Venus, which *πλειονς ἢ χιλιας ἱεροδοτους ἐκκλησιο ἱσταισας.* See CORINTH.

Having thus largely, and with great fidelity and plain-

ness, corrected some lamentable disorders which prevailed among the Co-inthians; the apostle proceeds to the other principal object of his epistle, which was to answer certain questions which they had proposed to him. Here he determines, *first*, those which related to the marriage-state; stating that in some circumstances this state should be entered into, and continued in; but in others, foreborne, particularly at that time; and enjoining wives not to depart from their husbands, and husbands not to dismiss their wives. (Ch. vii. 1—11.) He then shews, that marriages were not to be dissolved, as some thought they might, on account of a difference in religion; and he urges contentment with the stations, in which they were called, whether they were married or single, bond or free. (v. 12—14.) And with regard to single persons, he asserts the inexpediency of their marrying in the peculiar circumstances of the church at that juncture. (v. 25, to the end.) To the *second* query proposed, *viz.* how far they might comply with their heathen neighbours in "eating things sacrificed to idols," he replies, by reminding them that though all Christians might well be supposed to know the vanity of those imaginary deities, to which the sacrifices were offered, yet it might prove an occasion of grief and scandal to some, if the professors of Christianity should partake of those sacrifices in their temples; which, therefore, Charity would require them by all means to avoid. (Ch. xii.) He then, after waving, for his own part, the expectation of a maintenance from the Corinthians, states the right, which, as a minister of the gospel, he really had to be supported by those among whom he laboured; and this he argues both from natural equity, and scripture-principles. (Ch. ix. 1, to the end.) He next resumes the argument against partaking of entertainments upon "things offered to idols" in the heathen temples. (Ch. x. 1—13.) He proceeds to caution them against all approaches to idolatry. (v. 14, to the end, ch. xi. 1.) In reply to a *third* query, concerning the manner in which women should deliver any thing in public, when urged to it by a divine impulse, he first settles this point; he then considers various circumstances relating to public worship and guards against abuses in the celebration of the Lord's supper, and also in the exercise of spiritual gifts; concluding with a recommendation and description of mutual charity. (Ch. xi. 2, to the end, ch. xii. ch. xiii. Ch. xiv.) As some of the Corinthians doubted, and others denied, the resurrection of the dead, the apostle establishes this great and peculiar article of the Christian faith. (Ch. xv.) He then closes the whole with some necessary counsels to the Corinthian churches and exhortations to fortitude and charity. (Ch. xvi.)

The *second epistle* of St. Paul to the Corinthians was written during his stay in Macedonia, whither he had gone from Ephesus, somewhat more than a year after his former epistle; according to Pearson in the year 57, and as Mill supposes near the end of that year; or, as Dr. Lardner suggests, in September or October. (Ch. ix. 1—5. ch. xiii. 1.) It was conveyed by Titus, who was returning to Corinth in order to forward the collection intended for the poor Christians in Judea. Its evident design is, in general, to illustrate some of the same points upon which he had discoursed in the former, according to the information which the apostle had received from Titus concerning the circumstances and temper of the Corinthian church; and the writer intersperses and enforces some occasional reflections and advices upon various subjects, which he thought most conducive to their instruction and edification. From a view of the epistle it is evident, that a great part of it is employed in reclaiming the Corinthian church from their undue at-

tachment to Judaizing teachers, and from that party-spirit, which they had indulged, and in rekindling proper regards to the unadulterated doctrine of the gospel, and to his own apostolical counsels. This leading design of the epistle is interrupted by the occasional introduction of other matters, which can form no reasonable objection to the accuracy and beauty of this excellent composition; for the transitions arise from some obvious and important sentiments, which render them natural and just. In these digressions there is an admirable wisdom; because they relieve the minds of the Corinthians from that uneasiness, which they must have felt from a constant attention to so disagreeable a subject as their unsuitable conduct towards the apostle himself. It is with the same kind of propriety and sagacity, that the severe intimations, which the dignity of the apostolical character obliged St. Paul to drop against those, who might persevere in their opposition, are reserved to the close of the epistle; as they would feel with additional weight, in all probability, after their minds had been softened with the reiterated expressions of his tender affection to the Corinthians in general, and the innocence and amiableness of his character had been represented in such a variety of views. See Doddridge's Exposition, vol. iv. Whitby's Comment. vol. ii.

We cannot close this article, without referring to some pertinent and judicious remarks, made by archdeacon Paley, in his "Horæ Paulinæ," (an excellent work of original criticism and reasoning,) on the undesigned agreement or conformity that is manifest between these letters of St. Paul to the Corinthians, and the history of his life and travels in the book of Acts.

As it appears, from chap. vii. v. 1. that the first epistle was written to the Corinthians, in answer to one which he had received from them, this alone is a circumstance that favours the authenticity of the epistle:—for it must have been a far-fetched contrivance in a forger, first to have feigned the receipt of a letter from the church of Corinth, which letter does not appear; and then to have drawn up a fictitious answer to it, relative to a great variety of doubts and inquiries, purely economical and domestic; and which, though likely enough to have occurred in an infant society, in a situation and under an institution so novel as that of a Christian church then was, it must have very much exercised the author's invention, and could have answered no imaginable purpose of forgery, to introduce the mention of it all. Particulars of this kind are such as follow:—the rule of duty and prudence relative to entering into marriage, as applicable to virgins, to widows—the care of husbands married to unconverted wives, of wives having unconverted husbands—the care where the unconverted party chuses to separate, when he chuses to continue the union—the effect which their conversion produced upon their prior state, of circumcision, of slavery—the eating of things offered to idols, as it was in itself, as others were affected by it—the joining in idolatrous sacrifices—the decorum to be observed in their religious assemblies, the order of speaking, the silence of women, the covering or uncovering of the head, as it became men, as it became women. These subjects, with their several subdivisions, are so particular, minute, and numerous, that though they be exactly agreeable to the circumstances of the persons to whom the letter was written, nothing but the existence and reality of these circumstances could have suggested to the writer's thoughts. Another particular deserving of notice is, that in this correspondence the Corinthians did not say one syllable about the enormities and disorders which had crept in among them, and in the blame of which they all shared; but that the apostle's information,

concerning the irregularities then prevailing at Corinth, had come round to him from other quarters. (Ch. i. 11, 12. v. 1, 2.) That the Corinthians should, in their own letter, exhibit the fair side of their conduct to the apostle, and conceal from him the faults of their behaviour, was extremely natural, and extremely probable; but it was a distinction which would not have easily occurred to the author of a forgery; and much less likely is it, that it should have entered into his thoughts to make the distinction appear in the way in which it does appear, viz. not by the original letter, not by any express observation upon it in the answer, but distantly by marks perceivable in the manner, or in the order, in which St. Paul takes notice of their faults. For the particular traces of unintended and seemingly accidental coincidence between the facts that are recited in the two epistles, and those that may be collected from the history, and which is altogether irreconcilable with a premeditated impolture or forgery, we must refer the reader, conversant with subjects of this kind, and desirous of farther information, to the work already cited, p. 72—151.

We may here observe, that there is another epistle of St. Paul to the Corinthians, besides the two above mentioned, purporting to be an answer to an epistle from the Corinthians to him. This was translated by Scroderus, from a copy in the Armenian language, which had been lent to Mr. Whitton, and was afterwards, from a more perfect copy procured at Aleppo, published by his sons, as an appendix to their edition of Moses Chorenensis. No Greek copy exists of this epistle: it is not only unsupported by ancient testimony, but negatived and excluded; as it has never found admission into any catalogue of apostolical writings, acknowledged by, or known to, the early ages of Christianity. This epistle is an artful and specious forgery, introduced with a list of names of persons who wrote to St. Paul from Corinth, and preceded by an account, sufficiently particular, of the manner in which the epistle was sent from Corinth to St. Paul, and the answer returned. But they are names which no one ever heard of, and the account it is impossible to combine with any thing found in the Acts, or in the other epistles.

CORINTHUS, in *Ancient Geography*, a town of Greece, in Thessaly.—Also, a town of Greece, in Epirus.

CORIO, in *Geography*, formerly a town of Piedmont, in Italy, belonging to the king of Sardinia, is now a town of France, in the department of the Po, chief place of a canton, in the district of Turin, containing 5132 inhabitants. The canton is composed of 5 communes, and reckons in all 6764 inhabitants.

CORIOLOGO, CHRISTOFANO, in *Biography*, a designer and engraver in wood, who is said to have been a native of Nuremberg, but who afterwards established himself at Venice. Heineken conjectures that his real name was that of *Lederer*, a family still existing in Saxony, and which Christofano might translate into Coriolano, according to the custom of those times.

Vafari informs us, in his *Life of Marc Antonio*, that Christofano engraved, from the designs of himself and his scholars, all the portraits prefixed to the lives of the different painters, sculptors, and architects in his extensive work; and that he continued to enjoy the reputation of an excellent artist at Venice, where he was established. If so, Christofano Coriolano cannot have been born so late as 1566, which M. Huber supposes. Besides the prints for Vafari, many of those in the *Arts Gynnaſiæ Hieronymi Mercatoris*, the work of Ulyſſes Aldrovandini, are attributed to this master. But it is probable there were two artists of the same name. Huber.

CORIOLOGO, CAV. BARTOLOMEO, supposed the son of the

the preceding artist, was born at Bologna, about 1550, and is said to have perfected himself in design by studying in the academy of Caracci. Guido, however, seems to have been the painter he most admired; and we are indebted to Bartolommeo for several excellent engravings in chiaro-scuro, from the drawings of that graceful painter. These prints were produced, like those of Ugo de' Carpi and Andrea Andreani, by means of three blocks of wood; one of which gave the outlines and the greatest depths of shadow, as if hatched with a pen; the second, the middle tints; and the third, the darker masses. He flourished from 1620 to 1650. His prints are generally signed with his name, or with his initials, thus, B. C. Eques.

Amongst his best prints are the following: "St. Jerome before a Crucifix," a half-length figure, dated 1636, after Guido; "the Daughter of Herodias, with the Head of John the Baptist," from the same; "the Fall of the Giants," a large upright print on four sheets, from the same painter, dated 1647, and considered the chef d'œuvre of Coriolano Heineken. Huber.

CORIOLOANO, GIO. BATISTA, the younger brother of Bartolommeo, was born at Bologna, about 1596, and studied painting and design under Gio. Luigi. Valesio. Some of the pictures of Gio. Batista exist in the churches of St. Anna and the Annunziata, at Bologna. He is better known by his numerous engravings in wood and copper, the former of which are preferred by the connoisseurs.

We shall only notice the following prints by this artist, who is said to have died in 1649: "the Portrait of Fortunatus Licetus," 1639, in 4to.; "Christ crowned with Thorns," a middling-sized upright plate, boldly etched from Lod. Caracci. Huber.

CORIOLOANO, TERESA MARIA, sister to the two preceding artists, after having acquired sufficient knowledge of design from the instructions of her father, studied painting under Elisabetta Sirani. She also amused herself with etching, as appears by a small print representing the Virgin and Child. Huber.

CORIOLOANUS, CAIUS MARCUS, celebrated in Roman history, was descended from the family of the Marcii, and in his early years he displayed uncommon courage and nobleness of mind, united with strong passion and the pride of high birth. He first distinguished himself in the war against Tarquin, who was expelled; and obtained a civic crown, for having preserved the life of a fellow-citizen. For his success over the Volscians, he was presented with a fine horse richly caparisoned, and a tenth part of the spoil. The former he accepted, but disdained a greater share of the booty than fell to his lot in common with others of the same rank. As a further favour, he demanded the release of a Volscian prisoner, who had been connected with him by the tie of friendship, which was immediately granted; and the surname of Coriolanus was unanimously conferred upon him, on account of his great services in the capture of Corioli, the capital of the Volscians, which happened in the year 493 B. C. About this time dissensions prevailed between the patricians and plebeians; Coriolanus sided with the former, and was exceedingly severe against the plebeians. For some of his measures he was flogged before the tribunes, to which he paid no attention, till he conceived the safety of the state required him to come forward in his own justification. Instead, however, of softening the resentment of the people by submission, he aggravated their displeasure by the haughtiness of his behaviour. He was now condemned to be thrown from the Tarpian rock; but from this severe punishment he was saved by the courage of the patricians, in

whose cause he had embarked. He was at length tried by the people, to whom he appealed by the fears he had received in fighting for his country, and by the lives he had saved in battle; but the tribunes succeeded in obtaining against him a sentence of perpetual banishment. He heard the decree without emotion, and with a manly composure took leave of his mother, his wife, and children; but the ingratitude of his country made an indelible impression on his mind. He was bent on revenge: he joined with the enemies of Rome, took many of the towns, and encamped within five miles of the city itself. The people now law their error, and a deputation was sent out to treat with him: he received them with haughtiness, but would give them no hopes of a reconciliation. To a second and third message of the same kind he shewed himself inexorable. At length, his mother, wife, and children, came out to plead their country's cause. To their intreaties he could no longer refuse his ear. Raising his venerable parent from the ground, on which she had prostrated herself, he exclaimed, "You have saved Rome, my mother, but you have destroyed your son." He retired to his tent, and soon after took measures for a retreat. When he had brought back the troops to the Volscian country, he divided all the booty among the soldiers; on which account he so ingratiated himself with the men, that his own want of resolution was forgotten. By some of the historians we are told he lived to a great age; though others maintain that he was slain in a tumult, excited against him for yielding to the prayers of his country. Plutarch.

CORIOLEA, CORIOLI, in *Ancient Geography*, a town of Italy, situated in the country of the Volsci, of which it was the metropolis. From this town, which no longer subsisted in the time of Pliny, Marcius took the name of *Cerriolanus*.

CORIOS, a river of Asia, towards Carmania.

CORIORAGEMATODENDRON, in *Botany*, Pluk. See *MYRICA quercifolia*.

CORIOVALLUM, in *Ancient Geography*, a town of Belgic Gaul, on the route from Colonia Trajana, between Tunderum and Juliacum. Anton. Itin.

CORIS, in *Botany*, (*coris*; Dief.) Tournef. 652. Appendix. Linn. gen. 243. Schreb. 329. Willd. 374. Lam. Ill. 292. Juss. 96. Vent. 2. 288. Class and order, *pentandria monogynia*. Nat. Ord. *Lythnaceae*, Juss. *Primulaceae*, Vent.

Gen. Ch. Cal. one-leaved, ventricose, five-toothed, crowned externally with strong sharp bristles. Cor. monopetalous, irregular; tube the length of the calyx, cylindrical; border flat, five-parted; segments oblong, obtuse, emarginate, unequal. Stam. five, bristle-shaped, shorter than the corolla, declining; anthers roundish. Pist. Germ. superior, roundish; style filiform, the length of the stamens; stigma simple. Peric. Capsule globular, placed at the bottom of the calyx, one-celled, five-valved. Seeds numerous, somewhat egg-shaped, small.

Ess. Ch. Calyx ventricose, with thorn-like teeth. Corolla monopetalous, irregular. Capsule five-valved, included in the calyx.

Sp. C. *monspeliensis*. Linn. Sp. Mart. Lam. Ill. Pl. 102. Willd. (C. *carulea maritima*; Benth. Pin. 280. *Symphlytum petrum*; Camb. Epit. 699.) Root perennial. Stems several, about six inches high, more or less erect, cylindrical, branched, cinereous, or reddish. Leaves scattered, numerous, small, linear; the upper ones in the wild plant edged with sharp prickly teeth. Flowers red or

white, in dense, egg-shaped, terminal spikes. A native of sandy shores in the south of Europe.

CORIS lutea; C. Bauh. See *HYPERICUM coris*.

CORIS is also used in the East Indies for a kind of shells which pass for money. See *BIA* and *COWRY*.

CORISCO, in *Geography*, two islands of that name on the coast of Guinea, belonging to Benin.

CORISPERMUM, in *Botany*, (from *coris*; a bug, and *perma*, feed.) Linn. Gen. 12. Schreb. Willd. 26. Gært. 469. Lam. Illus. 12. Juss. 86. Vent. 2. 261. Class and order, *monandria digynia*. Nat. Ord. *Oleraceae*, Linn. *Atriplicae*, Juss. *Cheopodiceae*, Vent.

Gen. Ch. *Cal.* none; Linn. Schreb. Willd. (two-leaved; leaves opposite, compressed, acuminate, incurved; Lam. Juss. Vent. Gært.) *Cor.* dipetalous; Linn. (none, Lam.) *Stam.* Filament one, but in the lower flowers often from two to five, filiform; anther roundish. *Pist.* Germ superior, egg-shaped, compressed; styles two, capillary (one; Gært.) stigmas acute. *Peric.* none. *Seed* single, oval, compressed, flat or a little concave on one side, convex on the other, with an acute margin.

Eff. Ch. Calyx or corolla two-leaved, or two-petalled, one of them wanting. Seed single, elliptical, plano-convex, with an acute margin.

Sp. 1. *C. hyssopifolium*. Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Lam. Illus. Pl. 5. "Flowers lateral; bracts like the leaves, linear, smooth underneath." *Root* annual. *Stem* scarcely a foot high, pubescent towards the top, reddish beneath, striated, branched. *Leaves* alternate, entire, with a white longitudinal nerve, and somewhat membranous edges; lower ones two inches long, about a line broad, ending in a long point, diminishing gradually towards the top of the stem, without assuming the form of bracts. *Flowers* axillary within the upper leaves, sessile. *Seeds* emarginate. A native of Russia and the south of France.

2. *C. squarrosifolium*. Linn. Sp. 2. Mart. 2. Lam. 2. Willd. 2. "Spices lateral and terminal, squarrous; bracts egg-shaped, short, mucronate, somewhat villous." *Root* annual. *Stem* a foot high or more, much branched, panicled, zig-zag, cylindrical, almost smooth, greenish, with purple striæ; lower branches almost decumbent. *Leaves* about two inches long, alternate, linear, smooth, rather equally distant from each other. *Spikes* an inch long or more; bracts very different from the leaves, with white membranous edges; flowers sessile. *Seeds* not emarginate. A native of Tartary and Siberia. There is a variety, perhaps a distinct species, found in the south of France, with weaker stems and more slender generally terminal spikes. 3. *C. orientale*. Lam. 3. "Leaves long, narrow, linear; flowers somewhat panicled, growing only at the ends of the branches." *Root* annual. *Stems* about a foot high, slender, reddish at the base, branched. *Leaves* narrowing towards the base. *Bracts* small, oblong, villous. A native of the Levant.

CORISPERNUM foliis oppositis; Fl. lap. Gron. See *CALLITRICHÆ*.

CORITA, in *Geography*, a town of Spain, in the province of Leon; 17 miles S.S.W. of Leon.

CORITANI, or *CORICENI*, inhabitants of ancient Albion, were situated to the W. and N. of the Iceni, and, according to Camden, were the ancient inhabitants of the country, which is now divided into Northamptonshire, Leicestershire, Rutlandshire, Lincolnshire, Nottinghamshire, and Derbyshire. Other antiquaries, however, are of opinion that their territory was not so extensive. The name of the Cor-Iceni plainly indicates that there was some kind of affinity or connection between them and their neighbours, the Iceni. Some think they were two tribes of the

fame nation, and that Cor-Iceni denotes the lesser Iceni, from *Carr*, a dwarf, and Iceni. Others imagine that both these British tribes derived their name from the different kinds of animals which constituted their chief riches, and the tending of which was their chief employment; the Iceni from *Uchen*, oxen; and the *Cor-Iceni*, from *Cor*, a sheep. However this be, if the two tribes did not form one nation, they were in very strict alliance, and shared the same fate; having been both reduced to some degree of subjection to the Romans by Ostorius Scapula, and totally subdued by Suetonius Paulinus. The Romans made great changes in the country of the Cor-Iceni, by introducing agriculture, and by building many forts and stations in it to keep them in subjection. Lindum, now Lincoln, the ancient capital of the Cor-Iceni, became the seat of a Roman colony, and one of the most considerable cities which these people had in Britain; and it is mentioned both by Ptolemy and by Antoninus in both his journeys. By following the course of the 6th journey of Antoninus, from London to Lincoln, we meet with a considerable number of Roman towns and stations within the territories of the Cor-Iceni; as Venone, now Claycester; Ratae, now Leicester; Virometum, now Willoughby; Margidunum, now East-Bridgeford; Ad-Pontem, now Southwell; and Crocolana, now Brugh, near Cottingham. The extensive country of the Cor-Iceni was included in the Roman province called Britannia Prima.

CORITHUS, or *CORYTHUS*, a town and mountain of Italy, in Etruria, according to Servius on Virgil; but Cluvier thinks that Servius is mistaken; and that if such a place existed, it must have been in the country since called Cortona.

CORTIUM, a town of Asia, towards Syria; placed near the Euphrates by William of Tyre.

CORITUS, a mountain of Italy in Umbria; now Monte Corvo.

CORIUM, a place in the isle of Crete, near the lake or marsh called Corefium.

CORIUNDI, a people of Hibernia, according to Ptolemy.

CORIUS, a river of Carmania.

CORIZENSIS, an episcopal see of Asia, in the patriarchate of Antioch.

CORIZIOLA, in the *Materia Medica*, is a name given by some authors, particularly by Rhasis, to the scammony.

CORK, the exterior bark of a tree belonging to the genus of oak (*QUERCUS Suber*), which grows wild in the southern parts of Europe, particularly France, Spain, Portugal, and Tuscany. When the tree is about 15 years old, it is fit to be barked, and this can be done successively for eight years. The bark always grows up again; and its quality improves as the age of the tree increases. If care is not taken to strip the bark, it splits and peels off by itself, being pushed up by a second growth forming under that of the preceding year.

Stripping and preparing the Bark.—The bark is taken off by the Portuguese in sheets or tables, by cutting it with knives having two handles, similar to those which the tanners or skinners use at their beam, or horse, sitting it down after the circular incision is made, from top to bottom; to effect this incision they ascend the tree by a ladder to the part where the branches spring from the top; they then make a slice or slip: the filaments connecting the bark with the trunk are next cut down, or through, by a knife formed like our hay-spade, and which they use in nearly the same manner: the bark is frequently, through haste, broken off

at the root, in which case the two ends are distinguished by the appellations of "cut end" and "falt end;" the first is that which had been at the top of the tree, where the circular cut was first made, and the second is that which had been next the ground.

Another mode of accomplishing the artificial stripping of the tree, is thus performed: several incisions are made from the top of the trunk to the bottom, and at each extremity of these incisions a circular cut is effected; by this operation the bark is cut off from communication with either the lower or higher parts of the tree; consequently it is entirely deprived of support; in a little time it loosens, and its separation is completely accomplished by the hand; thus the progress of nature is expedited by very simple means. Before the operation of barking is again performed upon the same tree, should it be a young one, it ought to stand three years; it is not however unfrequently cut within the period; when it is cut too young, it is generally preferred by the English cork-cutter in his cellar till it alters from green to the colour proper for his purpose, which is effected merely from the time he keeps it in that state, though after all, it is still much inferior to that taken when the tree has arrived at maturity.

After being detached from the tree, the Portuguese "burn it," laying the convex side of the bark to the fire; in this operation they are careful to cover all the blemishes they possibly can, holes are filled up in an insufficient manner either by the swelling and straightening of the wood upon the fire, or by the artful introduction of foot and dirt. When the judgment of the burner is sufficiently exercised in flattening the bark, and artificially repairing its defects, it is laid into the farm yard for sale, in stacks, and bought by the merchants from thence for exportation.

Another method used in straightening the bark, is to pile it up in pits, loaded with heavy stones, by which method it becomes flat, this is afterwards more completely effected in a damp cellar, and is called "laying the corks;" when this operation is finished it is dried over a strong fire in what is called "a burning yard;" from negligence in this process it receives too much of that black colour which is so frequently discovered in articles made of cork: when sufficiently dried it is ready for stacking.

The cork is not burnt, but only charred on each surface; previous to this operation the pores of the bark are open, and its consequent sponginess of texture would make it not only give too much way to the knife; but particularly in the case of "taps" and "bungs" would render it a filter, rather than a preserver, of liquids. It shrinks with the application of moderate heat, and thereby closes the pores, by which any filtration might be effected. If "burning" ever be used as a cover for defects, it is not an original design but an accidental advantage, which is taken of a necessary process; "bungs" and "taps" are always charred on both surfaces; good bottle corks, though the bark of which they are made is likewise subjected to the operation of fire, do not after they are cut exhibit any marks of that element, being cut in the length way of the wood, the pores lie in a contrary direction, and the charring consequently is taken off by the process of rounding them.

The cork tree as well as the uses to which the bark is applied, &c.—This tree, as well as its use, was known to both the Greeks and Romans. By the former it was called *phellus*. Theophrastus reckons it among the oaks, and says, that it has a thick fleshy bark, which must be stripped off every three years to prevent it from perishing. He adds, that it was so light as never to sink in water, and on that

account might be used with great advantage for a variety of purposes. That the *faber* of the Romans was our cork-tree is generally and justly admitted. Pliny relates of it every thing said by Theophrastus of the *phellus*; and from his account we learn, that at the period when he wrote, cork was applied to as many purposes as at present. At that time fishermen made floats to their nets of cork; that is, they affixed pieces of cork to the rope which formed the upper edge of the net, in order to keep it at the surface of the water. Another use to which cork was applied, according to Pliny, was for anchor-buoys. "Ulus ejus ancoralibus maxime navium;" that is, as this passage may be interpreted, it was used for making buoys, called "Ancoralis," which were fixed to the cable, and by floating on the surface of the water, over the anchor, pointed out the place where it lay. Our navigators use for that purpose a large but light block of wood, which, in order that it may float better, is often made hollow. See BUOY.

Another use of cork among the Romans was for being made into soles, which were put into their shoes, in order to secure their feet from water, especially in winter; and, as high heels were not then introduced, they served the purpose of elevating ladies and making them appear taller than they naturally seemed. The practice of employing cork for jackets to assist in swimming is also very ancient; for we are informed, that the Roman whom Camillus sent to the capitol when besieged by the Gauls, put on a light dress, and took cork with him under it, because, to avoid being taken by the enemy, it was necessary that he should swim through the Tiber. When he arrived at the river, he bound his clothes upon his head, and placing the cork under him, was so fortunate as to succeed in his attempt. The most extensive and principal use of cork at present is for stoppers to bottles. To this purpose it is excellently adapted; because it is very light, may be easily compressed, and expands again by its elasticity as soon as the pressure upon it is removed, and, therefore, it fills and stops up very closely the space into which it has been driven by force. Besides, it may be easily cut into all forms; and though it abounds with pores, which are the cause of its lightness, it suffers neither water, beer, nor any common liquid to escape through it, and it is but slowly and after a considerable interval that it can be penetrated even by spirits; its numerous pores seem to be too small to afford a passage to the finest particles of water and wine, which can with greater facility ooze through more compact wood that has larger or wider pores. This use of corks was not altogether unknown to the Romans; for Pliny expressly says, that it served to stop vessels of every kind, and instances of its being employed for that purpose may be seen in Cato (*De Re rustica*, cap. 120.) and Horace (*lib. iii. od. 8. 10.*); its application to this use does not seem, however, to have been very common as other substances have been generally employed for this purpose. Stoppers of cork seem to have been first introduced after the invention of glass bottles, of which no mention occurs before the 15th century. See BOTTLES.

This wood is still formed into soles for shoes, into corks and bungs for stopping bottles, &c. into a floatage for the nets of fishermen; it is employed generally, though perhaps with a considerable degree of error in teaching the art of swimming; it is also ingeniously used on account of its lightness, when an amputation of the human leg has been necessary, to supply the deficiency; the Spaniards line stone walls with it, which not only renders their houses very warm but corrects the moisture of the air; the Egyptians made coffins of it, which being covered in the inside with a resinous composition

position preserved their dead bodies. It is hard to make that light black substance, called Spanish black, from its having been first made in Spain.

Cork bark has not only been applied as above, but also in the preservation of life, when endangered by shipwreck; the most conspicuous exhibition of its advantages is in the application of it in the construction of the "life boat" or "cork boat," as it was originally called. We have under the article *Boat*, "*life boat*," given our readers a short account of that inestimable invention; since which we have procured a very valuable account by the principal secretary of the meeting who first advertised the reward; we have also obtained from the liberality of Mr. Greathead, and the interest of the gentleman alluded to, a plan or section of the boat, drawn by the original inventor, which will be given under the article *LIFE BOAT*.

A cork jacket too has been revived from an old German discovery, by Mr. Dubourg, to preserve the lives of persons in danger of drowning, which is constructed as follows. Pieces of cork about three inches long, by two wide, and the usual thickness of the bark, are incised between two pieces of strong cloth or canvas and formed like a jacket without sleeves; the pieces of cloth are sewed together round each piece of cork, to keep them in their proper situations; the lower part of the jacket about the hips is made like the same part of women's stays, to give freedom to the thighs in swimming; it is made sufficiently large to fit a robust man, and is secured to the body by two or three strong tapes sewed far back on each side, and tied before; the strings are thus placed to enable any wearer to tighten it to his own convenience.

Cork in its action has the elasticity of a spring, and when pressed into any aperture, it exerts a force acting outwardly on all sides from the centre. It is this quality that makes it valuable in shutting out the external air from liquors, and elastic fluids; and it is fitted for this purpose in a degree proportioned to the impermeability of its pores. The elasticity of cork has also been employed for many other purposes in the arts; it forms the spring of the lifter in ordinary candlesticks, and where the frame is not heavy, it can be made into a good substitute for the pulleys and weights of the sashes of windows. See *CANDLESTICK* and *WINDOW-SASH*.

Other vegetable productions have likewise been occasionally employed possessing qualities similar to cork. The spondias lutea, a native of South America, which flourishes in moist situations, and which is there called monbin or monban, is sometimes brought to England, as a substitute for cork. The roots of liquorice are applied to the same use, and on this account, as well as its medicinal properties, is much cultivated in Sclavonia, and exported to different countries. The tree called myria, which is found in North America, has also been applied to similar purposes.

Cork-cutting, or the *Manufacturing of Corks*. This business, though it is thought one of the most dirty, is not one of the least profitable: it is likewise easy in the acquirement. The cork, after being pressed into square pieces, as above noted in the treatment of the bark, is received by the cork-cutters, and if not sufficiently flat for their purpose, they "lay" it again over a fire in their "burning yard," turning the convex part to the flame; the heat by twisting the edges of the bark, counteracts the natural bend, and compels it to receive a flat form. During this operation, a considerable degree of attention is paid to smoothing it, and particularly again to cover its defects. It is next cut into slips, narrow or wide, according to the intended cork, bung, or tap, for such are the names of the general divisions

in this business. The use of the two former is well known, the latter is used for stopping the tap-holes of barrels, as the name implies. These slips are again cut into squares, of a length proportioned to the use they are intended for. This operation is performed by one man, from whom they are handed forward to several others. A further division of corks takes place, of these different sorts according to their lengths, and are denominated "short," "short long," and "full long."

The cork maker places himself before the table or plank, on which is fastened a board about three inches thick, four broad, and twelve long; immediately on a line with his left hand is a piece of wood, rising about four inches from the board, and fixed about the middle of it, on which the cork is laid, after being cut as above. This wood not only supports the cork, and is as a guide to the workman, but by its elevation above the board, gives room for the knife to cut a part of the cork in a smooth and circular manner, without striking on the table below. The piece is then turned to where the last cut ceased, and this is continued until the knife has gone completely round: the top and bottom are then pared level, and the cork thrown into a box or basket, with the rest of the same length. As the bark is not of the same quality throughout each piece, the corks are sorted by a boy into four kinds, "superfine," "fine," "common," and "coarse," and are sold accordingly.

The only tool employed by the cork-cutter is a knife about three inches broad in the blade, and about six inches long, very thin and sharp, and equal in breadth from the handle nearly to the end, which is finished by a gentle curve. This knife he sharpens upon the board where the guard is placed, by one whet or stroke on each side, after every cut, and now and then upon a common whet-stone.

From the foregoing review it is evident, that the art of a cork cutter is principally to obtain a regular, round, and quick turn of the whist, in guiding the knife so as to complete a pretty correct circle, and to make a smooth surface; it is on this account that the knife must be particularly sharp, to enable the workman to turn it with ease.

The parings of the cork are carefully kept, and sold to the dry colour makers, to be burnt into Spanish black.

It may be supposed that those who give the detail of any manufacture would be the best able to point out improvements in it, though this is not always the case; yet one improvement in the "laying" of the cork wood, appears of great importance to the writer of this. In the present mode, a great deal of time is lost in placing and removing the stones used to flatten the bark; and though the weight may be moderated or introduced by degrees, yet it cannot be done in that regular manner which appears the most likely to effect the purpose. In addition to which it may be observed, that in proportion as the weight is carefully applied, will be the risk of breaking those pieces which most partake of the circular bend of the tree. To remedy this inconvenience, and to do away the old, gross, and cumbersome method, a screw might be used, such as that employed by the printers in pressing their work; by its operation a gradual pressure would be given, the former objections done away, and a much neater and workman-like method adopted.

Cutting the cork into stripes might also be accomplished with much greater facility; the whole breadth of the cork might be cut by one stroke, by means of semi-circular knives, like small cheese knives, set at certain distances, in a frame, which, by being affixed to a pole, with a cross bar as a handle, might be driven through the whole breadth, in the

the same time that a single slip is cut by the present method.

CORK, Acid of, in Chemistry, a yellowish thick acid matter obtained by distilling four times its weight of nitrous acid from cork. This is soluble in water and has an aultere bitterish taste. It does not crystallize, but becomes consistent like wax by evaporation; is soluble in ardent spirit; forms deliquescent salts with the earths and alkalis; and has as strong an attraction for lime as the acid of sugar.

CORK, Mountain, *Suber montanum*, or *Corium montanum*, in Mineralogy, a species of the micritic genus of earths and stones, according to the arrangement of Kirwan (Mineral. vol. i.) Its colour is white, or reddish-white, or yellowish-grey, or isabella, or ochre-yellow, or yellowish-brown. It is found either in thick compact pieces, and then called "mountain cork;" or in thin flat pieces, then called "mountain leather or paper;" or cellular, and then called "Caro montana, &c." The lustre is σ , rarely γ , and transparency δ . Its fracture presents fibres confusedly interwoven with each other, sometimes too subtle as to be distinguished with difficulty, and thus they give the fracture a compact earthy appearance. Hardness 4; it takes an impression, or yields like cork to the finger, and is somewhat elastic. Sp. gr. before it is penetrated by water, from 0.6806 to 0.9933; and after admission of water, from 1.2492 to 1.3492. (Briffon.) If perfectly dry, and sufficiently thick, it gives a found when struck. It feels meagre. Bergmann and Saussure found it fusible, though with difficulty, by the blow-pipe. By Mr. Bergmann's analysis it contains from 56 to 62 per cent. of silica, 22 to 26 of aerated magnesia, from 2.8 to 12.7 of argill, about 3 of calx of iron, and from 10 to 12.7 of aerated calx.

CORK-SCREW, in Mechanics. *Fig. 1. Plate XVII. Mechanics,* is a simple cork-screw, consisting of a screw, A, turning in a female screw attached by two small rods to the collar B, which receives the neck of the bottle from which the cork is to be extracted; the two rods have a groove in them to receive the ends of a cross piece, connected with the cork-screw, and prevent its turning round with the screw A. *Fig. 2.* is nearly the same, except that the nut, B, is turned instead of the screw.

Fig. 3. is called the *ae-plus-ultra* cork-screw; it consists of two cork-screws A, B, one within the other; the screw which enters the cork is fixed to the internal one. In using this instrument both screws are screwed up to their shoulders, and the whole is turned round together till the cork-screw has penetrated the cork. The handle and the two screws are then turned in the same direction, without permitting the frame to turn, till the cork is drawn. The handle is then turned the contrary way, and the screw drawn out of the cork by means of the small screw B.

Fig. 4. is a screw of nearly the same kind, a rack and pinion being substituted for the screw B.

A corking-machine is represented in *fig. 5*; in which A is a treadle to be worked by the foot; it is connected by a rod *b*, with an iron-lever D; the bottle to be corked is placed in a leathern case E, fastened to a board sliding in a groove; the cork is inserted, and the bottle slid under the lever D, the foot is then placed on the treadle, and the cork forced in; the corks are first pinched by placing them under the lever at *d*, to make them enter easily.

CORK-TREE, in Botany. See *QUERCUS SUBER*.

CORK, in Geography, a county of Ireland, in the province of Munster, lying in the south-western extremity of the island, and by far the greatest in extent and population. It has the Atlantic ocean on the south and south-west: the county of Kerry on the west; those of Limerick and Tip-

perary on the north, and that of Waterford on the east. Its greatest length extending eastward from Kerry is 78 miles (99 English); and its greatest breadth 56 miles (71½ English) containing 1,048,800 plantation acres (1,685,920 Eng.) and being about 1638 (or 2,65; English) square miles. The number of houses, according to an official return made to parliament in 1791, was 56,739, and they must have since considerably increased. From this the population has been estimated at 416,000, which is allowing 9.06 to a house in the city of Cork, and 5.6 to a house in other parts of the county, which those who are acquainted with the many populous towns in this county, and with the manner in which the cottages are crowded, must admit to be a very moderate computation. According to this statement, which is taken from Dr. Beaufort, the county of C rk contains very nearly a tenth-part of the number of acres in all Ireland, and above a tenth-part of the whole population. For not only its absolute population is the greatest, but its relative population is amongst the most considerable, being nearly the same as that of Antrim and Londonderry, and exceeded only by the very populous districts of Armagh, Monaghan, Down, Louth, and Dublin. It cannot therefore be wondered at, that it has three militia regiments to keep up. The number of parishes is 269, in which there are 105 churches. The bishoprics of Cork, Ross, and Cloyne lie entirely within the county, and all the above parishes belong to them except five. Cork returns eight members to the imperial parliament, *viz.* two knights of the shire, two for the city of Cork, and one each for the boroughs of Kinsale, Youghel, Bandon, and Mallow. In so large a district there must be a great variety of soil. It contains more good land than bad, and some parts of the county are highly cultivated, especially the neighbourhood of the Blackwater, and the barony of Muskilly in the eastern part. The barony of Ban and Bantry, which is covered with mountains, and the western parts of Carbery and Muskerry, in which are the Sheehy mountains, are the poorest and the least improved. The whole county is hilly, and, a few places excepted, very destitute of trees, which is the consequence of the vast number consumed in the iron-works in the 17th century, without new ones being planted. There are however some spots which are richly wooded. The Gaitees and the Waterford mountains bound it on the north-east. The Nagle mountains and the Boge which run westward through the heart of the county, though separated from each other by a long valley, may be considered as part of a range, that is continued with few interruptions from Helwick Leed in Waterford, across the counties of Cork and Kerry to the ocean. On the north of this range lies a narrow plain, which extends from the bounds of Tipperary to Dingle-bay. The rocks most common in this county are argillaceous. A coarse red or grey sandstone, often varying to a coarser and more slaty fracture, forms the greater part of the coast and the hills near it. There are in this many strata of slate, some of good quality for roofing houses. A large vein of limestone intersects the red argillite, commencing in the peninsula of Corshbeg and the islands in Cork harbour, and extending on the south side of the river Lee to its junction with the Bride, and thence through a valley adjoining this latter river to the distance of about 12 miles from the city of Cork. This limestone is evidently secondary as it contains a variety of petrified shells; and much of it on scaping has that disagreeable smell which characterises *Stinkstone*. This district contains some marbles which admit a good polish. In some of the limestone quarries near the city of Cork, there are not only very transparent quartz crystals, but also large amethysts which are

are much esteemed by the jewellers. The bottom of Bantry bay is entirely composed of broken pieces of coral, called coral sand, which is found to be an excellent manure. In Carbery there is a magnesian limestone. On the Cork side of the Galtees there is abundance of fine limestone, and this useful article may be procured on moderate terms in every part of the county. The Galtee mountains themselves consist of a very coarse pudding stone, in which is much iron shot quartz. Near Galtymore, on the estate of the countess of Kingston, is the remarkable cave of Skeheenrinky, which is deemed by Mr. A. Young superior to the peak. (See MITCHELSTOWN.) The county of Cork abounds in fine rivers, and good harbours. The Blackwater rises in the mountains between Limerick and Kerry, and flows eastward through this county, receiving the Awbeg, the Funchem, the Bride, and many smaller streams in a course of 80 miles. The Awbeg is the *Mulla* of Spenser, who resided at Kileolemen-castle, not far from its banks, and the Blackwater is the *Awinduff* of the same poet. On the banks of the Blackwater are many fine orchards remarkable for the cyder procured from them; and several handsome seats. It is navigable from Cappoquin in the county of Waterford, where it turns to the southward, and disembogues itself in the harbour of Youghel. The Lee issues from a lake called Gougane-Barra; which is, according to Smith, a most elegant and romantic spot, and has by some been preferred even to the lake of Killarney. This lake is west of Inchigeelch, by which town the river passes, and thence to the city of Cork, above which it divides into two branches which unite below the city; and it contributes much to the wealth and prosperity of that great commercial town. The passage down the river from Cork to the outer harbour consists of a succession of varied and beautiful scenery, which can scarcely be surpassed. The Bandon is another fine river, which, after watering the large and thriving town of Bandon-bridge, and the village of Inishonan falls into the harbour of Kinsale: it is navigable for large sloops as far as Inishonan, between winding banks which still deserve the character given them by Spenser; "the pleasant Bandon crowned with many-a wood." The whole coast of Cork is broken into creeks and bays. The harbour of Crookhaven, near Mizen-head, the south-west point of Ireland, is often resorted to, when the easterly winds prevent vessels from gaining the harbour of Cork. Bantry-bay, a little to the north of this cape, is, at least, 20 miles long, and from three to five broad, every where deep, sheltered, and free from rocks. For particulars of these harbours, and of the many towns which this county contains, the reader must be referred to their respective articles. At Dromagh and Dromana, in the barony of Duhallow are coal-pits, which are worked, but not in a judicious manner, or to much advantage. There is much ironstone, and there were many furnaces; but the dearth of fuel is a great check. Much linen is woven about Dunmanway, which is purchased by merchants in Bandon, and shipped from Cork. Near Bandon is a very extensive cotton mill, which gives employment to great numbers. There are some other manufactures, but none of much consequence, except those which belong more properly to the account of the city of Cork. The peasants in the county are very thickly disseminated. In many parts they are very dependent on their landlords, working for them at a low price in payment of the rent of their cottages, and the small lot of ground adjoining them. This has been called the *Cottar* system. The cottages in general, though bad, are not so wretched in appearance as in some other counties, and with scarcely a single exception have a small garden for cabbages,

as well as a field for potatoes, attached to them. The last supplies them with the principal article of their food. They all have a pig, and some of them several, in which last case they generally kill one for themselves at Christmas. This animal, as well as some poultry, often inhabits the same dwelling with its owner, though, of late, pig-flyes are becoming more common. There is a dunghill formed before the door of every cottage, which has a disagreeable appearance; but it is often the only place the owners have for laying up manure for their potatoe gardens. Spinning is the general business of the women, and notwithstanding the severe remarks that have been made on the laziness of the lower Irish, they are seldom seen idle. They spin more wool than flax. The middling and lower farmers have, of late years, improved much, both in their wealth and manner of living, and there is reason to expect further improvement, if the encouragement to agriculture continues, and the peace of the country be undisturbed. The system of agriculture, however, in use, is very bad, and much praise cannot be bestowed on the great landholders for their exertions to improve it. Cork partakes, with other counties of Ireland, the evils arising from absentees, some of the greatest proprietors being of this class; yet few counties have so great a proportion of respectable residents. With respect to the history of this county, we may observe that it was a kingdom of itself before the arrival of the English, and was governed by the M-Cartys. A descendant of that family, on resigning his Irish title of *M'Cartymore*, was made by queen Elizabeth, earl of Clancarty, a title which was attained soon after the revolution, in consequence of the attachment of the earl to the deposed monarch. Henry II. granted the whole kingdom of Cork by charter to Robert Fitz Stephen and Milo de Cogan, about the year 1177; but they were able to get possession only of a small part of it. It is unnecessary to trace the various changes of property which took place from forfeitures and intermarriages. It may be right however to mention that queen Elizabeth divided a great number of acres, which had been forfeited, amongst various undertakers, who agreed to introduce English tenants. Sir Walter Raleigh had three feignories and a half given to him on this occasion, which he sold, in 1602, to sir R. Boyle, afterwards the first earl of Cork, who was a great improver, and founded several towns. This property now chiefly belongs to the duke of Devonshire, who is the representative of the elder branch of the Boyle family. Many of Cromwell's officers afterwards obtained settlements in this county. Beaufort's Memoir. Young, &c. &c.

CORK, the second city of Ireland, and capital of the county of the same name, was originally built on a low marshy island, formed by the branches of the river Lee, from which circumstance its name is said to be derived, *cor-cach*, in Irish, signifying a moor or marsh. It appears, from the imperfect account we have of the early periods of Irish history, that in the 5th, or, as Ware says, in the 7th century, there lived a pious hermit called Barroc, or Fin Barroc, and in after ages, St. Fin Barry, who founded a monastery for regular canons of St. Augustine, and a school on the south side of the river Lee, near the place where the present cathedral stands; and that his fame drew such numbers to it, that to use the words of Colgan, "it changed a desert into a city." In the 9th and 10th centuries, this monastery and town were often plundered by the Danes, who then infested Ireland; but, at the beginning of the 11th century, they founded the present town in an island of the river, of an oval shape; and called it either from the name of the town they had burned, or the marshy situation, *Cor-ran*.

It was, however, very small, and probably did not contain above 1000 inhabitants; but the creeks which intersected it, were convenient for mooring the Danish vessels, and thus their merchandize and plunder were secured. On the arrival of the English in 1172, Cork became an English colony, and a royal garrison. King John ordered the fortifications to be repaired; a stone wall was built; caides were erected at the north and south gates; and bridges were made with portcullises for maintaining communication with the little towns adjoining the abbeys that had been founded on the north, as well as on the south side of the river, and which are now the north and south suburbs. Cork, however, was not so early a place of the first importance in the island. Stanishurt speaks of it as inferior to Limerick and Waterford; and Boate, who wrote near a century later, in the time of Cromwell, as inferior to the same towns, and Galway. Camden, who wrote in the time of Queen Elizabeth, thus describes it: "It is of an oval form, inclosed with walls, and encompassed with the channel of the river, which also crosses it, and is not accessible but by bridges lying along, as it were, in one direct street, with a bridge over it. It is a populous little trading town, and much resorted to; but so beset with rebel enemies on all sides, that they are obliged to keep constant watch, as if the town was continually besieged, and dare not marry out their daughters into the country, but contract one with another among themselves, whereby all the citizens are related in some degree or other." But though the town of Cork was confined to the small island now occupied by the main street and the numerous lanes which intersect it; yet the suburbs were considerable, and were protected by several castles.

The trade of Cork, in these periods, was not extensive, and the principal support of the inhabitants was the consumption of the monasteries, of which there were several. As a haven, Kinsale was in greater estimation. Since the commencement of the 18th century, the town has been gradually enlarged, by taking in and building upon the several marshy islands which lay near the principal one. The channels which were between these, served the purpose of canals, and were convenient in some respects, by enabling the merchants to load and unload their vessels at their respective warehouses, which often joined their dwelling-houses. In this, it resembled a Dutch town, and such is the description given of it in "the Traveller's Guide through Ireland," published in 1806. It is now, however, more than twenty years since the plan was adopted, of filling up these canals; and there is at present (1807) not a single one in the city, which appears as one island, lying between the north and south branches of the river. By this means, there are several wide pleasant streets, which want only regularity in the buildings, to enable them to vie with those even of the capital. The health of the city has also been promoted, for putrid exhalations arose from these canals, which were a receptacle for filth of all kinds; and, when the tide was out, had both a disagreeable smell and appearance. Many houses have been rebuilt, and in consequence of a new bridge thrown over the north channel, the city is increasing rapidly on the northern bank of the river. So long ago as 1788, the houses were 8093 in number; since which time, there has been a considerable increase. The number of inhabitants in several of the old houses is very great, in some cases above 50; and from the account Dr. Whitclaw has given of the population of Dublin, we may safely reckon ten to a house. We shall then be within bounds in stating the population of Cork at 80,000. It may serve to strengthen this opinion, that in the year 1801, when, in consequence

of the scarcity, committees were appointed to make returns of the persons needing charitable aid in each parish, the number was very nearly 30,000. The appearance of the city has nothing striking to recommend it in the structure of the houses. There are many comfortable, and even elegant mansions, but the want of uniformity, from their being built at different periods, and from the caprice or different views of the builders, prevents their appearing to as much advantage as they would otherwise. Cork has no public buildings of much consequence. The cathedral is a modern church, which is neat and convenient, but is surpassed by many country parish churches in England. The church of the Holy Trinity, or Christ-church, is larger, but is only remarkable for an awkward leaning, in consequence of a settlement at the time of building, which strikes every stranger, and made it necessary to take down the steeple. There are five other parish churches, and a French church. The Roman Catholic parish chapels are three in number, which accommodate immense crowds of people. One of these has been lately rebuilt at a great expence. There are, besides, four chapels belonging to friaries and the chapel of the nunnery. There are six meeting-houses for Protestant dissenters, viz. one for Presbyterians, one for Baptists, one for Quakers, one for Calvinists, and two for Methodists. The bishop's palace, which is near the cathedral, is an elegant and convenient modern structure, containing some spacious apartments. The exchange is a light and elegant building, in the Italian style, ornamented by columns of the Doric and Ionic orders. It was built by an Italian architect; as was also the corn-market house, of the Tuscan order, which has great merit as a building for that purpose. Adjoining to the exchange is the city court-house, and a very extensive coffee-house. The mansion-house, where the mayor resides, during his year of office, is a plain building, but contains two very spacious rooms for public entertainments. In one of them is a statue of William III., of plaster, which is painted, and which Mr. Twiss having confounded with a statue of the earl of Chatham, of white marble, has made the subject of ridiculing the corporation. The old custom-house is a large brick building, which having been deemed ineligible for business, has been promised by government to the *INSTITUTION for applying Science to the common purposes of Life*; and a new custom-house is to be erected in a better situation. There are two theatres; the Theatre Royal is tolerably large, but stands in great need of extensive repairs and embellishments; the other, which was built by Mr. Astley, is much smaller. The assembly room is very large, and the profits derived from it increase the funds of the North Infirmary, to the corporation of which it belongs. There are several bridges. St. Patrick's bridge over the north channel is one of the most elegant structures in Europe. It is built, in some respects, on the plan of the beautiful bridge at Neuilly, near Paris, and consists of a centre arch of 60 feet, and two of 50 feet; which arches are exact semi-ellipses. Mr. Shanelau was the architect. Parliament bridge, over the fourth channel, has been lately rebuilt, with a single arch, and makes a handsome appearance. The new barrack, at a short distance from the city, on the north, is on a commanding eminence, so as to be seen at a great distance from the city, in various directions. It is very extensive, containing accommodation for four regiments of foot, and 1000 horse, with an hospital and suitable apartments for officers. The old barrack on the south-side is still retained, and there is a convenient general hospital near it. The artillery have also a barrack and store; and there is a magazine about half a mile from the city. About three miles up the river are very extensive powder-

mills, with large floors, at a place called Ballincollig, belonging to government. The public-market, nearly in the centre of the town, is very neat and convenient. The meat-market consists of three rows, on each side of which the butchers have stalls. The whole is well flagged, covered in, and lighted from above. Adjoining, are the fish, poultry, and root markets. These markets are open, and supplied on every day, except Sunday; but on Wednesdays and Saturdays, which are reckoned market days, the supply is abundant, and of the best quality. There are some inferior markets, but they do not deserve notice. The county jail is a handsome new structure, built at a short distance from the city, which will enable the grand jury to take down the fourth gate at one end of the main street; and, adjoining which, was the old county jail. As a new city jail is shortly to be erected, the north gate may also be taken down, which will be a material improvement to that part of the city. The bridewell is a plain building, suitable to its purpose. The county court-house has been lately new-modelled, and an elegant entrance to it built, so as to be more worthy of the extensive and opulent county, the business of which is transacted there.

There are a great number of charitable institutions, but the buildings are not remarkable. Where the funds, indeed, depend on voluntary contributions, it cannot be expected that there should be money to expend on ornaments. If, however, they cannot be spoken of as contributing to the beauty of the city, they undoubtedly do honour to the feelings of the inhabitants. There are two infirmaries, containing upwards of 50 beds; a house of industry, with commodious cells for lunatics adjoining it; a house of recovery, for the reception of fever patients; a lying-in hospital; a foundling hospital, which receives about 200 children, besides those at nurse; a blue-coat hospital for 24 boys; a school of industry for 100 children of both sexes, with several alms-houses and parish school-houses. There are, besides, a general dispensary, which is provided with every thing necessary for restoring suspended animation; a society for relieving persons confined for small debts, and for lending small sums of money to poor tradesmen; a society for relieving the labouring poor, in time of sickness; and a society for assisting strangers, and enabling them to return to their respective homes. Except the foundling hospital, which is supported by a tax on coal; and the house of industry, which receives grants from the county and city grand juries; all of them chiefly depend on voluntary contributions, or on public amusements, which are made in a great degree conducive to charitable purposes. The consequent difficulty of procuring funds for their support, obliges the conductors of these institutions to use rigid economy: yet it may be questioned, whether the time now spent in providing necessaries might not be better employed in inspecting the internal regulations; and whether a permanent support for every useful institution would not, on that account, be desirable. Cork has also a society for *bettering the condition and increasing the comforts of the poor*, which maintains a correspondence with the similar societies in London and Dublin, and has suggested many useful plans, some of which are persevered in with success. Though the citizens of Cork have been stigmatised, by some illiberal travellers, as neglectful of the sciences and fine arts; yet there seems to be no just ground for this censure. The public library, supported by annual subscriptions, contains a large and well chosen collection of books, which is rapidly increasing. The institution already referred to, which also originated in private subscriptions, has a scientific library, a large collection of minerals, and the necessary apparatus for giving lectures in natural philosophy

and chemistry. The managers of it, having received the countenance and support of government, are now adding a botanical garden, and extending their plan in many respects. The proprietors of the institution, with some other gentlemen, form a literary and philosophical society, which meets on two evenings in every month. With respect to the fine arts, music is a favourite amusement; and there are many excellent performers, both professors and amateurs. The jolly celebrated Barry, who was a native of Cork, was first brought into notice by an ingenious townfman, Dr. Keigh; and there are not wanting, at the present time, men who have taste to discern, and liberality to encourage, rising merit: though a place so remote from the capital cannot be expected to afford scope for eminent talents. The environs of Cork, towards Passage and Glanmire, are extremely beautiful: the lands rise in gentle hills, ornamented with many country houses, gardens, and plantations, and with woods and fields of variegated verdure. On an island between the two branches of the Lee, above the city, is a walk of an English mile in length, planted with trees; from which there is a pleasant view of part of the city, and of the suburb of Sunday's Well. It is called the Mardyke, and is a fashionable walk. But whatever advantages its environs may possess, or whatever improvements may take place in this city, the source of all must be sought in its safe and capacious harbour, which has now become a regular station for an admiral, and which is the place of rendezvous for fleets sailing to the West Indies. The principal export from Cork has long been provisions, including beef, pork, and butter, made up either for the West Indies, or for the supply of the British fleet. The average exportation of beef, in the years 1743-4-5, was 92,950 barrels; the average of butter, in the same years, was 84,105 *cwt.*; and Smith says, it was ascertained that the average number of bullocks and cows slaughtered in Cork, from August to Christmas in each year, was near 100,000. The export of butter began about the year 1633; and about the same time the merchants began to barrel up their beef and butter with hoops bound about with twigs, after the English manner; and at present they are also iron-hooped. The average of beef for 19 years, ending in 1773, had increased to 291,970 barrels; and that of butter to 120,000 *cwt.* The export of pork was at that time inconsiderable. The average value of the whole exports was 1,100,190*l.* sterling. The other articles of export were hides, bay and woollen yarn, camblets, ferges, candles, soap, tallow, herrings, glue, wool, and some small articles. Of late years, the export of beef, and of all the articles connected with it, has decreased; and that of yarn, camblets, and ferges, has almost entirely ceased: but the export of pickled pork and bacon, of corn, of porter, spirits, &c. has become considerable. The quantity of butter exported in 1806 was 160,000 *cwt.*; the number of black cattle, on the average of the three last years, was only 18,000; the number of calf-skins, on an average of the same years, about 50,000. The imports are chiefly for the supply of the city, and the adjoining district. The breweries and distilleries of Cork are a great source of wealth. There are five porter breweries, besides many of ale and small beer. That distinguished by the name of the Cork porter brewery is the most extensive, not only in Cork, but in Ireland, and is probably surpassed only in London. There are four large distilleries, each of which pays 2100*l.* duty *per week.* At one of these is a steam-engine, of Boulton and Watt's latest construction: it is of 40 horse power, and no expence has been spared in the erection of it. The manufacture of clothing for the army is also very extensively carried on; and there are many lesser factories for coarse cloth, serge, &c.

The manufactories of sail-cloth, sheeting, paper, leather, glue, glass, &c. are also considerable. The corporation consists of a mayor, two sheriffs, a recorder, and several aldermen. The charter was given by Charles I. The sheriffs are chosen by the freemen at large; and, after having served the office, are called burgesses. On the day of election, the names of all these burgesses are put into a box or hat, and five names are drawn out: of these five the freemen are to chuse one to be mayor for the ensuing year. By an agreement, however, which has been entered into by a great number of freemen, who form a club, the senior burgess, if willing to serve, is always elected. The same club has also assumed to itself the choice of sheriffs, so as to render the public election a mere farce, or rather a ratification, according to form, of what has been previously determined at a meeting of the club. Cork, as well as Dublin, retains the privilege of sending two members to the imperial parliament. The electors consist of about 1500 freemen, and a number of freeholders in the county of the city, which is very extensive. The eldest sons of freemen are entitled to their freedom, as well as those who serve a regular apprenticeship to freemen. Many also obtain this privilege by favour every year; for as the number of voters is too great to admit of any attempt to dictate to them at elections, so there is little inducement to throw difficulties in the way of obtaining freedom. The income of the corporation, which arises chiefly from duties paid by those not free on articles of trade brought into the city, is so small as to be scarcely sufficient for the current expences. In history Cork has not been remarkable. Like most other parts of Ireland, it engaged in the interest of the impostor, Perkins Warbeck, which brought the citizens into some difficulty. In 1690 it was besieged by king William's forces, under the earl (afterwards duke) of Marlborough, and taken after a short resistance. The duke of Grafton, a natural son of Charles II., was killed at this siege.

Cork is 126 Irish miles S.W. from Dublin. The latitude of the observatory of the Cork Institution is $51^{\circ} 53' 54''$ N. Longitude W. from Greenwich, in time, $33^{\circ} 56''$; in degrees, $8^{\circ} 20'$. Smith, Young, &c. &c.

CORK, *Bisboprick of*, is supposed to have been founded in the seventh century. It was united with Ross by queen Elizabeth, in 1586; and they are both contained in the county of Cork, as is also the adjoining one of Cloyne. The Union is, in Irish miles, about 65 by 17; and in English, 83 by 23. The number of acres is 480,300, which are divided into 127 parishes, of which only 54 have churches. Beaufort.

CORK-BAY, a bay on the east side of Newfoundland island.

CORK, or CORKING of a saddle, are pieces of wood upon which the bolsters are made fast.

This part of the saddle was formerly made of cork, whence it still retains the name.

CORLAY, in *Geography*, a small town of France, in the department of the Côtes du Nord; is the chief place of a canton, in the district of Loudéac. The town contains 1483, and the canton 6481, inhabitants, dispersed in five communes, upon a territorial extent of $117\frac{1}{2}$ kilometers.

CORLIEU, in *Ornithology*, the name given by Albinus to the SCOLOPAX *totanus*, the spotted red-shank of Pennant, and spotted snipe of Latham.

CORLIN, in *Geography*, a small town of Prussian Pomerania, on the river Persante; 12 miles S.E. of Colberg. It has a few woollen manufactures.

CORLIS, in *Ornithology*, the common curlew, or SCOLOPAX *arquata*.

CORMA, in *Ancient Geography*, a river of Asia, in the territory of Chalontis, which discharged itself into the river Delos or Silla.

CORMALOS, a river of Asia Minor, in the Troad.

CORMANTIN, LITTLE, in *Geography*, a village of Africa, situated on the Gold Coast, three miles from Mawri, and a little below Aga; so called in contradistinction to Great Cormantin, from which it is distant $\frac{1}{2}$ miles W.S.W. The French and Portuguese formerly carried on a great trade with this place, in which the Dutch also shared, till it was discovered that the negroes adulterated the gold. About the year 1682, the Dutch resumed the trade, when they enlarged and strengthened Fort Amsterdams, the chief residence of the English, till they were forced to abandon it by De Ruyter, in 1665. The fort is a square stone building, fortified with four bastions, mounting 20 pieces of cannon; having convenient apartments for the officers and soldiers, and commanding fine views of the country and sea. Large cisterns, receiving the rain-water, supply the fort with water.

CORMANTIN, Great, a large and populous town, on the Gold Coast, in the territory of Fantin, standing about cannon-shot from the fort of Little Cormantin, on a high hill behind, and under the cannon of the fort. The town is occupied by a considerable number of merchants and fishermen, together with other inhabitants of different employments. Cormantin and Anamaboa were formerly the great marts of the English and Dutch commerce, as they were much frequented by the Akhaufce, who came hither with their goods in large caravans. N. lat. $5^{\circ} 5'$. E. long. $0^{\circ} 8'$.

CORMASA, or, as Polybius calls it, CURMASA, in *Ancient Geography*, a town of Asia, in Pamphylia.

COR-MASS, the name of a grand procession, said to have been established at Dunkirk during the dominion of Charles V., and renewed on St. John's day, the 24th of June. After the celebration of high mass, the procession, consisting of the several tradesmen of the town, begins. Each person has a burning taper of wax in his hand; and after each company comes a pageant, followed by the patron-saint, usually of solid silver, richly wrought and adorned. The companies are followed by music; and after the musicians, the friars, in the habits of their order, the secular priests, and then the abbot magnificently adorned, and preceded by the host. Machines likewise of various fantastical forms and devices, and as variously accounted, form a part of the shew on this occasion; which is described as one of the most superb and magnificent in the world, by an eye-witness, in 1755. Gent. Mag. vol. xxix. p. 263.

CORMELLES, in *Geography*, a small town of France, in the department of Eure, and district of Pontaudemer, with 1230 inhabitants. It is the chief place of a canton, which has 15 communes, and 10,063 inhabitants, on a territorial extent of 127 kilometers.—Also, a town of France, in the department of the Oise, and district of Clermont; 4 miles W.N.W. of Breteil.

CORMERY, a town of France, in the department of the Indre and Loire, and district of Tours; 7 miles S.E. of Tours.

CORMICY, a town of France, in the department of the Marne, and district of Reims; 10 miles N.W. of Reims.

CORMION, or LICONIUM, in *Ancient Geography*, a town of Asia Minor, situated on the Bosphorus of Thrace, and near the western bank of the river Aneretus. This small town lay to the east of the Hermezan promontory.

CORNIOX Sinus, a gulf of Asia Minor, in the Bosphorus of Thrace, over against the Hermezan promontory.

CORMOLAIN, in *Geography*, a town of France, in the department of the Calvados; 10 miles S.S.W. of Baveux.

CORMONS, a town of Germany, in the county of Goritz; 7 miles S.W. of Goritz.

CORMORANT, in *Ornithology*. See PELECANUS *carbo*, and *CORVUS aquaticus*.

CORMOS, or CORMON, in *Ancient Geography*, a town of Arcadia, on the frontiers of Laconia, near the source of the river Carrion, S.E. of Megalopolis. In the time of Pausanias, its ruins only were to be seen.

CORN, in *Agriculture*, a term applied to all sorts of grain fit for food; particularly wheat, rye, &c.

The farmers, indeed, rank under the denomination of corn several other grains; as barley, oats, and even pulse; as peas, vetches, &c. which, however, they sometimes distinguish by the denomination, *smaller corn*.

Europe, in every part of it; Egypt, and some other cantons of Africa, particularly the coasts of Barbary; and some parts of America, cultivated by the Europeans; and the Armenians themselves, produce corn. Other countries have maize and rice, in lieu of it; and some parts of America, both in the islands and continents, simple roots, such as potatoes, and manioc.

Egypt was anciently the most fertile of all countries in corn; as appears both from sacred and profane history. It furnished a good part of the people subject to the Roman empire, and was called the dry nurse of Rome and Italy. England, France, and Poland, seem now to have supplied the place of Egypt, and with their superfluities support a good part of Europe.

For the first discovery and culture of corn, authors are much divided: the common opinion is, that in the first ages man lived on the spontaneous fruits of the earth; as acorns, and the nut, or malt, produced by the beech; which, they say, took its name, *fagus*, from the Greek *φαγος*, *I eat*. It is added, that they had not either the use of corn, nor the art of preparing, or making it eatable. See *BAKING*.

Ceres has the credit of being the first that sowed the seed of corn, on which account she was placed among the gods; others give the honour to Triptolemus; others share it between the two, making Ceres the first discoverer, and Triptolemus the first planter and cultivator of corn.

Diodorus Siculus ascribes the whole to Isis; in which Polydore Virgil observes, he does not differ from the rest; Isis and Ceres being, in reality, the same. The Athenians pretend, it was among them the art began; and the Cretans, or Candiots, Sicilians, and Egyptians, lay claim to the same. Some think the title of the Sicilians best supported, that being the country of Ceres; and authors add, she did not teach the secret to the Athenians, till she had first instructed her own countrymen. Others say, Ceres passed first into Attica, thence into Crete, and, last of all, into Sicily; many of the learned, however, maintain, it was in Egypt the art of cultivating corn first began; and it is certain, there was corn in Egypt and the East, long before the time of Ceres. For the various modes of producing corn, and preparing it for use; see *HUSBANDRY*, and other articles appropriate to each kind of grain in this dictionary. For the best method of preserving corn, see *GRANARY*.

CORN *Laws*, in *Rural and Commercial Economy*, are those laws and regulations which relate to the importation and exportation, as well as general trade in grain. They are a set of rules and regulations which have undergone much change and alteration at different periods, but which still seem far from having attained that degree of perfection which is essential in so important an article of commerce. It has

been remarked by an able writer, that "almost every other manufacture may be admitted to a free trade; but as the trade of corn must at all times be limited by, and subservient to, the necessities of the state, it requires the attention of a careful and fostering parent." It is therefore contended, that the agriculture of the nation "ought to be guarded by the wisest laws and the strictest execution of them, as the only certain means of employing the greatest number of people, and consequently of increasing the population; and that it is the better entitled to this attention, that the farmer and the landholder pay a full proportion of all taxes imposed for promoting and protecting the sale of our other manufactures, both at home and abroad, as well as for the growth of corn at home."

Though very different principles have been laid down as the basis of these laws at different times, it seems evident that, as the strength and power of a nation must be proportioned to the extent and industry of its population, the chief attention of the framers of them should be directed to such measures as have an immediate tendency to encourage and promote the improvement of agriculture. It has indeed been contended; on the ground of long experience, that the foundation of such regulations should always be such as is calculated to induce the inhabitants to improve their grounds in such a manner as to raise the largest proportion of grain, the particular soil and climate is capable of permitting. And that this is "an object which can only be attained by securing a certain and steady market to the farmer for his produce; not only by preventing importation, but also, whenever it shall appear, from the moderate price of grain at home, that a greater quantity has been raised than is required for the annual supply of the inhabitants, by giving such a bounty on exportation, as shall ensure a ready vent for the excrement stock in foreign countries. It is not enough, says the able writer, that a nation raises, in general, a sufficiency of corn for the consumption of its inhabitants: it must be accustomed to raise considerably more, in order to afford plenty in bad seasons; and its annals ought to be distinguished by a greater or lesser exportation; but on no occasion ought it to be reduced to the necessity of importation, and having recourse to foreign countries for an expensive and precarious relief."

Mr. Young in his "Political Arithmetic" likewise remarks, in speaking of the obstacles which bad corn laws throw in the way of good husbandry, and of the want of permission to export grain in Spain, Portugal, and some parts of Italy, that he does not conceive it possible, "under such a system, to have a flourishing corn husbandry—prices will be too fluctuating—some years will be so cheap that the farmers will be ruined, and others so dear that the people will be starved. Long experience must convince us, continues he, that this is not only reasoning but fact. Famines never appear in countries that admit a free exportation; but in all above named, where a contrary policy has been pursued, they have appeared frequently and severely." And he farther observes that "the variations in the earth's products, owing to seasons, though not so great as some have imagined, whereby the husbandry is good, yet where it is indifferent, must necessarily be considerable." He thinks that one maxim may be laid down on this subject which can hardly be contradicted, which is, that "the good of husbandry requires that the price of corn should be proportioned to the product. Let us then, adds he, suppose the common consumption of a nation to be 5,000,000 of quarters of bread corn: the proportion between the common product and the common consumption must vibrate according to various circumstances.—Suppose a crop of 6,000,000 of quarters, and no exportation,

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what, he asks, must be the consequence? There is the surplus of a sixth in the markets, consequently the price is brought down much lower than that proportion. Here, says he, lies the misfortune. If corn in such a year yielded a price proportioned only to the plenty, the misfortune would not be great; but the addition in the markets of a sixth links the price probably a third, and perhaps more." And further, supposing "another good crop, with a new surplus of a sixth or seventh; this coming upon granaries full of a part of the former surplus, links the price yet lower; and then the farmers are not only discouraged, as, he says, several writers have observed, from sowing another crop, but what is as bad, they are impoverished so much that they cannot plough, harrow, dung, drain, ditch, fence, or do any thing with proper spirit. These two circumstances, inability in future to act well, and discouragement from sowing again, can hardly fail, he thinks, of occasioning in future years a scarcity, or probably a famine. Then the farmers reap of course a thin crop, from their former inability, and that too over only part of the land usually sown; in such a case, corn, he contends, must be very high to recompense the farmer; probably so high, that the government of the country is alarmed, and imports corn from wherever they can get it; then the price falls, when he again suffers. Thus a great crop or a bad one operates equally against him, and nothing can support him at all but such a product as pretty exactly answers the annual consumption. There is no balance preserved in the measures, exportation is prohibited, yet importation is allowed; so that it is impossible the price should with any regularity be such as can encourage good husbandry."

"On the contrary, if the policy of the state admits exportation, the surplus of a large crop being sent away, keeps the price at home, he maintains, from falling too low: this is an encouragement to the farmer acting two ways; first, by enriching him, he is able the better to improve all his culture; secondly, he is induced to sow as much corn as possible, for every man, whatever be his trade, is desirous of increasing that commodity which sells best at market."

The bounty on exportation, which was formerly given in this country, is considered as a refinement on this policy, and which, though given originally with the view of raising the price of grain, as an encouragement to the country gentlemen, yet it had the contrary effect, having rendered corn much more cheap, by becoming so great an inducement to the cultivation of it.

It is, in short, strongly contended, that "in such countries as will adhere to so destructive a system as that of restraining the export of corn, it is not of much consequence whatever advantages are given to husbandry, since all others united, that can be named, or thought of, will not make amends to the farmer for the want of a market: it is of no consequence to enable him to raise noble crops, if when he has got them, he cannot sell at a proper price; his plentiful harvests tend only to his ruin."

From the fullest consideration of the subject in various points of view, an able writer conceives it obvious, "that agriculture and manufactures are established on very different principles, and that whilst wealth and population raise considerably the money price of corn, and other rude produce of the soil, they have not an equal effect in advancing the price of manufactures." Hence, contrary to the opinion of the celebrated author of the *Wealth of Nations*, it is supposed the following political maxim may be fairly deduced: "that agriculture in rich and populous countries, stands more in need of a monopoly for its support than manufactures; and that the farther a nation advances in prosperity, it becomes the more necessary to secure its agriculture, not only by

restraining the importation of foreign corn, but also by removing every impediment which may prevent, and by giving every encouragement which may promote, the extension of cultivation and improvement over the whole face of the country."

Consequently, that, if this country wish "to preserve her present superiority in wealth and resources over the surrounding nations, agriculture must be protected by allowing to the husbandmen prices for their produce proportioned to the internal wealth and prosperity of the country; and that, if at any time, the bringing in of foreign corn tends to sink the money price of British grain below the corresponding value of labour and other commodities, the importation must be checked by judicious laws, altered from time to time, at different periods, to correspond with the prosperous or declining state of the country."

The principles on which the corn laws have been constructed at different times, so far as they can be traced and recognized, appear to have been these.

1st. That of cutting off the importation of corn from foreign countries, except when the price at home was very high.

2d. That of granting a bounty on the exportation of it, when it does not exceed certain prices.

3d. That of having recourse to both these measures according to circumstances; or what may be termed a sort of mixed or shifting policy, without any thing being permanent, without any regular law, or due arrangements of prices at which export should be allowed, or import be prohibited.

4th. That of lowering the import rates and duties, as well as that of the bounty, on exportation in a considerable degree, in order to reduce the prices of corn in the home market, to the state of former periods, and thus to introduce a permanent law in respect to corn by which the inconveniences of a varying policy may be remedied. And,

Lastly, That of regulating the import and export of corn, and the bounties and duties upon them, by the particular circumstances of the period, so that the farmer may obtain a fair and reasonable profit in the home market.

Having now considered the different objects which should be particularly attended to in constructing laws for the regulation of the commerce in grain, and shewn the principles on which they seem to have been in general founded, it may not be improper to trace the causes from which they proceeded, and the effects which they have produced at different times.

In regard to the corn laws of this country, as they existed previous to the revolution in 1688, it may be observed, that in order to preserve the laws of the kingdom in force, it was considered necessary, for several centuries after the conquest, to renew or confirm them upon the accessions of new sovereigns, a practice which explains the reason of the various confirmations of the great charter, and the frequent re-enactions of the same laws, on this subject, as well as others, without any new meaning appearing on the statute-book.

At this period, the rents of lands, held by farmers or tenants, were for the most part payable in produce, as in corn, cattle, or some other product afforded by the soil. And the rules by which the rents were received were extremely indefinite and irregular; the measures of grain being various, and taken heaped, nine bushels generally constituting the quarter. For though by the great charters of king John and Henry III., which had been often confirmed by succeeding kings and their parliaments, one weight

and measure had been directed to be made use of over all England, yet it was far from being the case, as is shewn by an act of 1360, the 25th of Edward III., in which the weights and measures are again attempted to be regulated; and in which it is directed, that eight bushels stricken and no more, shall be received as the quarter of grain, "but saving the rents and farms, and all manner of franchises of the lords." On which Mr. Dirom remarks, that, "with such reservations, it is not to be expected that the law could have any effect." And he adds, that, "under such impositions with the oppression of purveyance, and the depressed situation in life wherein the farmers were placed, it is not to be wondered that agriculture languished, and that a numerous community depended upon foreign provisions for their subsistence."

In tracing the progressive advances of agriculture from this depressed situation, it may be necessary to observe, that, at these periods, most of the business of the dealer or trader was carried on in the different markets and fairs of the kingdom, and that a large proportion of the revenue of the crown was drawn from the duties payable to the king, on the goods brought to them in order to be sold. And the barons had likewise, within their respective jurisdictions, tolls at the fairs. Hence it not unfrequently happened, that as the farmers and other dealers were conveying their corn and other necessaries to the markets and fairs to be disposed of, they were met by persons on the road, in order to purchase them for the purpose of retailing them at a higher price, in consequence of which, the king and the lords of the manors were deprived of the different duties payable upon them, and at the same time the price was enhanced on the people, in consequence of the diminished quantity brought to market. It of course became necessary, both on the score of public and private interest, to prevent the practice as much as possible, by the infliction of severe penalties; and various laws were enacted for the purpose at different times, the offenders being termed forestallers, regrators, and ingrossers.

Hitherto, as various laws had been formed with the view of inviting the importation of foreign articles of necessity, while the exportation of the superabundant stock of British grain had been prohibited, it cannot be supposed that agriculture had been encouraged as an object of national importance. About this period, 1393, however, a law was made, the 17th Richard II. c. 7, which authorized all the king's subjects to carry corn out of the kingdom, upon the payment of the customs and subsidies. And which was confirmed in 1425, referring to the king and council, power to restrain the exportation when they should judge it necessary.

However, from this reservation being construed into a prohibition to export grain without a licence, or from the difficulty of procuring the licence, the beneficial consequences to be derived from it were prevented; and from the check which was thus given to the art of cultivation, much inconvenience and distress experienced in the country, as is fully shewn by the preamble to the law of 1436, the 15th Henry VI. c. 2, by which it was followed, and in which liberty was given to persons to transport grain, without a licence to wherever they chose, except to the enemies of the king, when wheat was at 6s. and 8d. and barley at 3s. the quarter; which were sums rather above the medium prices, being in the proportion of the present money of 2l. 4s. for the quarter of the former, and 19s. 10d. for that of the latter.

The advantage of this law had been found so beneficial to the country in restoring abundance of grain, that it was in

1442 and 1444, confirmed and continued for ten years as well as soon afterwards made perpetual, by the acts of 20 Henry VI. c. 6. and 23 Henry VI. c. 5: and the effects of which, so far as they can now be discerned, were those of a very moderate and more steady, or less fluctuating, price of corn for forty years.

However, notwithstanding this, the laws favouring the importation of foreign grain still continued in force; and the trade was in the hands of foreign merchants or dealers, who conveyed their corn or other articles from one port to another, so as to anticipate the English farmers in the sale and disposal of their grain or other produce. And it is suggested by Mr. Dirom in his "Inquiry into the Corn Laws and Corn Trade," that, "although those merchants may have lost upon the grain which they imported into England at this time, they gained upon the general course of the trade; because they received in return, wool, unfinished woollen cloth, and ready money, upon which they made great profit in their own countries, and thus were enabled to undersell the produce of our fields at home."

Further, "this appears to have been the case, even after this period, from two restrictive and regulating laws of Richard III. 1. c. 8, 13, by the last of which it appears, that the foreign merchants who imported wines into England, had not only taken their payment two-thirds in woollen cloth, and one-third in ready money, but had considerably lessened the contents of their wine casks, although sold under the former titles and contents."

The inconvenience and consequent distress to which the business of cultivation was exposed, by the constant importation of foreign grain, at length awakened the attention of the legislature, and in 1463, a preventive law was made, 3 Edward IV. c. 2; some of the causes of which seem to have been, that the labourers or cultivators and occupiers of land, had been grievously injured by the importation of foreign grain, when corn at home was at a low price; by which the importation of foreign grain was prohibited, until the prices at home should exceed 6s. 8d. the quarter for wheat, 4s. for rye, and 3s. for barley; which is in the proportion of 1l. 15s. 2d. 1l. 1s. and 15s. 10d. of the present money.

The able author quoted above, considers these as the laws to which the agriculture of this country owes its origin; and that notwithstanding their objects have frequently been defeated by others, they are the basis or foundation which still remains; and on which a great fabric, now out of repair, has been erected; but which, by "moderate attention, may long continue to be the chief ornament and support" of the kingdom. It was on these laws, he adds, that the agriculture of the country rested for nearly a century; though the want of their being duly executed, rendered them in a considerable degree nugatory. For as the prohibition of the importation of foreign grain, was never sufficiently regarded; the occupiers of land had still to contend with the competition of grain from abroad as well as other oppressions and grievances at home; as is fully shewn by an act made in the year 1552 against regrators, forestallers, and ingrossers, the 5 and 6 of Edw. VI. c. 14; "by which the crime of forestalling is extended to persons buying victuals coming in ships from beyond the seas, to be sold in any market or fair, city, port, haven, creek, or road, as if no laws had subsisted by which such importation had been prohibited." And after observing that although the "repression of the practices of forestalling and regrating might have been necessary," it is not easy to discover any cause "for the enactment of ingrossing;" at a period so late as this when commerce had made such considerable advances: and further that, "by the same law, no person

perform at home could transport corn from one port to another without a licence; neither could they purchase corn to be laid up in their granaries for home sale, until the quarter of wheat was at, or under, *6s. 8d.* (equal to *16s. 6d.* of present money): malt and barley at *3s. 4d.* (*8s. 3d.*); oats at *2s.* (*4s. 11½d.*); pease and beans at *4s.* (*9s. 11d.*): and rye at *5s.* (*12s. 5d.*) per quarter."

By these means it is contended that the former system of corn laws was wholly subverted, for that, "although these were the prices to which exportation was limited by the act of Edward IV. in 1463, the value of money was materially changed; for, at the former period, there were only *37s. 6d.* in the pound of silver, and now there were *60s.* and at the former period, money bore a very high and unlimited interest, and now, it yielded only about *12 per cent. per annum*; so that *6s. 8d.* for a quarter of wheat, in 1463, was equal to *11. 15s. 2d.* and in the year 1552, it was only equal to *16s. 6d.*" as has been noticed above. And further that the prohibition to the purchasing of grain for storing up or conveying coast-ways, till the price should sink beneath the expense of raising it, must have necessarily put a total stop to all dealings in grain and of course ruin the farmers; all of which was done at a period when the price of corn had been invariably at a low state. It is supposed not to have occurred to the legislature at this period, that by keeping the grain at home in seasons of great plenty the price must be enhanced, as the farmers would not be capable of continuing their trade of raising grain under such disadvantageous circumstances; of course, that as soon as the stock on hand was consumed, scarcity if not famine must be the consequence; nor that by permitting an exportation of the excess of stock, plenty would be ensured, by preserving an open market to the farmers, and in that way enabling them to carry on their business, and raise more grain than was in general necessary for the home consumption: nor was the benefit that would arise to the nation, from the increased number of persons who might be engaged in raising and exporting the quantity of corn that could be spared, or the sums of money which would be brought into the country as the price of it, in the least attended to.

It seemed to have proceeded on the idea that the only mode of preserving plenty, was that of keeping the whole of the corn and other provisions at home, and importing as much as possible from abroad, which appears from experience to be far from having any foundation in truth.

However, the same system was farther enforced and followed out by the enacting of another law this year 1554, 1 & 2 Phil. & Mary, c. 5. under the supposition of injury from the exportation of corn and other victuals; by which it was provided that "no manner of person or persons should export any wheat, rye, barley, or other sort of grain, growing within England; or any malt made within the same; or any butter, cheese, herring, or wood, without having licence for to do, under severe penalties; except when the common price of corn, within England, should not exceed for wheat *6s. 8d.* (equal to *16s. 6d.* of present money): rye *4s.* (*9s. 11d.*) and barley *3s.* (*7s. 5d.*) per quarter.

Such was the policy of Edward IV. as well as of Philip and Mary, notwithstanding the price of wheat this and several years before, had been only *8s.* the quarter (equal to *19s. 10d.* of present money); and the export prices below the medium ones in times of ordinary plenty; and in Scotland it was soon afterwards followed by laws expressly prohibitory under very severe penalties of the exportation of all sorts of victuals, tallow, and flesh. Mary par. 6. c. 40. Jas. par. 11. c. 55.

After the enacting of this law, from the seasons being

favourable and the importation of foreign grain being continued, though the price of wheat remained about *8s.* the quarter; the farmers became ruined, and the business of cultivation much relinquished; which strongly marks the absurdity of directing persons to labour in occupations in which they cannot procure a reasonable subsistence. The excellent laws of Henry VI. and Edw. IV. had continued without repeal throughout the reigns of Henry VII. and VIII. without, however, being countenanced or having any execution, yet these sovereigns, as well as Edw. VI. and Philip and Mary, made repeated laws to enforce the people to cultivate and sow their grounds, 4 Hen. VII. c. 10. 7 Hen. VIII. c. 1. 27 Hen. VIII. c. 22; 5 and 6 Edw. VI. c. 15. 2 and 3 Phil. and Mary c. 2. those of the latter being particularly prejudicial in repressing the spirit of husbandry.

These inconsistencies did not however escape the attention of Elizabeth, as almost immediately upon her accession she not only renewed the laws which formerly existed for rebuilding farm houses, and tilling the land formerly in cultivation with greater vigour, 5 Eliz. c. 2. but by another law 5 Eliz. c. 5. § 26. permitted farmers to export their corn as merchandise, when the price was not high at home, as when wheat did not exceed *10s.* the quarter, equal to *11. 8s.* of present money, rye, peas or beans, *8s.* (*16s. 7d.*) barley and malt *6s. 8d.* (*13s. 10d.*) And as in the former of these laws, the penalties had been given to the king, they were now given to the next heir, &c. of the person offending. By this means a considerable extension of the exportation prices took place, which is remarked by the best writers of that period to have had a direct and immediate effect in the increase of tillage and the reduction of importation, though it had been observed by one of them that for several years preceding that time, "the importation of grain had exceeded forty-five millions of livres." These are probably the first traces of the navigation laws.

Not long after this, in 1570, a still more vigorous effort was made to restore the agriculture of the country, in a law enacted for the better increase of tillage, &c. 13 Eliz. c. 13. by which exportation was permitted, without limitation of prices, from such ports and creeks, in which a customer or collector of the subsidy of tonnage and poundage, had been placed, to any part beyond the seas in amity with England, when not restrained by proclamation, provided such exportations were made in ships belonging to English born subjects residing within the dominions; at such times as the several prices of grain should be so reasonable and moderate, when such exportations were intended, as that no prohibition should be made by the queen's proclamation, or by the presidents of the North, or of Wales, within their several jurisdictions; or of the justices of assize at their sessions, in other shires out of the jurisdiction of the said two presidents and councils; or by the major part of the justices of peace of the county at their quarter sessions. Thus, these different magistrates were to annually confer and deliberate with the inhabitants of the county concerning the prices of the different sorts of corn within their jurisdictions, in regard to its cheapness or dearness, and by their discretion decide whether it would be meet, at any time, to prevent any grain from being carried out of the realm, by any port within their jurisdictions or limits, and by a writing under their hands and seals, make a determination, either for permission or prohibition, and cause the same to be published by the sheriffs of the several counties; which was to continue in force until the same should be altered, by the said presidents and councils, or other powers respectively, except the same should, in the mean time, be countermanded by the queen, her heirs or successors; or by some order of the justices

judges of peace, in the counties situated out of the jurisdiction of the said two councils, in their quarter sessions to be holden in the mean time, or the greater part of them, should find the determination of the judges of assize to be hurtful to the country, in consequence of the dearth, or a great hindrance to tillage, in consequence of the great cheapness; which determination was in like manner to be published, and continue in force until a new regulation should be made; except the same should in the mean time be altered by the queen, her heirs or successors: provided always, that these preachers &c. should not publish their determinations, until the same was first notified to, and approved by, the queen, or her privy council: and that the custom or poundage be paid upon exportation: provided likewise, that the queen, her heirs and successors, might at all times by proclamation, prohibit exportation, either generally from all the ports of the realm, or particular ports only.

Mr. Dirom supposes the corn trade, in this case, to have been considered in a scientific manner: and that if the plan marked out had been properly digested and modified, as well as the duties upon exportation removed, there could have been no doubt of the act producing the most beneficial consequences to the kingdom; but the judges, to whom this important business was intrusted, had no certain rule by which to direct their proceedings, not being permitted to determine, by the price of grain at the time of their annual inquiry, the only certain index of plenty or deficiency, but simply upon a conference with the people of the country, to decide whether it would be hurtful to the kingdom, from the dearth, or a great hindrance to tillage, from the too great cheapness, to admit the exportation of corn, than which, he thinks, nothing could be more vague and uncertain. But further that, "whatever consideration might have been given to the framing of this act, the laying a duty of twenty *per cent. ad valorem* upon grain to be exported by licence, and ten *per cent.* upon grain to be exported by the statute, was equal to prohibition, and gave full scope to the importation of foreign grain, which was still (he says) received without the payment of any duty."

However, "in Scotland, the prohibition to export grain to foreign parts was continued under severe penalties;" as by Jas. 6. par. 11. c. 55.

Judging concerning the effects of the preceding law of England, from the prices of grain immediately subsequent to it; they do not seem to have been favourable, as the price of the quarter of wheat in 1574 was 2*l.* 16*s.* equal to 5*l.* 15*s.* 8*d.* of present money; and in 1587 not lower than 3*l.* 4*s.* equal to 6*l.* 12*s.* 8*d.*

In 1593, the corn laws seem to have again undergone a sort of revision, though the reason is not by any means explained; but they are taken notice of in an act, the 35 Eliz. c. 7. made for the adjusting of other acts, and which is entitled, "An Act for revising, continuance, explanation, and perfecting of divers Statutes:" by which it would seem, that the absurd and impracticable scheme of forcing the people to labour or cultivate their land, whether they could live by such means or not, had been given up; as the act passed in the 5th of the present reign was now repealed, and the plan laid down by that of the 13th appears likewise, from other circumstances, to have been relinquished, though the act itself is neither mentioned nor repealed, as the resolutions of the legislature are found to be changed by the 23d section of the present act: by which exportation was permitted, when wheat was at 20*s.* the quarter (equal to 2*l.* 1*s.* 4*d.* of present money); rye, pease, and beans, at 13*s.* 4*d.* (1*l.* 7*s.* 8*d.*); and barley and malt at 12*s.* (1*l.* 4*s.* 10*d.*); which are exactly double the prices at which exportation was per-

mitted by the former law of the 5th. However, at the same time, the duties payable upon corn, exported by force of the statute, were doubled; which, together with an unlimited importation, without the payment of any duty whatever, amounted to a prohibition, and consequently rendered the act nugatory, keeping the price of grain at an extravagant height; as, in 1594, the quarter of wheat sold at 2*l.* 16*s.*, equal to 5*l.* 15*s.* 8*d.*; in 1595, at 2*l.* 13*s.* 4*d.*, equal to 5*l.* 10*s.* 2*d.*; in 1596, at 4*l.*, equal to 8*l.* 5*s.* 4*d.*; and in 1597, at 4*l.* 12*s.*, equal to 9*l.* 10*s.* of present money.

The laws concerning grain continued, however, in this situation till 1604, when, on the accession of James I. to the crown, various statutes were revised; some continued, and others repealed, without any specific reason being given; and one was enacted in respect to grain, the 2 Ja. I. c. 25. § 26, 27. by which the exportation prices were considerably increased; namely, when the quarter of wheat was at 26*s.* 8*d.* (equal to 2*l.* 13*s.* 4*d.* of present money); the quarter of rye, pease, and beans, 15*s.* (1*l.* 10*s.*); the quarter of barley and malt, 14*s.* (1*l.* 8*s.*); provided the grain was carried abroad in ships belonging to English born subjects; reserving to the king, his heirs, and successors, the power to restrain, by proclamation, the exportation from the realm in general, or from particular places. But from exportation being still, under this act, encumbered with duties, it is obvious that the complete operation of it must have been greatly retarded or prevented.

And in another revising act of the same reign, 21 Ja. I. c. 28. § 3, 4. in the sections relating to grain, the exportation prices were still farther extended, under similar terms with the former act; namely, the quarter of wheat at 32*s.*, the quarter of rye at 20*s.*, the quarter of pease and beans at 16*s.*, and the quarter of barley and malt at 16*s.*, of current English money. This extent of 32*s.* for wheat was equal to 3*l.* 4*s.* of present money; 20*s.* for rye, to 2*l.*; and 16*s.* for barley and malt, pease and beans, to 1*l.* 12*s.*: which different sums are nearly double the medium prices of the present time, consequently very great, having obviously the extension of revenue in view. Besides this, the penalties for ingrossing were obviated by this act, while the prices of grain did not exceed those stated in it, which was become essentially necessary, in order to restore the internal as well as external trade in corn, which they had nearly put a stop to.

But the duties upon exportation having still been kept up, the proper effects of the law could not be produced.

In 1627, not long after the accession of Charles I., it was again renewed in exactly the same terms. 3 Cha. I. c. 5. § 24, 25. It is, however, remarked by Mr. Dirom, that "although the export prices were literally the same, they were very different in fact; for, in the year 1624, the yearly interest of money having been reduced from 10 to 8 *per cent.*, 32*s.* for a quarter of wheat, which, in 1623, was equal to 3*l.* 4*s.*, was, in 1627, equal to only 2*l.* 11*s.* 2*d.* of present money;" and so in proportion, in respect to the prices of other grain. It is conceived that the long interval of parliament, after the session in which this act passed, and the confusion which quickly succeeded the meeting of the following parliament, in 1640, were probably the causes of no farther attention having been had to the business during the remainder of the reign.

Though, from the unfortunate circumstance of connecting the corn laws with the revenue, the excellent institutions of the reign of Elizabeth, and those of her two immediate successors, had in a great degree been frustrated, agriculture had, in other respects, been treated by the laws as an object of much importance; not merely in the view of the numbers employed

employed in it, or the intrinsic value of the produce which it afforded, but likewise in consequence of the support which would be given to the navy, from the export trade, arising from it. On the restoration of Charles II. however, it was inconsiderately abandoned, being treated merely as an object of revenue.

In the year 1660, without the least reason being stated for any alteration in the corn laws, in a section of the act of tonnage and poundage, 12 Cha. II. c. 4. § 11. corn is considered in the same list or roll with other articles, on which duties are made payable. The exportation prices of grain were still more extended; but the duties were raised so high, as to be equal to a prohibition. Importation was also permitted; but the duties here likewise operated as a prohibition. The prices let for the exportation of wheat being 40s., equal to 2l. 8s. of present money; 2l. 8s. for the quarter of rye, pease, and beans, equal to 1l. 8s. 10d.; 20s. for the quarter of barley and malt, equal to 1l. 4s.; and 16s. for the quarter of oats, equal to 19s. 2d. And further by this act, the duties payable on exportation were 20s. for the quarter of wheat, equal to 1l. 4s.; 10s. for the quarter of rye, pease, beans, barley, malt, and buck wheat, equal to 12s.; and 6s. 8d. for the quarter of oats, equal to 8s. And by the same act, the rates inward, or duties on importation, were thus regulated: for the quarter of wheat, when the price, at the place of importation, did not exceed 44s., equal to 2l. 12s. 10d. the sum of 2l., equal to 2l. 8s.; and when it exceeded that price, 6s. 8d., equal to 8s. of present money. For the quarter of rye, when not exceeding in price as above, 36s., equal to 2l. 3s. 2d., the sum of 1l. 6s. 8d., equal to 1l. 12s.; and when it exceeded that price, 5s., equal to 6s. of present money. For the quarter of pease, beans, barley, and malt, not exceeding in price as above, 1l. 6s. 8d., equal to 1l. 12s., the sum of 1l. 6s. 8d., equal to 1l. 12s.; and when it exceeded that price, 5s., equal to 6s. of present money. Consequently, Mr. Dirom observes, that until the price of wheat per quarter was higher than 2l. 12s. 10d. of present money, and that of other grain in proportion, from the importation high duties acting as a prohibition, and exportation being in fact prohibited, prices would quickly rise, and bring the country to import at the low duties; a circumstance which, he says, accordingly happened: "for, in 1660, the quarter of wheat sold at 2l. 16s. 6d., equal to 3l. 7s. 9d. of present money;" "in 1661, it rose to 3l. 10s., equal to 4l. 4s.; and in 1662, to 3l. 14s., equal to 4l. 8s. 10d. of present money." He adds, that these laws, in addition to their having raised the price of grain to an "extravaгант height, had ruined many of the farmers;" and that agriculture declined, a great part of the lands lying without tillage or cultivation.

In consequence of this, the corn laws were again taken into consideration in 1663, the preamble to the act concerning which, 15 Cha. II. c. 7. § 1, 2, 3, 4, sufficiently shews the deplorable state into which husbandry had fallen; and it would seem that the legislature was now seriously anxious to afford it encouragement. By this law, the exportation prices were extended beyond their former limits: that of the quarter of wheat being fixed at 48s., equal to 2l. 17s. 7d. of present money; the quarter of buck wheat, barley, or malt, 28s., equal to 1l. 13s. 7d.; the quarter of oats, 13s. 4d., equal to 16s.; the quarter of rye, pease, and beans, 32s., equal to 1l. 18s. 5d. current English money: but the exported grain being still suffered to continue loaded with nearly 50 per cent. of duties, it operated as a prohibi-

tion. While, on the contrary, the high duties on importation were removed, and when the prices of grain did not exceed the same rates limited for exportation, or when grain was at the lowest price, importation was allowed, on the payment of about 9 per cent. of duties *ad valorem*, which were much lower than the low duties fixed by the act of tonnage and poundage. These duties were, for every quarter of wheat, 5s. 4d., equal to 6s. 5d. of present money; for every quarter of rye, 4s., equal to 4s. 10d.; for every quarter of barley or malt, 2s. 8d., equal to 3s. 2d.; for every quarter of buck wheat, 2s., equal to 2s. 5d.; for every quarter of oats, 1s. 4d., equal to 1s. 6d.; and for every quarter of pease and beans, 4s., equal to 4s. 10d.

By the introduction of the monosyllable *not*, in the clause of the act which relates to importation, it is observed, the meaning of the whole was perverted; as it never could have been the design of the framers of the act to a low importation at low duties, till grain had risen above the prices fixed for exportation; as, until that rise, the prohibition to *ingross* was taken off, and similar reasons influenced both cases.

This is rendered still more probable by a law of Scotland, Cha. II. par. 1. *sess.* 3. c. 12. 14. of the same year; in which the powers of exportation were extended, referring to the king and privy council to restrain or prohibit it as they should judge necessary; while a duty of about 40 per cent. *ad valorem* was laid upon grain imported, when the prices did not exceed those of exportation, namely, for ilk boll of wheat, under 12l., equal to 1l. 4s. of present money; bear and barley, under 8l., equal to 16s. the boll; and oats and pease, under 8 *merks*, equal to 10s. 8d. the boll; with power to the king and council to remit the duties, if the prices should rise.

In this case Mr. Dirom contends, that "the Scotch parliament clearly took the lead in the liberal and wise exercise of their powers, for the encouraging of agriculture, and thereby procuring plenty and cheapness of provisions." He adds, that "they permitted the exportation of all sorts of grain, when the prices at home were moderate, upon payment of a small duty; and as long as the prices remained in that situation, the duties payable upon importation were equal to a prohibition: and they gave unlimited powers to export cattle, and barrelled stiches of all kinds, without the payment of any duties: while, in England, importation was permitted, when the price of corn at home was at the cheapest rate, upon payment of a low duty; and the duties upon exportation, when the price of corn was in the same situation, amounted to a prohibition."

And in 1669, the parliament of Scotland, from reconsidering the subject, and finding that the exportation of corn had been impeded by the duty payable upon the same, now removed all duties, except a merk the chaldre, equal to 1s. 4d. of present money, payable upon corn exported, when the prices at home did not exceed those stated in the act of 1663. Cha. II. par. 2. *sess.* 1. c. 14. And in order to prevent any debates that might arise concerning the respective prices of victual, when the same were under or above the rates expressed in the said act, they recommended to, and authorized, the lords of the privy council to determine the same; declaring that it should be lawful for his majesty's subjects to export corns of all sorts, unless prohibited and discharged from doing the same, by a proclamation or public intimation from the said lords of council.

In 1670, a revision of the corn laws again took place, probably in consequence, as Mr. Dirom suggests, of the continual drain upon England for the payment of the price of the large quantities of grain imported; and by a law now

passed, entitled, "An Act for Improvement of Tillage, and the Breed of Cattle, for the common Good and Welfare of the Kingdom," it was enacted as lawful for every person, native or foreigner, to transport, at any time, as merchandise, all sorts of corn, although the prices exceeded the rates in the act of the 15th of the present reign; paying for the same the rates expressed in the act of tonnage and poundage. And that in cases where the prices of grain, at the places of importation, should not exceed the rates, as follows; there should be paid for custom these rates, namely, for every quarter of wheat, when the same should not exceed 53*s.* 4*d.*, equal to 3*l.* 4*s.* of present money, the sum of 16*s.*, equal to 19*s.* 2*d.*; when the same should exceed 53*s.* 4*d.*, and not exceed 4*l.*, equal to 4*l.* 16*s.*, there should be paid 8*s.*, equal to 9*s.* 7*d.*; for every quarter of rye, when the same did not exceed 40*s.*, equal to 2*l.* 8*s.*, the sum of 16*s.*, equal to 19*s.* 2*d.*; for every quarter of barley, malt, or buck wheat, when the same did not exceed 32*s.*, equal to 1*l.* 8*s.* 5*d.*, the sum of 16*s.*, equal to 19*s.* 2*d.*; for every quarter of oats, when the same did not exceed 16*s.*, equal to 19*s.* 2*d.*, the sum of 5*s.* 4*d.*, equal to 6*s.* 5*d.*; and for every quarter of pease and beans, when the same did not exceed 40*s.*, equal to 2*l.* 8*s.*, the sum of 16*s.*, equal to 19*s.* 2*d.* And that when the prices of corn should exceed the aforesaid rates, there should be paid the former custom and poundage: imagined to have been intended to be, by the act of 1663, 5*s.* 4*d.*, equal to 6*s.* 5*d.*, for wheat; 4*s.*, equal to 4*s.* 10*d.*, for rye, pease, and beans; 2*s.* 8*d.*, equal to 3*s.* 2*d.*, for barley and malt; and 1*s.* 4*d.*, equal to 1*s.* 6*d.*, for oats. 22 Charles II. c. 13. § 1, 2.

The above mentioned writer supposes that this law was without doubt designed to promote the exportation of English corn, and to restrain, if not prohibit, the importation of grain from abroad; but that the former was completely prevented, from the high duties continued upon it; and that the latter was rendered nugatory, in consequence of no rule being laid down for ascertaining the price of grain, at the time or place of importation: of course the trade continued to be carried on, on the payment of the low duties; agriculture languished; the dealers finding their account in feeding the populace with foreign grain, the prices of course keeping high: the average price of the quarter of wheat, for the ten years preceding this period, having been 2*l.* 8*s.* 10*d.*, equal to 2*l.* 18*s.* 8*d.* of present money. It is suggested, that by these laws the poorer sort of farmers became ruined, and the richer were weakened, being necessitated to turn their attention from corn to live stock, or any other objects by which they could support their families: the price of corn consequently rose on the manufacturer and labourer; and the importer of foreign grain became an important

man, upon the ruins of the landholders, farmers, and others.

Notwithstanding this, the rest of this thoughtless and inattentive reign passed away without any alteration being made, though it continued for a period of fifteen years afterwards. Grain, of course, kept high in price: the average of the quarter of wheat, for the twenty years, from 1660 to 1680, having been 2*l.* 9*s.* 9*d.*, equal to 2*l.* 19*s.* 9*d.* of the present money.

In 1685, on the accession of James II., the evasion of the duties payable on imported corn, and the distress caused by the vast importation of grain from abroad, were brought under the consideration of the legislature; and another act for the improvement of tillage passed, 1 Ja. II. c. 19, by which the defect of the above law was endeavoured to be obviated; it being there referred to the justices of the peace, in the several counties of England, where foreign grain might be imported, at their quarter sessions, after Michaelmas and Easter, on the oaths of two or more substantial persons, neither being merchants nor factors for the importation of corn, nor anywise concerned or interested in the corn to be imported, and each having a free estate of 20*l.* per annum, or a leasehold of 50*l.* per annum, to determine the prices of the several kinds of grain, which they were to certify to the principal officer of the customs in the several counties, for his rule and regulation.

The importation of victual from Ireland had been prohibited in Scotland, under very severe penalties, Char. II. par. 2. seff. 3. c. 3, only referring to the lords of the privy council power to admit of it, for such times as they should think proper, when the price within the kingdom should be at or above 8*l.* Scots, equal to 16*s.* of present money, for bear and meal; and 10*l.*, equal to 20*s.*, for wheat per boll. But in this year, 1686, by the act of Ja. VII. par. 1. seff. 3. c. 14, a total prohibition was enforced; all victual which should then be imported, being directed to be sunk or destroyed.

It is remarked by the writer we have quoted above, that for the ten years from 1650 to 1660, the average price of the quarter of wheat in this country had been 2*l.* 9*s.* 6*d.*, equal to 2*l.* 19*s.* 5*d.* of present money; that from the latter period to 1670, it had been 2*l.* 8*s.* 10*d.*, equal to 2*l.* 18*s.* 8*d.*; from this last period to 1680, it had been 2*l.* 10*s.* 8*d.*, equal to 3*l.* 0*s.* 10*d.*; and that from 1681 to 1685 inclusive, it had been 2*l.* 4*s.* 3*d.*, equal to 2*l.* 13*s.* 1*d.*

But the unfavourable tendency of the above system of corn laws is more fully shewn by the scale of prices, fixed by them for the exportation and importation of wheat, in the following tables, from 1360 to 1688, as taken from the above excellent work.

C O R N.

TABLE of Exportation Prices and Duties for Wheat.

ENGLAND.

	Exportation Prices <i>per Quarter.</i>		Anno Domini	Anno Regis.	Exportation Duties <i>per Quarter.</i>		
	Present Money.	Money of the Time			Money of the Time.	Present Money.	
	<i>£. s. d.</i>	<i>£. s. d.</i>			<i>£. s. d.</i>	<i>£. s. d.</i>	
Permitted	0 0 0	0 0 0	1360	34 Edward III.	0 0 0	0 0 0	by statute. by licence.
	0 0 0	0 0 0	1393	17 Richard II.	0 0 0	0 0 0	
	0 0 0	0 0 0	1425	4 Henry VI.	0 0 0	0 0 0	
	2 4 0	0 6 8	1436	15 Henry VI.	0 0 0	0 0 0	
	0 16 6	0 6 8	1554	12 Phil. & Mary	0 0 0	0 0 0	
	1 0 8	0 10 0	1562	5 Elizabeth.	0 0 0	0 0 0	
	0 0 0	0 0 0	1570	13 Elizabeth.	0 1 0	0 2 1	
	0 0 0	0 0 0			0 2 0	0 4 2	
	2 1 4	1 0 0	1593	35 Elizabeth.	0 2 0	0 4 2	
	2 13 4	1 6 8	1604	2 James I.	0 2 0	0 4 0	
	3 4 0	1 12 0	1623	21 James I.	0 2 0	0 4 0	
	3 11 2	1 12 0	1627	3 Charles I.	0 2 0	0 3 2	
	2 8 0	2 0 0	1660	12 Charles II.	1 0 0	1 4 0	
	2 17 7	2 8 0	1663	15 Charles II.	1 0 0	1 4 0	
	Without limitation of prices	0 0 0	0 0 0	1670	22 Charles II.	1 0 0	

SCOTLAND.

	Prices <i>per Boll.</i>			Anno Regis.	Duties <i>per Boll.</i>	
	Present Money.	Money of the Time.	Anno Domini		Money of the Time.	Present Money.
	<i>£. s. d.</i>	<i>£. s. d.</i>			<i>£. s. d.</i>	<i>£. s. d.</i>
Prohibited	0 0 0	0 0 0	1587	20 James VI.	0 0 0	0 0 0
Permitted when under	1 4 0	12 0 0	1663	15 Charles II.	0 5 0	0 0 6
	1 4 0	12 0 0	1669	21 Charles II.	0 0 10	0 0 1

TABLE of Importation Prices and Duties for Wheat.

ENGLAND.

	Importation Prices <i>per</i> Quarter.		Anno Dom.	Anno Regis.	Importation Duties <i>per</i> Quarter.	
	Present Money.	Money of the Time.			Money of the Time.	Present Money.
	£. s. d.	£. s. d.			£. s. d.	£. s. d.
Invited - - - -	0 0 0	0 0 0	1202	3 John.	0 0 0	0 0 0
Invited - - - -	0 0 0	0 0 0	1215	16 John.	0 0 0	0 0 0
Invited - - - -	0 0 0	0 0 0	1266	9 Henry III.	0 0 0	0 0 0
Invited - - - -	0 0 0	0 0 0	1297	25 Edward I.	0 0 0	0 0 0
Invited - - - -	0 0 0	0 0 0	1328	2 Edward III.	0 0 0	0 0 0
Invited - - - -	0 0 0	0 0 0	1358	25 Edward III.	0 0 0	0 0 0
Permitted - - - -	1 15 2	0 6 8	1463	3 Edward IV.	0 0 0	0 0 0
When not above	2 12 10	2 4 0	1660	12 Charles II.	2 0 0	2 8 0
When above that price	0 0 0	0 0 0			0 6 8	0 8 0
When not above - - -	2 17 7	2 8 0	1663	15 Charles II.	0 5 4	0 6 5
When not above - - -	3 4 0	2 13 4	1670	22 Charles II.	0 16 0	0 19 2
From that price to	4 16 0	4 0 0			0 8 0	0 9 7
And when above that price	0 0 0	0 0 0			0 5 4	0 8 0

SCOTLAND.

	Prices <i>per</i> Boll.		Anno Dom.	Anno Regis.	Duties <i>per</i> Boll.	
	Present Money.	Money of the Time.			Money of the Time.	Present Money.
	£. s. d.	£. s. d.			£. s. d.	£. s. d.
Permitted - - - -	0 0 0	0 0 0	1663	15 Charles II.	3 0 0	0 6 0
Prohibited - - - -	0 0 0	0 0 0	1672	25 Charles II.	0 0 0	0 0 c
Prohibited - - - -	0 0 0	0 0 0	1686	2 James VII.	0 0 0	0 0 0

It is considered by Mr. Dirom as extraordinary, that the advantage which must necessarily accrue to a nation from raising the utmost possible quantity of corn, and exporting such portions of it as the consumption at home does not demand, should, for such a great length of time, have been misunderstood in this country; especially since the example of the neighbouring states, constantly bartering their excrecent stock of this article for the raw materials and money of the kingdom, could scarcely have escaped notice for such a number of centuries. The importation trade is considered as operating, in various ways, in direct opposition to the benefit of the country: in consequence of which, agriculture became in a declining state; much of the ground was without cultivation; there was a decrease in the population, a proportionate reduction in the public revenue necessarily took place; and the number of remaining manufacturers were of course fed at an exorbitant price, by the products of

foreign lands, the inhabitants of which were not unfrequently at enmity with us, but who drew vast sums from the country, and thus robbed it of its riches.

But we now approach a period in which a different system was acted upon, and in which a very material change took place in the laws respecting corn; but which was not accomplished by simply reviving or amending the old acts, or by merely reducing the duties upon exported grain, but by at once giving up every idea of revenue from grain raised at home; and thus holding out a new system which should invigorate and encourage the cultivation of the soil, while it afforded a new stimulus to the trade and navigation of the country.

In 1688, not long after the accession of William and Mary to the crown, the subsequent important act for encouraging the exportation of corn was passed, 1 Will. & Mary, c. 12. and *ibid.* c. 24. § 18, by which exportation was permitted from

from England, when the prices at home did not exceed the following rates: malt or barley, 2*s.* the quarter, Winchester measure, equal to 28*s.* 10*d.* of present money; rye, 32*s.*, equal to 38*s.* 5*d.* per quarter; and wheat, 48*s.*, equal to 2*l.* 17*s.* 7*d.* the quarter; provided it was made in English shipping, the maller and two-thirds of the mariners, at least, being subjects of that state, and the exporter producing a certificate under his hand, of the quantity of grain shipped, to the collector of the customs at the port where the grain had been shipped, and proving the said certificate by the oaths of one or more credible persons; and upon bond, of at least 200*l.* for every 100 tons of corn, that the said grain should be exported to parts beyond the seas, and not again re-landed, the exporter should receive the following bounties: for every quarter of barley or malt, ground or unground, 2*s.* 6*d.*, equal to 3*s.* of present money; for every quarter of rye, ground or unground, 3*s.* 6*d.*; equal to 4*s.* 2*d.*; for every quarter of wheat, ground or unground, 5*s.*, equal to 6*s.*; and on producing a certificate, under the common seal of the chief magistrate in any places beyond the seas, or under the hands and seals of two known English merchants, that such corn had been actually landed; or upon proof, by credible persons, that such corn had been taken by enemies, or perished on the seas, the exporter's bond was to be given up; and the money, paid by the collector or commissioner of the customs, to pass in his account.

And the same system of policy was adopted soon afterwards in Scotland in 1695, by an act Will. par. 1. c. 32, in which all export duties were taken off, and a bounty of eight merks granted upon ilk chaldor of corn exported, when the prices did not exceed the following: wheat twelve pounds the boll equal to 1*l.* 4*s.*; bear, barley, or malt, eight pounds, equal to 16*s.* the boll; pease, oats, and meal, six pounds, equal to 12*s.* the boll; the whole being of Linnlithgow measure, provided that the exportation was made in Scotch ships and by Scotsmen, the maller and three-fourths of the seamen being Scotsmen, power however being reserved to the lords of the secret council, when the prices exceeded the fixed rates, to discharge and discontinue exportation.

The duties and subsidies payable upon exported corn from England, not having been given up by the former act, they were now, 1700, finally removed and taken away by another act, 11 and 12 Will. III. c. 20. § 4, whether upon ground or unground grain.

By this means what has been termed a new system of corn laws, was finally established in both this country and Scotland, and the act of Union taking place soon afterwards, 1706, their laws concerning grain were made alike. That when oats shall be sold at 1*s.* sterling, shall be paid 18*s.* of present money, the quarter or under, there shall be paid 2*s.* 6*d.* sterling, equal to 3*s.* bounty, for every quarter of the oatmeal, so long as rewards are granted for exportation of other grains; and that the bear of Scotland have the same reward as barley.

It has been already seen that the prices and duties of corn imported, had been determined by the act of 1670, but that for want of a rule for ascertaining the prices at the times and places of importation, the duties were evaded. The act of 1685 was to supply this defect; it enjoined and required the justices of peace of the several counties, at their respective quarter sessions, to inquire into and determine the prices of grain at fixed periods, and to send certificates thereof to the several custom houses within their jurisdiction, to be there hung up in a public place for the rule and direction of the parties concerned. But in consequence of neither the trouble of its execution being compensated, nor the neglect of it

permitted, it was in many places unattended to; and from no mode or rule having been substituted, in such an event, the defect was laid hold of by the importer, and much foreign grain was imported without payment of the duties during 1728 and 1729. And difficulties had likewise been met with from the modes employed in ascertaining the prices and quantities of grain exported.

There being, therefore, in different places a great neglect in the justices of peace, to determine the prices of grain, by which the duties on imported corn were to be regulated, the matter was now, 1729, taken up, and they were directed to do it in future, in their respective counties, at their next quarter sessions, or any adjournment, according to the act of 1670, and that on their omitting or neglecting to do it, and to certify the same, the collectors of the customs at the respective places of importation, were empowered to demand and receive the duties according to the lowest price of the several sorts of corn mentioned in the last named act.

And to ascertain the quantity of grain shipped, for which a bounty was to be paid, in a better manner, the proper officers of the customs were directed to admeasure the same, by a tub, or measure, containing four Winchester bushels; and when such corn to be exported was brought to be shipped off in sacks, they were empowered to make choice of any two of them out of twenty, and in that way compute the quantity to be shipped, on which the bounty was to be paid. And that the same powers should be employed in ascertaining the prices and quantity of bear, bigg, oatmeal, and malt, made from wheat or wheat malt, for being exported, 2 Geo. II. c. 18. § 1, 2, 3, 4, 5. That in all such cases, as where any corn or grain had been imported since the first day of the Michaelmas quarter session, then last past, where the importers or proprietors had omitted to pay the respective duties on the same on demand, they should forfeit and lose all such grain, or the value of it.

Notwithstanding this, neglects still frequently occurred in determining the prices of grain, according to which the duties payable on importation were to be levied, and of course the means were afforded of much foreign grain being brought in, though the prices at home were very low; consequently another act was now, 1732, passed, for the better ascertaining the same, and preventing fraudulent importation, in which it was again recommended to the justices of peace, at their quarter sessions, in the several counties where foreign grain should or might be imported, to give in charge, to the grand jury, in the open court, to make inquiry and presentment, upon their oaths, of the common corn market prices, of middling English corn and grain, of the respective sorts and quantities mentioned in the act, made in the 2*d.* year of the reign of king Charles II. as the same should be commonly bought and sold, in every such county, which presentment should be certified by the said parties, in writing, to his majesty's chief officer and collector of the customs for the time being, at every such port, place, or haven, where importation should be made, and which should be hung up in some public place in the custom house, for general information and instruction: and that the custom duty upon foreign grain imported, as directed by the above act of Charles II., should be collected and paid, according to the prices contained in such certificate. But that after importation, no foreign corn or grain was to be exported, or in any manner or shape laden on ship board, or put to sea, for carrying, conveying, or transporting it from one part or port of the kingdom to another, either by itself or in mixture with English corn, under the very severe penalties and forfeitures therein mentioned. 5 Geo. II. c. 12.

It is stated by Mr. Dirom, in his very able "Inquiry into the Corn Laws and Corn Trade," that at this period agriculture had considerably recovered its strength, and that the exertions of the farmers had become vigorous and constant. That the prices of corn for several years preceding it had been very reasonable, and that a great export trade in corn had been carried on from this country; proper attention having been paid to the execution of those laws which were made to guard against fraudulent importations: the average price of the quarter of wheat, for the five years from 1731 to 1735 inclusive, being only 34*s.*; in 1736, 40*s.*; in 1737, 38*s.*; and in this year 1738, only 35*s.* 6*d.* yet under these plentiful circumstances, the lower orders of the populace were excited to commit various outrages, by which the corn was destroyed. Therefore, in order to repress such disorders, an act was passed, 11 Geo. c. 22, by which such offenders were severely punished, and the inhabitants of the hundreds, in which such outrages should be committed, subjected to the payment of the damages.

The power of suspending the laws, in Scotland, which were made to prohibit the importation of foreign grain, or to buy, sell, or retail the same, which had rested on the act of 1703, and the two preceding ones therein referred to, having been formerly vested in the privy council of that kingdom; in consequence of the prices of grain having risen in 1740, from the severity of the winter, and some importation of foreign grain made contrary to law, from there existing no power of suspending the prohibitory acts there, on account of the act of the sixth Anne, c. 6. having done away the privy council, a temporary expedient without any new plan was now, 1741, had recourse to, and a law made, which transferred such power to the courts of session, judiciary, and exchequer; the judges in these courts being required to determine on the necessity of exportation or importation, from the prices of grain in the county of Edinburgh. The duties payable in England by the act of the 22 Charles II. being required by the same law to be paid on the importation of grain into Scotland; the whole of the clauses and provisions of that act, as well as of that of the 2 George II., termed "An act to ascertain the custom payable on Corn imported, being extended to Scotland."

Difficulties having arisen concerning the computation and measurement of wheat, meal, and other ground corn, on which a bounty was payable upon exportation, in order to adjust all differences arising thereon, by a law now (1751) made, the officers of the customs were empowered to allow the same bounty on the exportation of 224 pounds weight of wheat meal, or other ground corn or grain, as was allowed upon the exportation of four bushels of wheat, or other corn or grain, unground; and for the more effectually expediting the business, they were permitted to make choice of any two sacks out of twenty, from which to compute the weight. 24 Geo. II. c. 56. § 1.

These laws had greatly contributed to the extension of the export trade in grain, while plenty continued at home, with moderate prices. It is stated, that the average exportation of four years, from 1748 to 1751 inclusive, was 1,212,686 quarters annually; and that the average price of wheat, for the same four years, was 36*s.* 3*d.* the quarter.

From the money, applicable to the payment of the bounty, becoming inadequate to the discharge of the sums due on such extensive exportations, an act was now (1753) passed, 26 Geo. II. c. 15, by which the debentures, for the bounties on exported corn, were to carry an interest, when not paid within six months, at the rate of 3 per cent. per annum, according to the regulations of the act of the 12 and 13 of King William.

The crop of 1756 being defective and the prices of course rising, the populace from being long in the habits of plenty, mistaking the cause, committed various outrages in different places. And a law was brought forward in 1757 30 Geo. II. c. 1, by which all sorts of corn, meal, malt, flour, bread, biscuit, or starch, were prohibited exportation, before the 25th December 1757, except malt made to be exported, and declared to be so before the 4th December 1756, ships cleared out with it before the 25th being suffered to proceed on their voyages: power was however reserved to the king to remove the prohibition by proclamation, and to admit all persons, natives as well as foreigners, but no particular person or persons, to export grain. All duties, customs, rates, and impositions of every kind, on corn or flour, imported, or taken from the enemy and brought into the kingdom, were discontinued until the 24th of August 1757; and the same might be carried coastways free of duty, 30 Geo. II. c. 7, and importation without duty was permitted also in ships of other friendly nations from any port or place whatever, 30 Geo. II. c. 9. § 14. After 11th March 1757, the distillation of low wines and spirits from any wheat, barley, malt, or any other sort of grain, or from any meal or flour, was prohibited during the space of two months, 30 Geo. II. c. 10. and it was afterwards continued to the 11th December in the same year; but with power to his majesty to suspend the act and permit it, by proclamation or an order of council. 30 Geo. II. c. 15.

By these laws and regulations, the exportation of corn is stated to have been completely checked, the quantity of about 80,000 quarters having been exported, previously to the prohibition, and about 150,000 quarters of foreign grain brought in.

There was however a restoration of the exportation trade in 1759 it proceeding as usual, with but little importation of foreign corn, but in consequence of the crop of 1762, being a little deficient, importation took place from the rise of prices, which at the low duties was capable of being done, and of course was considerable, during that and the three years which followed it. During the last, from some cause of fear, an embargo was laid upon all ships laden with corn for exportation, the 26th of September, but which having been done contrary to law, it was necessary to pass an act of indemnity for it in the following year 1766, the 7 Geo. III. c. 7. On this it is remarked by the writer quoted above that there does not now seem to have been any sufficient ground for those measures; as in the year stated there were more than 300,000 quarters of grain exported, and under 250,000 imported.

In 1767, prohibitory laws were passed for a limited period, for the prevention of the exportation of corn, grain, meal, flour, bread, biscuit, and starch, as well as the extraction of low wines, and spirits from wheat and wheat flour. Also a law for permitting, for a limited time, the importation of wheat and wheat flour, oats, and oatmeal, rye, and rye-mal without duty. 7 Geo. III. c. 3, 4, 5, 8. And in 1768 the same laws were renewed, having some additions made to them; it being now enacted that they should continue in force until twenty days after the beginning of the next sessions of parliament, or the exportation of the above different articles, as well as their distillation and preparation from wheat or wheat flour, was prohibited, except to particular British dependencies. And the importation both of wheat, wheat flour, barley, barley-mal, pulse, oats, oatmeal, rye, rye-mal, from any part of Europe, and maize or Indian corn and rice from North America, as well as wheat and wheat flour from Africa, were allowed without any duty. 8 Geo. III. c. 1, 2, 3. And in 1769, the prohibition

was continued until twenty days after the meeting of the next sessions of parliament, but the importation of rice from North America permitted duty free.

But in 1770 the former law of the preceding year, prohibiting the exportation of corn, grain, meal, malt, flour, bread, biscuit, and starch, and also the extraction of low wines and spirits from wheat or wheat flour, was continued in force until twenty days after the commencement of the ensuing session of parliament, provided that the said continuation might be abridged, and this act, or any part of it, altered and varied by any other act or acts to be enacted in the present session. 10 Geo. III. c. 1. Consequently by another law of this session, those parts of the former acts, which prohibited the exportation of malt, were repealed. 10 Geo. III. c. 10. And an act was likewise passed for registering the prices at which corn was sold in the several counties of Great Britain, as well as the quantity exported and imported. 10 Geo. III. c. 39. And in 1771 prohibitory laws against the exportation and extraction of the above different articles were again passed, 11 Geo. III. c. 1. (with the exception of victualling ships, on their being sent to British dependencies) to be in force till the twentieth day after the meeting of the next session of parliament. On the meeting of the session of parliament in the following year (1772), a prohibitory law was again passed, against the exportation and extraction of the same articles, to be in force till the twentieth day after the meeting of the next session of parliament. Afterwards an act was likewise passed, permitting the importation of wheat, wheat flour, rye, ryemeal, and Indian corn, without duty, until the first day of December in the same year.

It is considered by the able inquirer into the corn laws and corn trade mentioned above, that all this would seem to have been had recourse to without any sufficient grounds, as the price of grain was not by any means very high, and the quantity exported from the year 1760 to 1770 greatly exceeded that which was imported.

On the meeting of parliament in 1773, an act was, however, passed, by which a free importation was permitted before the first day of January in the following year, for any

wheat, wheat flour, rye, ryemeal, barley, barleymeal, oats, oatmeal, pease, beans, tares, calivancies, and all other sorts of pulse, from any part of Europe or Africa; and permission to carry the same coastwards, under similar regulations to those of wheat or wheat flour the growth of this country, provided due entries were made according to the previous practice of the kingdom; and likewise for the free importation of wheat, wheat flour, Indian corn and meal, biscuit, pease, beans, tares, calivancies and all other sorts of pulse, from North America, under the same regulations. And another prohibitory law was enacted, 13 Geo. III. c. 1, 2, 3, preventing the exportation and extraction of all the above named articles, wines and spirits, except for victualling ships, or to British dependencies, until the first day of January 1774.

These laws, though radically injurious to the agriculture of the country, are conceived by Mr. Diron, from their not trenching on the general system, as only productive of a temporary effect which might have been overcome.

By another law of the same year 1773, the 13 Geo. III. c. 40. such alterations and changes were however made, by the reduction of the export and import prices, and the rendering the duties on importation a mere trifling, that a new system seems to have been introduced and established in the corn laws, destructive of the old code by which such benefits had accrued to the agriculture and commercial industry of the country; and by which, besides producing plenty and reasonable prices at home, by the disposal of the excremental flock in foreign markets, vast sums of money had been brought into the kingdom. The manner in which that useful code had been gradually raised, formed, and matured by experience, through a vast length of time, and finally established by the laws of 1670, 1688, and 1706, has been amply shewn in the preceding part. But in order to place the different systems in a better point of contrast, and thereby afford a more distinct notion of their nature and principles, the excellent comparative tables introduced below, have been drawn from Mr. Diron's "Inquiry into the Corn Laws, &c."

TABLE.—Old System of Laws for Importation of Grain.

Importation Prices and Duties.		Money of the Time.				Present Money.							
		Prices.		Duties.		Prices.		Duties.					
		£.	s.	d.	£.	s.	d.	£.	s.	d.			
1670	For every quarter of wheat, when the prices did not exceed	2	13	4	0	16	0	3	4	0	0	19	2
	when above that price, and not exceeding	4	0	0	0	8	0	4	16	0	0	0	7
	when above that price	0	0	0	0	5	4	0	0	0	0	6	5
1670	For every quarter of rye, peas, and beans, when the price did not exceed	2	0	0	0	16	0	2	8	0	0	19	2
	when above that price	0	0	0	0	4	0	0	0	0	0	4	10
	For every quarter of barley, when the price did not exceed	1	12	0	0	16	0	1	18	5	0	19	2
1670	when above that price	0	0	0	0	2	0	0	0	0	0	3	2
	For every quarter of oats, when the price did not exceed	0	16	0	0	5	4	0	19	2	0	6	5
	when above that price	0	0	0	0	1	4	0	0	0	0	1	6

TABLE

TABLE.—New System of Laws for Importation of Grain.

Importation Prices and Duties.		Prices.				Duties.				
		£.	s.	d.	£.	s.	d.	£.	s.	d.
1773	For every quarter of wheat, when the price was at or above	-	-	-	2	8	0	0	0	0
	100 weight of wheat flour	-	-	-	0	0	0	0	0	2
	quarter of rye, peas, or beans, when the price was at or above	-	-	-	1	12	0	0	0	3
	barley, bear, or bigg, when the price was at or above	-	-	-	1	4	0	0	0	2
	oats, when the price was at or above	-	-	-	1	6	0	0	0	5

It is remarked by the able writer, in respect to these tables, that, according to the *old laws*, but especially that of 1670, importation was not allowed till the prices at home were very high, and then even the duties were great, in consequence of which, foreign corn could be only introduced for the supply of times of scarcity, never being able to come in competition with the home produce. That, the law of 1688 did not even notice importation; it being solely enacted for the purpose of promoting and encouraging the agriculture of the country, by affording a new market for the superabundant grain, and in that way giving a new stimulus to the exertion of the people, to bring the waste and barren lands into a state of profitable cultivation: The business of importation being left to the laws which previously existed, by which it was supposed to be sufficiently restricted, if not wholly prohibited.

It is observed further, that at the time these laws were passed, and till 1714, the interest, borne by money, was *6 per centum per annum*, being of course proportionally of greater value than at present, when the interest is only *5 per cent per annum*. Besides, the old acts did not, in fact, admit the importation of flour or ground corn at any period; only the grain at certain places, where the prices should happen to be very high. Neither did they allow the carrying of imported grain by sea, coastways, nor the transporting of it to any other place, except that to which necessity had brought it; restrictions which seemed so essential as to require being enforced, under very severe penalties, by the act of the 5th of George II.

But that the *new law*, or that of 1773, commences with

importation, and directs that, at any time when the price of the middling sort of British grain shall be at the prices stated in the above tables, at the several ports and places where the same should be imported; then all customs and duties, formerly payable on wheat, wheat flour, rye, peas, beans, barley, bear, bigg, and oats, imported into the kingdom, should cease and be no longer payable, while these prices continued. That, instead of the former duties, those stated in the above table, should only be paid. It was likewise enacted, that the importation of oatmeal from Ireland, or any other part beyond the seas, into any port or place in Scotland, should be lawful, where the price of oatmeal exceeds *16s.* the boll of 8 stone, troy weight.

Further, that by the new law importation is admitted, when the prices of grain at home are at such a reduced rate, as that foreign corn may always come in competition with the home produce in the markets, an evil that has constantly existed since the passing of the act; besides, by this law, wheat and other grain imported, may be conveyed coastways, and entered and landed in any other parts of the kingdom, at which the prices of middling British corn, grain, or flour, are at or above the respective rates stated in the table given above, under such regulations as wheat, wheat flour, rye, peas, beans, barley, bear, bigg, or oats, the growth of this kingdom, are permitted to be conveyed coastwise. Also, that on importing corn, grain, or flour, and paying the duties, where the same shall be again exported within six months, the duties were to be drawn back and repaid.

TABLE.—Old Laws for the Exportation of Grain.

Exportation Prices and Bounties.		Money of the Time.				Present Money.						
		Prices.		Bounties.		Prices.		Bounties.				
£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	
1688	Upon every quarter of wheat, ground or unground, when the prices were at or under	2	8	0	5	0	2	17	7	0	6	0
	of rye, when the price was at or under	1	12	0	3	6	1	18	5	0	4	2
	of barley or malt, when the price was at or under	1	4	0	2	6	1	8	10	0	3	0
1706	of oatmeal, when the quarter of oats is at or under	0	15	0	2	6	0	18	0	0	3	0

TABLE.—New Laws for the Exportation of Grain.

Exportation Prices and Bounties.		Prices.	Bounties.
		£. s. d.	£. s. d.
1773	Upon every quarter of wheat, or malt of wheat, when the price is under	2 4 0	0 5 0
	of rye, when the price is under	1 8 0	0 3 0
	of barley, bigg, or malt made thereof, when the price is under	2 0 0	0 2 6
	of oats, when the price is under	10 14 0	0 2 0
	And for every quarter of oatmeal, consisting of 276 lbs. avoirdupois	0 0 0	0 2 6

The provisions of the *old laws* of 1688 and 1706, have been already so fully stated and considered, that nothing further than what is contained in the above table seems requisite here.

Under the *new law* it was enacted, that, when the price of the quarter of wheat was at, or above, 44s.; rye, pease, and beans, 28s.; barley, bear, and bigg, 22s.; and oats, 14s. no such corn or grain should be transported or conveyed out of the kingdom, under severe penalties. That after the 1st day of January 1774, the bounties formerly allowed by law upon grain exported, should cease and determine; and that, in the place thereof, when the prices of it should be under the rates stated below, at the ports and places, whence the same should be shipped, there should be allowed, on the exportation of such grain, either ground or unground, being the growth of this kingdom, and shipped in British ships, the master, and at least two-thirds of the mariners of such ships being subjects of his majesty, these bounties; that is to say, when the price of middling British wheat is *per* quarter under 44s. a bounty for every quarter of wheat, or malt made from it, 5s.; when the quarter of rye was under 28s. a bounty of 3s.; when the quarter of barley, bear, or bigg, was under 22s. a bounty of 2s. 6d. for every quarter of them, or of malt made from them, and when the quarter of oats was under 14s. a bounty of 2s. on every quarter, and 2s. 6d. upon every quarter of oatmeal, consisting of 276 pounds avoirdupois weight.

Further, that, by the old laws, the justices of peace were to ascertain the prices at their quarter sessions, which, by the new law, was continued the same for England; but for Scotland it was transferred to the sheriffs of the different counties to be ascertained four times in every year, certificates of which were to be sent to the custom-houses within their jurisdiction respectively, so as to regulate the payment of the export and import bounties and duties.

However, so far as exportation was concerned, those rules were, in 1774, wholly altered, it being enacted, that the prices of exported corn, grain, and oatmeal should be regulated and directed according to the average prices, at which they should be respectively sold in the public market at or nearest to the port or place whence they should be intended to be exported, on the market day preceding that of their being shipped, and the bounties to be payable accordingly.

From the comparative statements given in the above tables, the difference in the principles and operations of these different systems of laws, will be easily understood, the former being calculated for the promotion of cultivation at home, and preventing the importation of foreign corn, unless called for by necessity; while the latter is formed for the purpose of promoting the importation of grain from abroad, whether there may be any necessity for it or not. Thus the foreign cultivator is allowed the liberty of importing his

flour into the country almost free from duty, while the bounty upon flour or meal produced from wheat is taken off.

But in order to expedite and render the conception of the various laws, which have been detailed above, more easy and familiar, we shall here introduce the tabular view of them given by the author of the "Inquiry into the Corn Laws and Corn Trade," as brought down to the year 1773.

T A B L E.

Anno Dom.	Anno Regis	Abbreviation of English Exportation Laws.
1300	34 Ewd. III.	Exportation prohibited.
1393	17 Rich. II.	Allowed, upon payment of the ordinary subsidies and duties.
1425	4 Hen. VI.	The last law confirmed, but reserving power to the king and council to refrain it.
1436	15 Hen. VI.	Allowed, when wheat did not exceed 6s. 8d. and barley 3s. <i>per</i> quarter.
1442	20 Hen. VI.	The last act confirmed for 10 years.
1444	23 Hen. VI.	And that act now made perpetual.
1552	5 & 6 Ed. VI.	Prohibited, until the prices were at or under 6s. 8d. for wheat, 3s. 4d. for barley and malt, 2s. for oats, 4s. for pease and beans, and 5s. for rye <i>per</i> quarter.
1554	1 & 2 P. & M.	Prohibited, when the prices did not exceed 6s. 8d. for wheat, 4s. for rye, and 3s. for barley <i>per</i> qr.
1562	5 Eliz.	Allowed, when the prices did not exceed 10s. for wheat; 8s. for rye, pease, and beans; 6s. 8d. for barley and malt, <i>per</i> quarter.
1570	13 Eliz.	Allowed, under the direction of prebendaries, &c. upon payment of duties.
1593	35 Eliz.	Allowed, when the prices did not exceed 20s. for wheat, 13s. 4d. for rye, pease, and beans, 12s. for barley and malt, upon payment of a duty of 2s. for every quarter of wheat, and 16d. for every quarter of other grain.
1604	2 James I.	Allowed, when the prices did not exceed 27s. 8d. for wheat, 15s. for rye, pease, and beans, and 14s. for barley and malt <i>per</i> quarter, and upon payment of the same duties

5 F Allowed.

C O R N.

Anno Dom.	Anno Regis.	Abbreviation of English Exportation Laws.	Anno Dom.	Anno Regis.	Abbreviation of British Exportation Laws.
1623	21 James I.	Allowed, when the prices did not exceed 32s. for wheat; 20s. for rye, pease, and beans, barley and malt <i>per</i> quarter, and upon payment of the same duties.	1757	10 Geo. II.	Prohibited until the 25th Dec. 1757. but with power to the king and council to take off the prohibition.
1627	3 Charles I.	Allowed upon the same terms with the last act.	1757	11 Geo. II.	Corn-market established at Westminster; and, the same year, an assize made for bread.
1655	12 Charles II.	Allowed, when the prices did not exceed 40s. for wheat; 24s. for rye, pease, and beans; 20s. for barley and malt, and 16s. for oats, upon payment of the same high duties.	1766	6 Geo. III.	Exportation prohibited for a limited time; and, same year, an embargo laid upon ships loaded with corn for exportation; and same year, the mayor and aldermen of London empowered to determine the prices of corn in January and July, as well as in April and October.
1663	15 Charles II.	Allowed, when the prices did not exceed 48s. for wheat, 32s. for rye, pease, and beans, 28s. for barley and malt, and 13s. 4d. for oats <i>per</i> quarter, upon payment of the same high duties.	1767	7 Geo. III.	Exportation of grain, and distilling from wheat or wheat-flour, prohibited from the 26th Sept. to the 14th Nov. 1767.
1670	22 Charles II.	Allowed, without limitation of prices, upon payment of the same high duties.	1768	8 Geo. III.	Exportation of corn, and distilling from wheat or wheat-flour, prohibited until 20 days after the commencement of the next sessions of parliament.
1688	1 W. & M.	Not only allowed, when wheat was not above 48s. rye 32s. and barley and malt 24s. <i>per</i> quarter; but bounties granted.	1769	9 Geo. III.	Five thousand quarters of bigg allowed to be exported from the islands of Orkney, yearly; and, same year, exportation of grain and distilling from wheat or wheat-flour prohibited for a limited time.
1699	10 Will. III.	Prohibited for one year, from the 10th February 1699.	1770	10 Geo. III.	Corn regiter established; and weekly returns, from market-towns in the several countries, to be made of the prices of wheat, rye, barley, oats, and beans, in England; and of bear or bigg in Scotland. Same year the exportation of corn, and the distilling from wheat or wheat-flour, prohibited till 20 days after the commencement of the next session of parliament.
1700	11 & 12 W. III.	Bounty suspended from 9th Feb. 1699, to 29th September 1700. The subsidy and all the duties payable upon corn and grain, ground and unground, bread, biscuit, and meal given up and totally removed.	1771	11 Geo. III.	Exportation of corn prohibited, and also the distilling from wheat or wheat-flour, until 20 days after the commencement of the next session of parliament.

T A B L E.

Anno Dom.	Anno Regis.	Abbreviation of British Exportation Laws.	Anno Dom.	Anno Regis.	Abbreviation of British Exportation Laws.
1706	5 Anne.	Union settled-English bounties adopted over all the kingdom, and extended to oatmeal, bigg, and malt of wheat.	1772	12 Geo. III.	Exportation of corn, and distilling from wheat and wheat-flour, prohibited until 20 days after the commencement of next session of parliament.
1709	8 Anne.	Exportation prohibited, until the 29th Sept. 1710.	1773	13 Geo. III.	Exportation of grain, and distilling from wheat and wheat-flour, prohibited until the 1st day of Jan. 1774. Same year, the former bounties and duties repealed, and a total alteration made in the corn laws.
1729	2 Geo. II.	Rules laid down for measuring corn to be exported, and for ascertaining the prices, &c.	1774	14 Geo. III.	Alteration of the method of ascertaining the prices of corn to be shipped for exportation.
1732	5 Geo. II.	Grand juries at sessions, to prevent the price of corn, and corn imported, not to be again exported, nor carried coastways.			
1741	14 Geo. II.	Prohibited until the 25th Dec. 1741.			
1751	24 Geo. II.	Bounties upon corn exported in meal, to be paid according to the weight, at the rate of 448 pounds for the quarter			
1753	26 Geo. II.	Money due upon debentures for corn exported, to bear interest at 3 <i>per cent per annum</i> , if not paid in six months after presenting the certificate.			

C O R N.

T A B L E.

Anno Domini.	Anno Regis.	Abbreviation of English Exportation Prices.	Money of the Time	Present Money.
1436	15 Hen. VI.	Exportation permitted, when the price of grain, at home, did not exceed <i>per</i> quarter, for Wheat - - - - - Barley - - - - -	£. s. d. 0 6 8 0 3 0	£. s. d. 2 4 0 0 19 10
1554	1 P. & M.	Permitted, when the price did not exceed, for Wheat - - - - - Rye - - - - - Barley - - - - -	0 6 8 0 4 0 0 3 0	0 16 6 0 9 11 0 7 5½
1562	5 Eliz.	Permitted, when the price did not exceed, for Wheat - - - - - Rye, peafe, and beans - - - - - Barley and malt - - - - -	0 10 0 0 8 0 0 6 8	1 0 8 0 16 6 0 13 10
1593	35 Eliz.	Permitted, when the price did not exceed, for Wheat - - - - - Rye, peafe, and beans - - - - - Barley and malt - - - - -	1 0 0 0 13 4 0 12 0	2 1 4 1 7 7 1 4 10
1604	2 James I.	Permitted, when the price did not exceed, for Wheat - - - - - Rye, peafe, and beans - - - - - Barley and malt - - - - -	1 6 8 0 15 0 0 14 0	2 13 4 1 10 0 1 8 0
1623	21 James I.	Permitted, when the price did not exceed, for Wheat - - - - - Rye - - - - - Barley, malt, peafe, and beans - - - - -	1 12 0 1 0 0 0 16 0	3 4 0 2 0 0 1 12 0
1627	3 Char. I.	Permitted, when the price did not exceed, for Wheat - - - - - Rye - - - - - Barley, malt, peafe, and beans - - - - -	1 12 0 1 0 0 0 16 0	2 11 2 1 12 0 1 5 7
1660	21 Char. II.	Permitted, when the price did not exceed, for Wheat - - - - - Rye, peafe, and beans - - - - - Barley and malt - - - - - Oats - - - - -	2 0 0 1 4 0 1 0 0 0 16 4	2 8 0 1 8 9 1 4 6 0 19 2
1663	15 Char. II.	Permitted, when the price did not exceed, for Wheat - - - - - Rye, peafe, and beans - - - - - Barley and malt - - - - - Oats - - - - -	2 8 0 1 12 0 1 8 0 0 13 4	2 17 7 1 18 4 1 13 7 0 16 0
1688	1 W. & M.	Permitted, when the price did not exceed, for Wheat - - - - - Rye - - - - - Barley and malt* - - - - -	2 8 0 1 12 0 1 4 0	2 17 7 1 18 4 1 8 9

* Prior to the year 1346, the exportation of all kinds of grain from England was totally prohibited.

T A B L E.

Anno Domini.	Anno Regis.	Abbreviation of British Exportation Prices.	Money of the Time.	Present Money.
1706	5 Anne.	Exportation of grain permitted, when the price of the quarter did not exceed, for Wheat, ground or unground, or malt of wheat - - - - - Rye, ground or unground - - - - - Barley, bear, or bigg, or malt, ground or unground - - - - - Oats - - - - -	£. s. d. 2 8 0 1 12 0 1 4 0 0 15 0	£. s. d. 2 17 7 1 18 5 1 8 9 0 18 0
1773	13 Geo. III.	Exportation permitted, when the prices were under, for Wheat - - - - - Rye - - - - - Barley, bear, or bigg, or malt thereof - - - - - Oats - - - - -	0 0 0 0 0 0 0 0 0 0 0 0	2 1 0 1 8 0 1 7 0 0 14 0

C O R N.

T A B L E.

Anno Dom.	Anno Regis.	Abbreviation of English Exportation Duties.	Price of the Quarter of Grain.		Duties per Quarter.	
			Money of the Time.	Present Money.	Money of the Time.	Present Money.
1570	13 Elizabeth.	For wheat, when not prohibited	£. s. d.	£. s. d.	£. s. d.	£. s. d.
		other grain	0 0 0	0 0 0	0 1 0	0 2 0
		wheat exported by licence	0 0 0	0 0 0	0 0 8	0 1 4
1593	35 Elizabeth.	For wheat, when the price did not exceed	0 0 0	0 0 0	0 2 0	0 4 0
		other grain by ditto	0 0 0	0 0 0	0 1 4	0 2 8
1604	2 James I.	For wheat, when the price did not exceed	1 0 0	2 1 5	0 2 0	0 4 0
		other grain as per exportation prices	0 0 0	0 0 0	0 1 4	0 2 8
1623	21 James I.	For wheat, when the price did not exceed	1 6 8	2 13 4	0 2 0	0 4 0
		other grain as per exportation prices	0 0 0	0 0 0	0 1 4	0 2 8
1627	3 Charles I.	For wheat, when the price did not exceed	1 12 0	3 4 0	0 2 0	0 4 0
		other grain as per exportation prices	0 0 0	0 0 0	0 1 4	0 2 8
1660	12 Charles II.	For wheat, when the price did not exceed	1 12 0	2 11 2	0 2 0	0 3 2
		other grain per exportation prices	0 0 0	0 0 0	0 1 4	0 2 1½
1663	15 Charles II.	For wheat, when the price did not exceed	2 0 0	2 8 0	1 0 0	1 4 0
		Rye, peas, beans, barley, malt, buck wheat	0 0 0	0 0 0	0 10 0	0 12 0
		Oats when not above	0 16 0	0 19 2	0 6 8	0 8 0
1670	22 Charles II.	For wheat when the price did not exceed	2 8 0	2 17 7	1 0 0	1 4 0
		Rye, peas, beans, barley, malt, buck wheat	0 0 0	0 0 0	0 10 0	0 12 0
		Oats	0 13 4	0 16 0	0 0 0	0 0 0
1670	22 Charles II.	For wheat, without limitation of price	0 0 0	0 0 0	1 0 0	1 4 0
		Rye, peas, beans, barley, malt, buck wheat	0 0 0	0 0 0	0 10 0	0 12 0
		Oats	0 0 0	0 0 0	0 6 8	0 8 0

T A B L E.

Anno Dom.	Anno Regis.	English and British Bounties on Exportation.	Price of the Quarter of Grain.		Bounties per Quarter.	
			Money of the Time.	Present Money.	Money of the Time.	Present Money.
1688	1 Will. & Mary.	For wheat, when the price did not exceed	£. s. d.	£. s. d.	£. s. d.	£. s. d.
		Rye, ground or unground, when not above	2 8 0	2 17 7	0 5 0	0 6 0
		Barley and malt, ground or unground, when not above	1 12 0	1 18 5	0 3 6	0 4 2½
1706	5 Anne.	For wheat or malt made of wheat, ground or unground, when not above	1 4 0	1 8 9	0 2 6	0 3 0
		Rye, ground or unground, when not above	2 8 0	2 17 7	0 5 0	0 6 0
		Barley, bear, or bigg, malt, ground or unground, when not above	1 12 0	1 18 5	0 3 6	0 4 2½
		Quarter of oatmeal when oats not above	1 4 0	1 8 9	0 2 6	0 3 0
1773	13 George III.	For wheat and malt of wheat, when the price is under	0 15 0	0 18 0	0 2 6	0 3 0
		Rye, when under	0 0 0	2 4 0	0 0 0	0 5 0
		Barley, bear, or bigg, when under	0 0 0	1 8 0	0 0 0	0 3 0
		Oats, when under	0 0 0	1 2 0	0 0 0	0 2 6
		And for every quarter of oatmeal confisting of 276 pounds avoirdupois.	0 0 0	0 14 0	0 0 0	0 2 0
			0 0 0	0 0 0	0 0 0	0 2 6

T A B L E.

C O R N.

T A B L E.

Anno Domini.	Anno Regis.	Abbreviation of English Importation Prices.	Money of the Time.	Present Money.
1463	3 Edw. IV.	Importation of foreign grain permitted, when the prices at home per quarter did exceed, for Wheat - - - - - Rye - - - - - Barley - - - - -	£. s. d. 0 6 8 0 4 0 0 3 0	£. s. d. 1 15 2 1 1 1 0 15 10
1660	12 Char. II.	Importation permitted, when the prices did exceed, for Wheat - - - - - Rye - - - - - Beans, barley, and malt - - - - -	2 4 0 1 16 0 1 6 8	2 12 9 2 3 2 1 12 0
1663	15 Char. II. *	Importation permitted, when the prices did not exceed, for Wheat - - - - - Rye, peas, or beans - - - - - Barley, malt, or buck wheat - - - - - Oats - - - - -	2 8 0 1 12 0 1 8 0 0 13 4	2 17 7 1 18 5 1 13 7 0 15 0
1670	12 Char. II.	Importation permitted, when the prices did not exceed, for Wheat - - - - - Rye, peas, or beans - - - - - Barley, malt, and buck wheat - - - - - Oats - - - - -	2 13 4 2 0 0 1 12 0 0 16 0	3 4 0 2 8 0 1 13 5 0 19 2
1773	13 Geo. III.	Importation permitted, when the prices were at or above, for Wheat - - - - - Rye, peas, or beans - - - - - Barley or malt - - - - - Oats - - - - -	0 0 0 0 0 0 0 0 0 0 0 0	2 8 0 1 12 0 1 4 0 0 16 0

* This is the act, in which the insertion of the word *not* in the important clause, entirely altered the intention of the law.

T A B L E.

A. D.	Anno Regis.	Abbreviation of English Importation Laws.
1202	3 John.	Importation of foreign grain invited.
1215	16 John.	Invited.
1266	9 Hen. III.	Invited.
1297	25 Edw. I.	Invited.
1328	2 Edw. III.	Invited.
1350	25 Edw. III.	Invited.
1360	34 Edw. III.	Invited.
1463	3 Edw. III.	Prohibited, until the price exceeded 6s. 8d. for wheat, 4s. rye, and 3s. for barley per quarter.
1560	12 Char. II.	Allowed, upon payment of different duties according to the prices.
1663	15 Char. II.	Allowed, upon payments of lower duties.
1670	22 Char. II.	Allowed, upon payment of different duties according to the prices.
1685	1 James II.	Regulations to prevent fraudulent importation.
1729	2 Geo. II.	Regulations for ascertaining the price of corn at the time of importation, and for receiving the duties, according to the prices.
1732	5 Geo. II.	Further regulations asent the prices, and prohibiting corn imported to be again exported, or carried coastways.
1757	30 Geo. II.	Duties upon the importation of corn suspended until the 24th

A. D.	Anno Regis.	Abbreviation of English Importation Laws.
		August 1757, and importation allowed, duty free, in ships of foreign nations in amity with Great Britain.
1766	6 Geo. III.	Importation of foreign grain permitted, for a limited time, duty free.
1767	7 Geo. III.	Importation permitted, for a limited time, duty free.
1768	8 Geo. III.	Ditto. Ditto.
1769	9 Geo. III.	Importation of rice permitted, for a limited time, duty free.
1772	12 Geo. III.	Importation permitted duty free to 1st December.
1773	13 Geo. III.	Permitted, duty free to 1st of January 1774. Same year the old corn laws totally altered, and importation of foreign grain and flour permitted, at all times and places, when the price of the quarter was 2s. or above 4s. for wheat; 3s. for rye, peas, and beans; 2s. for barley; and 16s. for oats. Importation of oatmeal into Scotland permitted duty free, when the price there shall exceed 16s. per boll weighing 8 stone Troy.

T A B L E.

A. D.	Anno Regis.	Abbreviation of English Importation Duties.	Price of grain per qr.				Duties per quarter.			
			Money of the Time.		Present Money.		Money of the Time.		Present Money.	
1660	12 Charles II.	For wheat, when the price did not exceed - -	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	
		when it exceeded that price - - -	2 4 c	2 12 9	2 0 c	2 8 0	0 6 8	0 8 0	0 6 8	0 8 0
		Rye, when the price did not exceed - - -	1 16 0	2 3 2	1 6 8	1 12 0	0 5 0	0 6 0	0 5 0	0 6 0
		when it exceeded that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
		Beans, barley, and malt, when not above - -	1 6 8	1 12 0	1 6 8	1 12 0	0 5 0	0 6 0	0 5 0	0 6 0
		when above that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
1663	15 Charles II.	For wheat, when the price did not exceed - -	2 8 0	2 17 7	0 5 4	0 6 5	0 4 0	0 4 9	0 4 0	0 4 9
		Rye, peas, and beans, when not above - - -	1 12 c	1 18 5	0 2 6	0 3 2	0 2 0	0 2 5	0 2 0	0 2 5
		Barley and malt, when not above - - -	1 8 c	1 13 7	0 2 0	0 2 5	0 1 4	0 1 7	0 1 4	0 1 7
		Buck wheat, when not above - - -	1 8 0	1 13 7	0 2 0	0 2 5	0 1 4	0 1 7	0 1 4	0 1 7
		Oats, when not above - - -	0 13 4	0 16 0	0 1 4	0 1 7	0 1 4	0 1 7	0 1 4	0 1 7
		For wheat, when the price did not exceed - -	2 13 4	3 4 0	0 16 0	0 19 2	0 8 0	0 9 7	0 8 0	0 9 7
		when above that price, and not exceeding - -	4 0 0	4 16 0	0 5 4	0 6 5	0 4 0	0 4 9	0 4 0	0 4 9
		when above that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
		Rye, peas, and beans, when not above - - -	2 0 c	2 8 0	0 16 0	0 19 2	0 4 0	0 5 4	0 4 0	0 5 4
		when above that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
		Barley, malt, buck-wheat, not above - - -	1 12 c	1 18 5	0 16 0	0 19 2	0 2 8	0 3 2	0 2 8	0 3 2
		when above that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
		Oats, when not above - - -	0 16 c	0 19 2	0 5 4	0 6 5	0 1 4	0 1 7	0 1 4	0 1 7
		when above that price - - -	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c	0 0 c
British Importation Duties.										
1773	13 Geo. III.	When the price of wheat is at or above - - -	0 0 0	2 8 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
		Rye, peas, or beans, at or above - - -	0 0 0	1 12 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
		Barley, bear, or bigg, at or above - - -	0 0 0	1 4 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
		Oats, at or above - - -	0 0 0	0 16 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
		And for every hundred weight of wheat flour - - -	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

T A B L E.

Anno Domini.	Anno Regis.	Abbreviation of Scotch Importation Laws.
1454	17 James II.	Importation of foreign grain invited to be made, either by foreigners or denizens.
1493	5 James IV.	Invited.
1663	15 Charles II.	Allowed from Ireland upon payment of a duty of 3 <i>l.</i> per boll, when meal and barley did not exceed the price of 5 <i>l.</i> per boll at home.
1672	24 Charles II.	Importation of victual from Ireland prohibited under severe penalties.
1687	3 James VII.	Prohibition to import victual from Ireland renewed, and victual so imported ordered to be destroyed.
1703	2 Anne.	Importation of victual prohibited from foreign parts, until the price of the boll of grain exceeds 12 <i>l.</i> for wheat, 8 <i>l.</i> for bear, meal, and malt, and 6 <i>l.</i> for oats and pease; but with power to the lords of the privy council to suspend this prohibition when necessary.
1741	14 Geo. II.	Importation permitted, when the prices of grain, in the county of Edinburgh, exceeded 40 <i>s.</i> for wheat; 20 <i>s.</i> for pease and beans; 18 <i>s.</i> for bear and barley; and 13 <i>s.</i> 4 <i>d.</i> for oats, per quarter, and 8 <i>l.</i> Scots, per boll, for oatmeal, upon payment of the duties fixed by the English acts of the 22d Charles II.

T A B L E.

Anno Domini.	Anno Regis.	Abbreviation of Scotch Exportation Laws.
1555	13 Mary.	Exportation of grain prohibited under severe penalties.
1587	20 James VI.	Prohibited.
1663	13 Charles II.	Exportation of grain permitted when the price of victual at home was under 12 <i>l.</i> for wheat, 8 <i>l.</i> for bear and barley, and 8 merks for peas and oats, <i>per</i> boll; upon payment of the usual duty.
1669	11 Cha' II.	All duties payable upon grain exported removed, except one merk <i>per</i> chaldler upon every kind of victual.

T A B L E.

Anno Dom.	Anno Regis.	Scotch Importation Duties.	Price of Grain per Boll.		Duties per Boll.								
			Money of the Time	Present Money.	Money of the Time.	Present Money.							
			£. s. d.	£. s. d.	£. s. d.	£. s. d.							
1663	15 Cha' II.	Duties payable upon the boll of all kinds of grain imported, when the boll of barley and meal did not exceed at home	8	0	0	16	0	3	0	0	6	0	
1703	2 Anne.	A duty of 40 <i>s.</i> per boll, besides the former duties upon each boll of grain from England for feed						2	0	0	4	0	
1741	14 Geo. II.	The same duties to be paid in Scotland, as are payable in England upon grain imported by the English act of 22 of Charles II.											
Scotch Exportation Duties.													
1663	15 Cha' II	For wheat, when the price of the boll is under	12	0	0	4	0	0	0	5	0	6	
		bear or barley, when the boll is under	8	0	0	16	0	0	0	5	0	6	
		Oats and peas, when the boll is under 8 merks	5	6	8	10	8	0	0	5	0	6	
1669	21 Cha' II.	Duty upon each chaldler of grain exported, when under the above prices at home						0	13	4	1	12	
1695	7 William.	Duties upon exportation ceased, and bounties commenced.											
Scotch Exportation Bounties.													
1695	7 William.	For every chaldler of grain, when the price of the boll of wheat is at, or under	12	0	0	4	0	5	6	8	0	10	8
		For bear, barley, and malt, at or under	8	0	0	16	0						
		Peas, oats, and meal, at or under	6	0	0	12	0						
1706	5 Anne.	The same bounties with England.											

As it would appear from what has been advanced in the preceding pages, that on the experience of a great length of time, it would seem that the laws and regulations in respect to grain, which were brought forward under the acts of 1670, 1688, 1706, and 1732, had considerable influence and effect in promoting the improvement of agriculture, increasing the quantity of corn, and thereby preventing the necessity of having

recourse to *importation* for a precarious and uncertain supply; it may not only be proper to afford the following tabular view from the valuable work quoted above, of the prices, bounties, and duties, as laid down by them, by which their principles and objects may be more clearly comprehended, but also to contrast them with the regulations concerning those which have been enacted by the law of 1791.

C O R N.

TABLE.—Prices, Bounties, and Duties, on Exportation and Importation of Grain by the former Acts.

Bounties per Quarter.		Exportation.	Price of Grain per Quarter.		Importation.	Duties per Quarter.	
Money of the Time	Present Money.		Money of the Time.	Present Money.		Money of the Time.	Present Money.
£. s. d.	£. s. d.		£. s. d.	£. s. d.		£. s. d.	£. s. d.
		1. WHEAT, WHEAT-FLOUR.			OR MALT made of WHEAT.		
0 5 0	0 6 0	Bounty, when the price did not exceed - - -	2 8 0	2 17 7	there was payable upon importation - - -	0 16 0	0 19 2
		when the price was not above - - -	2 13 4	3 4 0	there was payable - - -	0 8 0	0 9 7
		when above that price and not above - -	4 0 0	4 16 0	there was payable - - -	0 5 4	0 6 5
		and when above that price - - -					
		2. RYE, PEASE.			BEANS, BUCK WHEAT.		
0 3 6	0 4 2½	Bounty, when the price did not exceed - - -	1 12 0	1 18 5	there was payable upon importation - - -	0 16 0	0 19 2
		when the price was not above - - -	2 0 0	2 8 0	there was payable - - -	0 4 0	0 4 9½
		and when above that price - - -					
		3. BARLEY, BEAR.			BIGG, MALT.		
0 2 6	0 3 0	Bounty, when the price did not exceed - - -	1 4 0	1 8 9	there was payable upon importation - - -	0 16 0	0 19 2
		when the price was not above - - -	1 12 0	1 18 5	there was payable - - -	0 2 8	0 3 2½
		and when above that price - - -					
		4. OATS.			OATMEAL.		
0 2 6	0 3 0	For the quarter of oatmeal, when the price of oats did not exceed - - -	0 15 0	0 18 0	there was payable upon the importation of oats - -	0 5 4	0 6 5
		when the price was not above - - -	0 16 0	0 19 2	there was payable - - -	0 1 4	0 1 7
		and when above that price					

TABLE.—Prices, Bounties, and Duties on Exportation and Importation of Grain,
by the latter Act.

Bounties <i>per</i> Quarter.		Prices of Grain <i>per</i> Quarter.		Duties <i>per</i> Quarter.
	1. WHEAT.		WHEAT.	
£. s. d.		£. s. d.		£. s. d.
0 5 0	Bounty when under - - -	2 4 0		
	Exportation prohibited when at, or above	2 6 0		
	when under	2 10 0	there is payable upon importation	1 4 3
	when at, or above	2 10 0	} ditto ditto	0 2 6
	but under	2 14 0	ditto ditto	0 0 6
	when at, or above	2 14 0		
	2. RYE.		PEASE and BEANS.	
0 3 0	Bounty when under * - - -	1 8 0		
	Exportation prohibited when at, or above	1 10 0	there is payable upon importation	1 2 0
	when under	1 14 0	} ditto ditto	0 1 6
	when at, or above	1 14 0	ditto ditto	0 0 3
	but under	1 17 0		
	when at, or above	1 17 0		
	3. BARLEY.		BEAR or BIGG.	
0 2 6	Bounty when under - - -	1 2 0		
	Exportation prohibited when at, or above	1 3 0	there is payable upon importation	1 2 0
	when under	1 5 0	} ditto ditto	0 1 3
	when at, or above	1 5 0	ditto ditto	0 0 3
	but under	1 7 0		
	when at, or above	1 7 0		
	4. OATS.		OATS.	
0 2 0	Bounty when under - - -	0 14 0		
	Exportation prohibited when at, or above	0 15 0	there is payable upon importation	0 6 7
	when under	0 17 0	} ditto ditto	0 1 0
	when at, or above	0 17 0	ditto ditto	0 0 2
	but under	0 18 0		
	when at, or above	0 18 0		

N. B.—Flour, meal, and malt, are regulated in proportion to the several sorts of grain. The importation of malt is at all times prohibited.

* The bounty, by the tables in the act of parliament, appears to be given only upon rye, and not also upon the exportation of peas and beans.

It has been observed on these tables, by Mr. Mackie, that though the import prices and duties are higher in a small degree in the latter, than was the case in the act of 1773, which is so far returning to the old system, yet that the encouragement held out to the husbandman is considerably less, than was the case under the ancient regulations. Without considering the difference in the value of money between the periods, it may be noticed, he says, that the bounty of 5s. on wheat, is now withdrawn when it reaches 44s., and exportation flopped when it advances to 46s. the quarter; while, by the old laws, exportation, with the bounty, was continued till the price reached 48s.

And importation, by this act, is permitted on low duties, when the price of wheat advances to 2l. 10s.; while, by the old acts, the duties were equal to a prohibition, until the price reached 4l. and even then, the duty was high, instead of being reduced to almost nothing, as is now the case, before wheat reaches a price capable of repaying the farmer in an unfavourable season. In fact, it is contended, that agriculture has derived little protection or support from the late laws, its continued prosperity depending rather on the impossibility of procuring adequate supplies of grain from abroad, by which the farmers in this country have, in a great degree, retained the monopoly of the markets, than the countenance it has received from the legislature.

Since the period already noticed, however, the above plan has been relinquished, and different changes and alterations have been made in the corn laws, by which it would seem that some parts of the old system have been again in some measure reverted to.

The act of 1773, by so greatly lowering the rates and duties on the importation of foreign grain, had contributed to fix and establish the import system, and speculation in corn, under the direction of the merchants, by which, from the prices of grain in the markets abroad, being commonly so much below those of this country, they were constantly ready, by some contrivance or other, to open the ports, before the price of the home grain in the markets, came to the rate at which foreign grain was permitted to be imported. It consequently became necessary, from time to time, to pass acts, in order to counteract such designs, and render the general law more efficient.

Accordingly, in 1781, an act was made, 21 Geo. III. c. 50, by which so much of the acts of the 1 Ja. II.; 5 Geo. II.; 6 Geo. III.; and 14 Geo. III., as related to the ascertaining of the prices of medium English wheat, and other grain, in the port of London, and counties of Kent and Essex, was repealed; and, in the place of which, an inspector was appointed, to fix the weekly average prices, from the actual sales in the said port; by which exportation, and the bounties paid thereon, were to be regulated. But besides this, an average price is directed to be made up from the weekly returns of each three months, on the first day of the sessions held in London, in January, April, July, and September, for the purpose of regulating importation for three months, and the duty payable thereon, in the port of London, and the above-mentioned counties. And, in 1783, the law respecting corn was suspended, importation being permitted at low duties, and exportation prohibited, till the 25th August of the same year, in England, and the 25th of September in Scotland. 23 Geo. III. c. 1, 53, 81.

In 1789, an act was passed, 29 Geo. III. c. 38., for improving and extending the act of the 21 Geo. III. c. 50, by which every corn-factor in London, and the suburbs,

was necessitated to give in weekly returns of his sales to the inspectors; and importation was permitted into London, Kent, and Essex, when the prices of middling British grain reached the rates fixed in the act of 1773, as formed from the six last weekly returns in the port of London, immediately preceding the quarterly sessions, with the exception of oats, which was formerly was directed to be regulated by twelve weekly returns: the act being extended to the maritime counties of England, which were divided into eleven districts. The inspectors of corn returns, were to be appointed by the justices of peace in each county, and directed to make weekly returns of the prices of grain, from not more than twelve, or less than eight market towns in each county, the average prices, made from the weekly returns, being directed to be sent to the collectors of the ports in the district, for regulating exportation; and the average prices for the whole district, formed from the six weekly returns, immediately preceding the first day of February, of May, of August, and of November, were to regulate the importation of foreign grain and the duties paid thereon.

In 1790, an act of indemnity, 30 Geo. III. c. 1, was passed, for abrogating the corn laws, in pursuance of orders from the privy council of the 11th and 18th of November, 23d of December 1786, 2d and 8th of January 1790, by which the above orders are confirmed, and the laws respecting corn suspended; no sort of British grain being permitted to be exported, except the particular specified quantities for the use of the sugar colonies; but all kinds of foreign grain permitted to be brought freely into every port in the kingdom at the low duties; the act being to continue in full force, until the 29th of September in this year.

And, by the 30 Geo. III. c. 43, the execution of these laws was further suspended, until the 28th February 1791, full powers however being given to the privy council, to admit the exportation of all kinds of British grain, whenever it judged it necessary. Further, by the 31 Geo. III. c. 4, the two preceding acts were amended; and, by the introduction of a clause in the general corn law, passed this session, they were continued in full force until its commencement on the 15th of November 1791.

It is remarked by Mr. Mackie, in his "Letters on the Corn Laws," that none of these acts for rendering the law of 1773 more efficient, were extended to Scotland, the consequence of which was, that from the average prices not being fixed and determined by the actual sales, whenever the ports were opened for the importation of grain from abroad into it, it constantly took place, when the current price of produce there was greatly under the reduced rates at which that act even admitted the importation of foreign corn; namely, wheat at 48s. the quarter, Winchester measure, &c. And that, on the contrary, when the overplus quantity of corn was in such abundance, as to permit exportation, the ports there were constantly shut, before the price of the home produce reached the limit at which exportation ceases; both of which cases operate unfavourably for the agriculture of the country.

In 1791, an act for a new general corn law was passed, 31 Geo. III. c. 30., commencing on the 15th of November of the same year, by which the 1 Ja. II. c. 19.; 1 Gul. & M. c. 12.; 5 Geo. II. c. 2.; 10 Geo. III. c. 39.; 13 Geo. III. c. 43.; 21 Geo. III. c. 50.; 29 Geo. III. c. 58.; and so much of the 15 Cha. II. c. 7., as prohibits the buying of corn to sell again, and laying it up in granaries, when above certain prices, were repealed.

By this act, the maritime counties of England are divided into twelve districts, and Scotland into four districts, making sixteen in the whole. The prices of grain at the corn exchange in London, being made to regulate the exports and imports of the first district, which comprehends the ports of that city, together with the counties of Kent, Essex, and Suffolk. And, in the other districts, the particular market towns, at which the prices and quantities of grain actually sold are collected, are listed in the act. The dealers in grain are directed to give in, on oath, weekly accounts of their actual sales for that time, to the officer termed the inspector of returns, who, from such returns, is to make out an account of the general weekly average price of the whole district, which is to be transmitted to the collectors of the customs at the different ports within the said district, by which the bounties payable on exportation are to be regulated.

And, at four different times in the year, as within the space of seven days after the 15th of February, 15th of May, 15th of August, and the 15th of November, the receivers of corn returns, in each district, are to make up the average prices of corn within the same, from the last six weekly returns thereof, with the exception of oats, which is to be made up from twelve weekly returns, this quarterly average being sent to the collectors of the customs at the different ports within the said district, at such periods as mentioned above, by which importation, and the duties payable thereon, are to be regulated for the following quarter.

But, in Scotland, the average prices of grain are not ascertained from the actual sales. The sheriffs of the different counties, once in the month, convene juries for fixing the average price at which it is usually selling, but the witnesses brought forward produce no account of their actual purchases or sales, only deposing to what they believe from their own experience, and the opinion of others, to be the current prices. Monthly accounts of the average prices of grain within each county, are made from these, by the sheriffs of the different counties, which are sent up to the receiver of corn returns in the port of London, from which the receiver is to make up an average account for each district, and transmit it to the collectors of the ports within the same, which is to regulate the bounties upon exportation; and, at the above-named quarterly periods, he is to make up the average prices from the two last monthly returns, which are to regulate the duties payable upon importation for the following quarter.

But corn from abroad may be imported and landed at any time without payment of duties, provided it be warehoused under certain regulations, but cannot be taken out of the warehouse for home consumption, until the low duties are paid, and such other duties as are payable at the time, in the district where intended to be used; nor can corn of either foreign or home produce be conveyed coastways from the port of any district, where exportation is not permitted, at the time of shipping, to the ports of any district in which exportation is permitted.

And when the general average of the whole country exceeds the rates of import at the low duties, his majesty, in such case, the parliament not being sitting, can, with the consent of the privy council, suspend the execution of the act so far as to prohibit exportation wholly, and permit importation at the low duties, such permission continuing in force three months; but this power does not extend to prohibiting the exportation of foreign grain warehoused before.

Since the above act, other laws have been made for the further regulation of the trade in grain. In 1793, an act

of indemnity was passed, the 39 Geo. III. c. 3, for putting a stop to the execution of the general corn law, by an order of council of the 9th of November 1792, prohibiting the exportation of home produce, and granting liberty to import corn from abroad, until the 1st of March 1793; and for further suspending the said law, by granting power to his majesty and council at any time during the sitting of the parliament, to permit importation and prohibit exportation.

And by the 33 Geo. III. c. 63., the general corn law of 1791 was altered, by the repeal of the clauses for ascertaining the average prices of corn in England, and substituting others of a similar tendency in their stead. And further, by granting liberty to his majesty and council, when parliament is not sitting, to permit the importation of grain, and prohibit the exportation of home produce, when the general average of the whole kingdom exceeds the prices at which grain can be imported at the low duties from Ireland and the colonies of North America; namely, wheat, 48s. 6d., 32s. barley, 24s. oats, 16s. Likewise, by allowing exportation with a bounty of 1s. 6d. when oatmeal is under 14s. per boll; prohibiting exportation to foreign countries, when above 14s. the boll.

The law of 1795, the 35 Geo. III. c. 4, passed the 13th February, suspends the general corn law of 1791, by giving power to his majesty, with the consent of the privy council, to prohibit the exportation and permit the importation of all sorts of grain from abroad, without the payment of any duties whatsoever. The act to be in force until six weeks after the next parliament has met.

In consequence of a report of a committee of the house of commons, made in 1804, on which it appeared, that the price of corn from 1791 to the harvest of 1803, though very irregular, and increased on the average greatly by the years of scarcity, has in common afforded a fair profit to the grower; but that, from the stimulus of the usual high prices having increased industry, by which large tracts of waste land have been brought into cultivation, which, joined to the two last productive seasons, and other causes, have occasioned such a depression in the value of corn, as may tend to the discouragement of agriculture, unless supported by the aid of the legislature. Accordingly an act was this year passed the 44th Geo. III. c. 109, for the purpose of regulating the importation and exportation of corn, and the bounties and duties payable on the same; and by which it was enacted, that from and after the 15th of November, 1804, so much of the act of the 31 Geo. III. c. 30. as regulates the prices at which British corn, grain, malt, meal, flour, and biscuit, may be exported, except to Ireland, and at which corn from abroad, grain, meal, and flour may be imported, except from Ireland, and as fixes the duties and bounties payable thereon, be repealed. Further, that, by this act, the importation and exportation of grain, into and from England and Wales, be regulated by the average price of the twelve maritime districts, and into or from Scotland, by the average price of the four districts of it; and that the bounties and duties be regulated by schedules annexed to the act; that whenever the average shall be under the prices, at which corn may be importable into Great Britain and Ireland, from abroad, on the low duties, exportation shall be permitted from Great Britain to Ireland, &c.; and that the importation and exportation of corn into and from Ireland shall be regulated by schedules annexed to the act. The first schedule shews the prices, to which the scale of bounty is to attach on the export of corn, &c. and the prices at which the exportation is prohibited. According to which wheat may be exported

when at or under 48*s.* the quarter, with a bounty of 5*s.*; rye at or under 32*s.* with a bounty of 3*s.*; peafe and beans are exportable withut a bounty, until at or under 35*s.*; barley, bear, or bigg, or malt made of barley, bear, or bigg, may be exported at or under 28*s.* with a bounty of 2*s.* 6*d.*; oats at or under 16*s.* with a bounty of 2*s.*; wheat, flour, bifcuit, &c. with a bounty of 1*s.* 6*d.* per cwt.; wheat meal, with a bounty of 1*s.* 3*d.* per cwt.; barley, bear, or biggmeal, with a bounty of 10*d.* per cwt.; and oatmeal, with a bounty of 1*s.* per cwt. But that when the price of wheat exceeds 54*s.* that of rye 35*s.* that of peafe and beans 35*s.* that of barley, bear, or bigg, or malt made of them, 31*s.* and that of oats 19*s.* no export is to be allowed.

The fecond fchedule fhews the prices, according to which high or low duties are to take place on importation. When imported from the province of Quebec, or the other colonies or plantations in North America, wheat under 53*s.* the quarter, is fubject to the high duty of 24*s.* 3*d.* the quarter; at or above 53*s.* but under 56*s.* to the firft low duty of 2*s.* 6*d.*; and at or above 56*s.* to the fecond low duty of 6*d.*; rye, peafe, and beans, under 35*s.* the quarter are fubject to the high duty of 22*s.*; at or above 35*s.* but under 37*s.* to the firft low duty of 1*s.* 6*d.*; and at or above 37*s.* to the fecond low duty of 3*d.*; barley, bear, or bigg, under 26*s.* are fubject to the high duty of 22*s.*; at or above 26*s.* but under 28*s.* to the firft low duty of 1*s.* 3*d.*; and at or above 28*s.* to the fecond low duty of 3*d.*; oats under 17*s.* are fubject to pay the duty of 6*s.* 7*d.*; and at or above 17*s.* but under 18*s.* the firft low duty of 1*s.*; and at or above 18*s.* the fecond low duty of 2*d.*; oatmeal, if under 16*s.* 6*d.* the boll of 140 lbs. avoirdupois, or 128 lbs. Scotch troy, is fubject for every boll to the high duty of 8*s.*; at or above 16*s.* 6*d.* the boll, but under 17*s.* 4*d.* to the firft low duty of 1*s.*; and at or above 17*s.* 4*d.* the boll, to the fecond low duty of 2*d.* When imported from any other country abroad, wheat under 63*s.* the quarter is fubject to pay the high duty of 24*s.* 3*d.*; at or above 63*s.* but under 66*s.* the firft low duty of 2*s.* 6*d.*; and at or above 66*s.* the fecond low duty of 6*d.*; rye, peafe, and beans, under 42*s.* pay the high duty of 22*s.*; at or above 42*s.* but under 44*s.* the firft low duty of 1*s.* 6*d.*; and at or above 44*s.* the fecond low duty of 3*d.*; barley, bear, or bigg, under 31*s.* 6*d.* pays the high duty of 22*s.*; at or above 31*s.* 6*d.* but under 33*s.* the firft low duty of 1*s.* 3*d.*; and at or above 33*s.* the fecond low duty of 3*d.*; oats, under 21*s.* pay the high duty of 6*s.* 7*d.*; at or above 21*s.* but under 22*s.* the firft low duty of 1*s.*; and at or above 22*s.* the fecond low duty of 2*d.*; oatmeal under 20*s.* the boll, pays the high duty of 8*s.*; at or above 20*s.* but under 21*s.* the firft low duty of 1*s.*; and at or above 21*s.* the fecond low duty of 6*d.*

The third fchedule fhews the prices to which the feale of bounty attaches on the export of corn, ground corn, flour, or meal, malt, &c. from Ireland, and the prices at which the exportation is prohibited. When exported to any country abroad, wheat at or under 29*s.* 5*d.* the barrel Britifh, is allowed a bounty of 3*s.*; rye, and likewise peas and beans, at or under 29*s.* 4*d.*, a bounty of 1*s.* 10*d.*; barley, bear, or bigg, or malt made from them, at or under 16*s.*, a bounty of 1*s.* 5*d.*; oats, at or under 10*s.* 2*d.*, a bounty of 1*s.* 3*d.*; wheat flour, bifcuit, &c. a bounty of 1*s.* 6*d.* the cwt.; wheat, meal, 1*s.* 3*d.* the cwt.; rye meal, or flour, 9*d.* the cwt.; barley, bear, or bigg flour, 10*d.* the cwt.; and oatmeal 1*s.* the cwt. When the price of wheat exceeds 33*s.* 1*d.* the barrel Britifh; of rye, peas, and beans, 22*s.* 3*d.*; of barley, bear, or bigg, or malt made

from them, 17*s.* 8*d.*; and of oats 12*s.* 3*d.*, no exportation is permitted.

The fourth fchedule fhews the prices according to which the high or low duties are to take place on importation into Ireland.

By the aft of the 45 Geo. III. c. 26. fec. 3, paffed in 1805, fo much of the aft of the 41 Geo. III. c. 36, as may enable the lord lieutenant of Ireland to prohibit the exportation from it for a limited time, fo as not to endure longer than the expiration of fix weeks, after the commencement of the next feffion of parliament, corn, potatoes, and all other provisions whatever, and to permit the importation of corn, &c. for fuch limited time, without the payment of duty, and the faid aft to be further continued in force until the 25th day of March 1806.

The aft of the 16th July 1806, 46 Geo. III. c. 97, which is intitled, "An Aft to permit the free Interchange of every fpecies of Corn between Great Britain and Ireland," enacts that the bounty and duties payable on exportation and importation of all corn and grain, meal, flour, bread, or bifcuit, from Great Britain into any port or place of Ireland, or from Ireland, into any port or place of Great Britain, fhall ceafe and determine. Provided always that the perfon exporting fuch articles declare before the chief officer of the customs that the corn, &c. is really intended to be exported to Great Britain or Ireland, as the cafe may be, on which certificates, &c. are to be given to the exporter as in other cafes of tranfmitting goods coastways, without any fee or perquifite.

And by an aft of the 19th February, 1807, the 47 Geo. III. c. 7, the above recited aft is amended, it being enacted that the faid aft, and the feveral claufes and provisions therein mentioned, concerning the exportation and importation of any fort of grain or corn, meal, flour, bread, or bifcuit, from Great Britain to Ireland, or from Ireland to Great Britain was intended to extend, and is hereby declared to extend only to fuch corn or grain, meal, flour, bread, or bifcuit, as is the growth, produce, or manufacture of Great Britain or Ireland refpectively, and not to fuch being the growth, produce, or manufacture of any other country or place.

It is obferved by Mr. Mackie, in his excellent "Letters on the Corn Laws," after fuggellng many judicious amendments in the aft of 1791, that the power of the crown in fufpending thefe laws without the confent of parliament is a highly dangerous power, which renders them in fome meafure of no effect. He conceives that in all free countries agriculture, which is an objeet of the greateft national importance, fhould conflantly be under the facred proteetion of ftanding laws, left the cultivators of the foil fhould not have their induftry fufficiently encouraged. And that at prefent, however deficient the cafe might formerly have been, when capitalifts are always ready and on the watch to open the ports, and fpeculate in the introduction of grain from abroad, importation fhould never be permitted but with the greateft precaution, nor exportation put a flop to contrary to the eftablifhed laws, except in cafes of abfolute neceffity, when indemnity would be readily granted. Some method of counteraeting this and other inconveniencies of a fimilar kind he conceives to be effential. From the barriers which had been formerly fet up, as a preventative of the importation of corn from abroad, being deltroyed, by the repeal of the old laws and reducing the import duties, a change made by the law of the year 1773, has arifen, he conceives, the inability of Great Britain to fupply herfelf with corn the produce of her own foil.

"In proportion," fays he, "as the country advanced in
prosperity,

prosperity, the surplus quantity, after supplying the inhabitants, which used formerly to be exported, was gradually absorbed by the increasing population and luxury of the nation; and the law in question, among other causes, giving a check to the further extension of agriculture, necessary to counterbalance the additional consumption, the tide at last turned against the country, and a regular influx of foreign grain became expedient to supply the growing wants of the inhabitants."

The differences which took place in this way, are strikingly shewn in the statement given below from Mr. Dirom, who remarks that no accounts have been preserved concerning the exports and imports of corn, previously to 1697, or that, from the high duties, little trade of this nature was carried on; but that in the years from that period to 1700 inclusive, the amount of the exportation of the different sorts of grain was 331,223 quarters; while the importation was only 8,948 quarters: that, in the course of the ten years from the last of the above periods to 1710, the amount of the annual exportation was 248,945 quarters; while the average of the importation only came to 442 quarters. That in one of these years (1709) more than half a million of quarters, and in the course of the whole, not less than 2,849,446 quarters were exported, while only 4,442 quarters were imported.

In the next ten years, from 1711 to 1720 inclusive, the average yearly exportation increased to 449,193 quarters; the average annual importation being only 71 quarters. The amount of the exportation of these ten years being nearly in a double proportion to that of the preceding ten, amounting to 4,491,933 quarters; while the import was only 714 quarters.

In the subsequent ten years, from 1721 to 1730 inclusive, though from different circumstances, much foreign grain was introduced in some of the years, the exports kept nearly up to the preceding equal period; the amount of the whole of them for these ten years being 4,479,683 quarters; the imports of the different kinds of grain being 732,692 quarters.

For the ten years, from 1731 to 1740 inclusive, the act of 1729 having given a check to foreign importation and promoted cultivation, the average annual exportation was 549,447 quarters; while the amount of the average importation was only 4,690: the whole export of the ten years being 5,494,471 quarters; and the whole import only 46,909 quarters.

For the ten years from 1741 to 1750 inclusive, on

account of the great industry and exertion of the farmers, in consequence of being released from prohibitory and injudicious laws, the annual average amount of exportation rose to the extraordinary height of 848,660 quarters; while the imports amounted only to 15,193 quarters. The exports in 1748 were 1,123,953 quarters, in 1749, 1,250,306 quarters, and in the following year the amazing amount of 1,667,778 quarters; the whole for the ten years being 8,486,602 quarters; while the imports of the several sorts of grain were only 159,437 quarters.

But for the ten years from 1751 to 1760 inclusive, the exports declined, on the average, to 582,837 quarters; the imports, on the average, being 37,397 quarters. This reduction in the exports is supposed to have depended on the deficient crops of 1756 and that of the following year.

From about this period the commencement of the import system seems to have taken its rise, which has since been carried to such an amazing extent.

The imports of the years 1763 and 1764 chiefly consisted of oats; but in 1765 they were different sorts of foreign grain, chiefly wheat, amounting to 218,031 quarters; while the exports of the several sorts of corn amounted to the extent of 457,730 quarters. In 1767 the vast amount of 907,420 quarters was imported, 500,000 of which were wheat; and on the average of the twelve years, from 1761 to 1772 inclusive, the annual exportation had sunk to 370,703, the yearly importation having increased to 251,279 quarters.

Under the sanction of the act of 1773, in 1774 the large amount of 926,174 quarters of grain were imported from abroad, one third being wheat or wheat flour; while the quantity exported was not more than 51,099. In 1775 the immense quantity of 1,163,407 quarters of foreign corn was imported, half of which being wheat and wheat flour, while the exportation only rose to 191,007 quarters. On the whole, for the twelve years from 1773 to 1784 inclusive, the annual average importation came up to 578,358 quarters; while the exportation decreased to 267,182 quarters. The whole importation of this period being not less than 6,940,293 quarters of foreign grain; while only 3,206,184 quarters of grain of home growth were exported.

This reverse in our corn trade, with the vast disadvantages which are sustained by it to the nation, are still further shown by Mr. Mackie in the table of the exports and imports of all sorts of grain, sent from or brought into Great Britain, from the conclusion of the above period to the year 1793.

C O R N.

ACCOUNT of Exports and Imports of Corn into Great Britain, from 5th January 1785,
to 5th January 1793.

GREAT BRITAIN, *Dr.*

Cr.

		Quarters.	Price.					Quarters.	Price.		
			<i>s. d.</i>						<i>s. d.</i>		
1785	To foreign wheat } imported.	110,863	41 10			1785	By wheat exported.	132 68	41 10		
1786		51,463	38 10			1786		205,466	38 10		
1787		59,339	41 2			1787		120,526	41 2		
1788		148,710	45 0			1788		82,971	45 0		
1789		107,324	51 2			1789		67,865	51 2		
1790		216,374	53 2			1790		229,754	53 2		
1791		459,420	47 0			1791		71,546	47 0		
1792		22,131	42 2			1792		310,681	42 2		
1793		459,611	48 4			1793		81,755	48 7		
Average price of the above 9 years 45 <i>s.</i> 9 <i>d.</i>		1,635,305	45 9	£.	<i>s. d.</i>	Balance paid in 9 years by Great Britain for foreign wheat, or per annum 36,893 ¹ / ₃ qrs. 84 <i>l.</i> 11 <i>s.</i> 5 <i>d.</i>		1,303 265	45 9	£.	<i>s. d.</i>
				3,740,760	3 9					2,988,831	1 3
		1,635,305						332,040		759,929	2 6
								1,635,305		3,740,760	3 9

GREAT BRITAIN, *Dr.*

Cr.

		Quarters.	Price.					Quarters.	Price.		
			<i>s. d.</i>						<i>s. d.</i>		
1785	To foreign barley } imported.	67,212	24 0			1785	By barley exported.	166 40	24 0		
1786		62,374	24 4			1786		111,598	24 4		
1787		43,244	22 8			1787		135,086	22 8		
1788		11,479	22 0			1788		212,811	22 0		
1789		12,295	22 10			1789		344,631	22 10		
1790		30,117	25 6			1790		51,166	25 6		
1791		61,135	25 10			1791		41,590	25 10		
1792		118,527	26 8			1792		47,555	26 8		
1793		147,109	31 8			1793		44,492	31 8		
Average price of the above 9 years 25 <i>s.</i>		553,554	25 0	£.	<i>s. d.</i>	Balance received by Great Britain in the above 9 years for barley exported or per annum 80,190 ² / ₃ qrs. 78 <i>l.</i> 4 <i>s.</i> 5 ¹ / ₂ <i>d.</i>		6,115,348	25 0	£.	<i>s. d.</i>
				691,940	0 0					1,394,185	0 0
				702,245	0 0						
		1,115,348						1,115,348		1,394,185	0 0

C O R N.

ACCOUNT of Exports and Imports of Corn into Great Britain, from 5th January 1785,
to 5th January 1793.

GREAT BRITAIN, *Dr.*

Cr.

		Quarters.	Price.					Quarters.	Price.		
			<i>s. d.</i>						<i>s. d.</i>		
1785	To foreign ryeim- ported - - }	28,761	28 0			1785	By rye exported	13,163	28 0		
1786		3,643	27 2			1786		6,736	27 2		
1787		7,054	27 8			1787		12,683	27 8		
1788			27 8			1788		31,220	27 8		
1789		14,844	29 10			1789		39,946	29 10		
1790		21,683	34 0			1790		47,34 0			
1791		56,378	31 4			1791		3,528	31 4		
1792		13,027	30 10			1792		16,151	30 10		
1793		5,124	34 10			1793		512	34 10		
Average price of the above 9 years, 30s. 1 $\frac{1}{4}$ d.		150,514	30 1 $\frac{1}{4}$	£.	<i>s. d.</i>	Balance paid by Great Britain, in the above 9 years, for rye imported, be- ing per annum, for 2947 $\frac{1}{2}$ qrs. 4485l. 17s. 6d.		123,986	30 1 $\frac{1}{4}$	£.	<i>s. d.</i>
				226,868	9 11			26,528		186,495	12 2
										40,372	17 9
		150,514		226,868	9 11			150,514		226,868	9 11

GREAT BRITAIN, *Dr.*

Cr.

		Quarters.	Price.					Quarters.	Price.		
			<i>s. d.</i>						<i>s. d.</i>		
1785	To foreign peas and beans im- ported - - }	16,813	30 8			1785	By peas and beans exported - }	15,904	30 8		
1786		35,705	33 2			1786		16,309	33 2		
1787		42,884	31 10			1787		18,260	31 10		
1788		10,902	27 2			1788		15,135	27 2		
1789		391	27 2			1789		27,891	27 2		
1790		43,168	31 0			1790		17,577	31 0		
1791		14,726	30 6			1791		13,721	30 6		
1792		43,259	31 4			1792		17,291	32 4		
1793		48,274	37 4			1793		13,483	37 4		
Average price of the above 9 years, 31s. 1d.		256,126	31 1	£.	<i>s. d.</i>	Balance paid by Great Britain in the above 9 years for peas and beans im- ported, being per annum for 11,172 $\frac{1}{2}$ qrs 17,304l. 6s. 10d. - - }		155,571	31 1	£.	<i>s. d.</i>
				398,062	6 9			100,555		241,783	5 3
										156,279	1 6
		256,126		398,062	6 9			256,126		398,062	6 9

C O R N.

ACCOUNT of Exports and Imports of Corn into Great Britain, from January 5th 1785,
to January 5th 1793.

GREAT BRITAIN, *Dr.*

Cr.

		Quarters.		Price.		£.	s.	d.			Quarters.		Price.		£.	s.	d.					
				s.	d.						s.	d.						s.	d.			
1785	To foreign oats imported }	274,089	17	2	235,259	5	6	1785	By oats exported	25,273	17	2	22,097	13	2	1786	19,293	18	0	17,308	16	0
1786																						
1787					426,670	0	0	1788								1789	32,683	16	0	26,146	8	0
1788					313,814	12	10	1790								1790	42,275	18	10	15,422	5	10
1789					429,722	16	0	1791								1791	16,358	18	2	11,858	10	4
1790					735,173	18	10	1792								1792	25,709	18	2	23,352	6	10
1791					788,709	18	2	1793								1793	17,473	21	10	19,074	13	10
1792					1,008,401	18	2	Balance paid by } Great Britain, in the above 9 years, for oats imported, being per annum for 375,593 ³ / ₄ qrs. 522,496l. 10s. 3d. - }		182,580		17		10		161,090		14		1		
1793	Average price of the above 9 years, 17s. 10d.	5,362,921	17	10	4,863,559	6	4															5,180,341
		5,362,921			4,863,559																	

GENERAL Abstract of the Exports and Imports of Corn from and into Great Britain for 9 Years, from 1785 to 1793 inclusive.

	Quarters.	£.	s.	d.		Quarters.	£.	s.	d.
To foreign wheat imported from 1785 to 1793	1,635,305	3,740,760	3	9	By wheat exported from 1785 to 1793	1,303,265	2,980,831	1	3
To barley ditto	553,552	691,940	0	0	By barley ditto	1,115,348	1,394,185	0	0
To rye ditto	150,514	226,868	9	7	By rye ditto	123,986	186,495	12	2
To peas and beans ditto	256,126	308,062	6	9	By peas and beans ditto	155,571	241,783	5	3
To oats ditto	5,362,921	4,863,559	6	4	By oats ditto	182,580	161,090	14	1
					By surplus quantity of grain imported by Great Britain, in the 9 years above-mentioned, after deducting the quantity exported, being at the rate of 564,185 qrs. $\frac{3}{4}$ value 550,756 $\frac{3}{4}$ l. per ann.]	5,077,668	4,956,804	13	8
	7,958,418	9,921,190	6	5		7,958,418	9,921,190	6	5

The same writer, after observing that the act of 1791 in some degree discouraged the importation of corn from abroad, by increasing the rates or duties on it, which was a defect in the old laws, yet still that statute is far from a state of perfection. A radical error had, he conceives, been committed in the outset of the corn laws, which has never been removed, which is that of the relative regulating rates of exportation and importation for the different kinds of grain, not having been fixed for such, proportionably to their real values, the labour and expence they stand the farmer in raising and bringing to market, as in such instances he would be under the necessity of relinquishing the cultivation of any particular sort of grain, so rated from the corn dealer, in consequence being able to have almost a complete command of the home market, from his being capable of supplying it from abroad. This he contends is the case at present in regard to oats, as from various statements he shews, that if the rate of importation for that sort of grain had been regulated originally, "in proportion to the current values in 1670 and 1688, when the present system of corn laws was first enacted," it should have been in the following proportion. "As 28*s.*, the average price of wheat is to 85*s.* 4*d.*, the import rate of wheat including the duty, so is 12*s.*, the average price of oats, to 36*s.* 6*d.*, being the relative import rate at which oats ought to have been imported, including the duty; whereas the law allowed foreign oats to be imported at 17*s.* 4*d.* including the duty. This he shews to have continued still the case with this sort of grain, from which the culture has been greatly abandoned by our farmers; and a large importation of that sort of corn, though much inferior to our own, rendered necessary, 5,362,921 quarters having been imported from 1785 to 1793 at the value of 4,863,599*l.* 6*s.* 4*d.*

It is concluded on the whole, that as the "wealth of nations varies considerably at different times, so ought the rates which regulate the export and import of foreign corn; if these affect the money price of our own produce in the home market, and tend to sink its relative value below the current price of labour, with which it must always bear a just and necessary proportion, the rates must consequently be raised in order to preserve agriculture, the only solid basis on which the real wealth and lasting prosperity of a state can be founded." Should our industry and capital continue to increase for thirty years, in the same ratio it has done since the peace of 1783, the money in circulation, the price of labour, and the expence of cultivation may be double what it now is; and the price of corn will naturally increase in the same degree: should the rates, at which corn from abroad is then permitted to be imported, have a tendency to obstruct such a rise, he contends, that they must either be heightened or this country will lose its agriculture, as has already happened in the case of oats; but that, on the other hand, should the prosperity of the country decline, so as to lessen the demand for labour, or the floating capital to one-half, the price of corn should sink in the same proportion, to the diminished price of labour, and the import rates be lowered, if the means of preventing such a necessary diminution. Consequently, that, if these principles be well founded, a permanent law for the regulation of the export and import of grain, is inconsistent with sound policy; it should be such as to expire regularly at fixed periods, according to the wisdom of the legislature, on taking the situation of the country into full consideration, so as to regulate it in conformity to the price of labour, which is "the most certain index of the growing prosperity, stationary situation, or declining state of the nation."

In support of which Mr. Malpas, in his late work

on the "Principle of Population," observes, that in order "to restore our independence, and build our national greatness and commercial prosperity on the sure foundation of agriculture, it is evidently not sufficient to propose premiums for tillage, to cultivate this or that waste, or even to pass a general inclosure bill, though these are all excellent as far as they go. If the increase of the commercial population keep pace with these efforts, we shall only be where we were before, with regard to the necessity of importation. The object required is, to alter the relative proportion between the commercial and the agricultural population of the country, which, he thinks, can only be done by some system, that will determine a greater proportion of the national capital to the national land." And he "sees no other way at present of effecting this object, but by corn laws adapted to the peculiar circumstances of the country, and the state of foreign markets." These are stated as the leading principles and circumstances which are necessary to be particularly had in view in the framing of laws for the regulation of the trade in corn.

CORN, in *Surgery*, is a hard, dry, cuticular, warty, or horny induration in the skin, and sometimes also in the subjacent cellular membrane. In the former case, the induration may be moved backwards and forwards; but in the latter, it is immovable. Corns are in general not larger than about the size of a small pea, and are produced in consequence of external pressure, especially in such parts as are exposed to much friction, and where the skin is very near to the bone. They are, therefore, most generally found in the toes, or the soles of the feet; but sometimes also in other parts, as on the upper ridge of the hip bone, where they are produced by the pressure of women's stays. Sometimes also similar indurations are formed in the ears of women, who wear heavy ear-rings. When they are formed in the feet, they generally arise from the use of too narrow or high-heeled shoes, and sometimes merely by wearing the stockings too tight. Frequently they produce no inconvenience; but sometimes they become so painful as to render the patient entirely lame. The pain is increased by wearing warm stockings, tight shoes, violent motion of the body, standing or walking too long, drinking spirituous liquors, and during variable weather. They are generally painful in hot weather, but rarely so in cold.

With respect to the cure, the surgeon may either endeavour to remove the pain for a time, or radically to free the patient from the disease. The violence of the pain may be immediately relieved, by the patient's sitting down, taking off his narrow shoes, placing his foot in a horizontal position, and cooling it a little. A more permanent relief may be obtained, by shaving off the prominent part of the corn with a knife, as far as it can conveniently be got at, without, however, exciting any hæmorrhage, and by the use of emollient warm fomentations. The patient cannot be radically freed from his corns, unless he resolves, during the progress of the cure, to wear no other than wide, soft, and low-heeled shoes, and to walk and stand as little as possible. If this is out of his power, and he is under the necessity of frequently walking or standing for a considerable time, the pressure may be prevented in the following manner: Take a piece of linen spread with some emollient plaster; lay one piece over another, from eight to twelve times together, and cut a hole in the middle of them, exactly the same size and circumference as the corn; then apply it in such a manner that the corn enters the hole in the plaster, and is thus defended against the contact of the stockings and shoes. When such a plaster has been worn for the space of some weeks, the corn, if recent, generally disappears without requiring any

other remedy. When the corn is situated in the sole of the foot, we need only cut a hole into a felt-sole, so as to fit the corn, and introduce it into the shoe.

By the following treatment, corns may be removed with certainty, radically, and speedily, especially if we employ at the same time the perforated sole or plaster: Rub two or three times a day an emollient liniment, such as the ointment of althea, or, which is still better, the volatile liniment, upon the corn, and keep it covered during the intervals with an emollient plaster. Every morning and evening let the foot be kept for half an hour in warm water, and the corn well rubbed with soap. Let the external part of the corn, which will have become perfectly white, soft, and pulpy, be then scraped with a blunt knife, till all the soft part is removed, and till the operation begins to give pain to the patient; upon which, we must immediately desist. This treatment is to be continued till the corn is entirely extirpated; for if we desist from it earlier, the corn will grow again. However, we must take care not to cut the part with the knife, so as to make it give pain or bleed.

Amongst a variety of remedies that have been recommended for corns, the following are the principal: green wax, soap plaster, diachylon, mercurial or henlock plaster, a piece of bacon, the juicy pulp of a fresh lemon, and even a piece of green oil-cloth, &c. which are to be changed as often as may be necessary. The following remedies have also been recommended as infallible: R Gum. ammoniac. Cer. citrin. aa ʒij Aerng. æris ʒvj. M. F. Emplastr. S. To be spread upon linen and applied to the corn. Or, R Enpl. de gabano, de ammoniac. diachyl. comp. aa ʒiij. Camph. ʒij. M. F. Empl. D. S. To be spread pretty thick upon linen, and applied to the corn, in pieces just sufficiently large to cover it. In order to aid the operation of the remedy, we may previously soften the corn in warm water, and scrape off as much of it as we are able. The following plaster has been said to produce the separation of the corn within three or four days: R Gum. galban. ʒij. in acet. dissolut. & ad spiritumdinem evaporat. Add. Picis naval ʒfs. Empl. diach. simpl. ʒij. In fine, Sal. ammon. virid. Aeris pulverif. aa ʒj. M. F. Empl. The excision of the corn is not to be recommended as a radical method of cure, both on account of the difficulty and danger with which it is attended, and because it sometimes proves unsuccessful. When the patient has got rid of his corns, he must avoid all the above-mentioned causes which tend to produce them, or they will again return.

CORNS, in *Veterinary Science*, a troublesome disease in the feet of horses, most generally occurring in the fore feet, and in the inside heel, within the angle or union of the quarter with the bar; though these bruises are sometimes found in both quarters or sides of the foot.

Terms improperly used in any art or science render its accents more difficult, obscure our views of it, and retard its advancement: so the term *corns* is, in this case, a gross misapplication of words, creating perplexity and misconception, and which actual experience even in the disease is hardly sufficient to do away.

When the skin of the human foot is gradually compressed or rubbed, without any sudden and violent irritation that shall raise the cuticle or create a sore, it thickens first, then becomes horny, and is rightly enough termed a corn, from *cornu*, Lat. or *corne*, Fr. *horn*.

In the horse, on the contrary, whose foot is every where thickly clothed with natural horn, such an occurrence, if it were possible, could not be a disease; but if a bruise takes place in the foot, at the point above described, it is also called a *corn*, though agreeing in nothing with the former

disease, but in the common circumstance of its affecting the foot with pain and lameness.

Where a corn, as it is called, exists in the foot, it is known by a redness, more or less intense, in the angle formed by the union of the bar with the sides of the foot, and is most generally observed, as we have already stated, in the inner quarter: it is tender, if pressed upon, producing lameness; and if the irritation is carried far enough, it fester, and the pus, being prevented escaping below by the sole, forms a passage inside the hoof upwards, through the foliated substance or clavic processes, to the coronet; and if a shoe, pressing too hard upon the part, continues to be used, the irritation being kept up for a long time, the part becomes weakened in its function, not forming good sound horn, and a painful disease is created, which is eradicated with difficulty, and is liable to return, after relief has been obtained, by the slightest renewal of this permanent pressure, or of irritation of any kind.

Having briefly described the disease, as it commonly appears, we proceed to consider its cause, and the cure.

As it is unequal pressure that produces corns, even in strong feet, from the shoe bearing too hard upon the point of the foot above indicated; so, in feet naturally weak, a slighter degree of pressure, if the pressure be permanent, shall be sufficient to induce it: so that the disease may be observed in all sorts of feet, but far more frequently in weak ones, as in low heeled feet, or where the heels project very much, and the horn turns under, and is thin.

The horse's foot, we may remark, by being continually bound by the nails which attach the shoe to the foot, is ever hardening and diminishing in its volume, under their influence and pressure, and especially all the elastic parts of the foot, which, not being then called into much action, become inert and rigid, or are absorbed; the posterior parts of the foot, in particular, are deranged by it, and in its contracting the foot, often forms waving lines of horn, which turn under at the heels, so that the shoe will take its bearing on the parts so disposed, in a direction tending inwards, and bring on bruises and weaknesses, or *corns*, as the smiths have been pleased to call them.

The inflammation induced by the bruise or pressure occasions an increase, or sometimes rupture, of the blood-vessels of the part pressed on; so that instead of lymph, the red parts of the blood flow into them: and hence that redness in the horn of the bruised part, the external indication of this disease.

If the pressure be speedily and effectually removed, and all external irritation be kept away, healthy horn forms again, and the disease disappears; but if the irritation be kept up for any length of time, or has been attended with much violence, the vascular parts go on to suppurate; and the pus, as we have observed, forces its way with great pain to the coronet. Its frequent recurrence leaves the parts very weak, and the smiths are then apt to imagine it is natural to them, and convey this idea to others, and seldom admit the real cause of the disease.

One circumstance, we believe not much understood, it is of importance to disclose here, respecting the production of this disorder, and which cannot be too generally known and considered, as it may be the means of warning those whose experience has not yet informed them of the danger: it is this, that if we make a perpendicular section of the horse's foot, across the two points of the heel, where the corns usually are found, it will be observed that the outside and inside heels exhibit different appearances: the vascular parts lying much lower on the inside than on the outside quarter; so much so, that any one holding the foot from the ground, and

and levelling the sole to his eye with his drawing-knife or butrets, he would meet with the blood of the inside quarter before he had brought it to what he would conceive the proper level of the outer, and before he at all suspects it; for the horse's foot, no doubt for the wisest purposes, is not made a regular cone, as on a careless inspection we should apprehend it to be, but is placed inclining on the ground, with the inside the highest, forming a species of rhomb or lozenge; the inner parts being thinner in horn, more elastic, and flatter; while the outer are flatter in horn, and with less vascular matter, and more adapted for receiving the wear, which, we may observe, takes place primarily on the outer side of the toe or pincer, as may be seen by looking at the shoes when taken off, or observing the wear of the natural foot unshod; and thus compression and uneasiness are prevented by the greater yielding and elasticity of the inner quarter and the heels: for had the foot been on every side equally unyielding, resistance, compression, and pain, under heavy burdens, or great or long continued exertions of the animal, would have been produced.

It is this difference which may deceive the smith, and make him bring the shoe nearer the quick on this quarter than he intends; and it is the superior elasticity and vascularity of his fore feet that occasions them to be more the subjects of this disease than the hind, where corns rarely occur, and which we have heard the smiths attribute to the cause of their standing with their hind feet in the dung of the stable.

The position, also, in which the smith is obliged to hold the foot between his thighs, turned upwards, and drawn away from the horse outwards, will tend to increase his deception, in regard to these circumstances of the apparent levelling of the hoof; and where there is a weak, low, fleshy heel, as it is termed, a slight mistake is sufficient to produce a bruised heel, or corn, which in flatter feet it would be more difficult to do; though in these we sometimes find it has been done.

A shoe too narrow for the foot, or with the heel made very sloping inwards, would also induce a bruise of these parts; for we see, by the brightness of the shoe at this part, after it has been on some time and removed, that the nails do not entirely prevent the motion of the heels on this surface.

Finally, a shoe not equally fitted to bear alike on all the parts of the foot, but bearing on the toe and heels only, especially the inner heel, and not taking sufficient pressure at the quarters, would, by this partiality of pressure, induce inflammation and pain. Clenching the nails too forcibly near the heel, so as to induce more pressure there than at the toe, would also do the same thing. Under the article FARRIERY, we propose considering some other parts of this subject, having barely inserted enough of that branch of the business here as may be said particularly to belong to this subject.

If this reasoning, therefore, be true, the corn arises from the weakness and insufficiency of the foot to bear the pressure of a nailed shoe, or from partial and ill disposed pressure in the strong feet, or improper paring: therefore the ancients, who, we believe, knew nothing of this nail shoeing, had not their horses subject to this disease; and such, on examining their writings, turns out to be the fact: for though they have described, and often most truly, the distiches of the horse, they have not described this disease, so as for us to conclude on its identity. The "Pulmonum ad aperturam" of Vegetius, lib. ii. cap. 56. has some of the characters of the corn; but it is not clear whether oxen or horses were the objects of it, and he recommends unsole-

ing for it: whatever it is, it was probably a disease arising from a weak heel, which, by long journeys or rough roads, might be so bruised as to bring on similar consequences.

Having treated of the appearance of the corn and its causes, we have now to consider the remedy, first observing that prevention from it is ever the wisest line of conduct, especially in a disease where the mechanical causes of it are obvious, and can be prevented. Where the corn or bruised heel has taken place, the first and most natural suggestion is to remove the shoe, and take away all the red diseased horn with the drawing knife, so as, on the re-application of the shoe, to remove all pressure from the part, and thus admit a new growth of horn not subject to external pressure. For this purpose, the horse may be turned to graze during its growth, when in general it will grow down apparently perfect: it is, however, if the disease has been of any duration, too apt to return, if the smith brings only the ordinary pressure of a shoe upon it; though this takes place by degrees, and not at the first shoeing: the parts weakened by the disease become unable to sustain even this pressure, and first become tender, and afterwards lame; or the parts fester, according to the degree of it. The barred shoe, on this account, is often had recourse to by the smiths with good success; the pressure to the corn being done away by the parts of the shoe opposite it being bent out of the line or plane of the shoe, and then to the foot a light stopping of turpentine dressings on tow is applied, and bound in with tar cord. The continuance of this, which is seldom persisted in long enough, restores the horn to soundness; which being then left off, and the ordinary shoe applied, induces again the consequences, sooner or later, that we have described. A shoe may be beat or filed out with a space opposite the corn; but we have found it more easy and certain, when the parts are arrived at this state, to make a shoe rather thicker than the ordinary shoe, and to cut off entirely that extremity of it that comes opposite the corn, to a short distance from it, so as to be assured no pressure can arise from the shoe itself; for if the shoe be left long, however managed, by long wear it is apt to play and become relaxed, from the parts both of the hoof and shoe giving way to each other, and thus creating a degree of looseness, when the heel of the shoe, coming upon the part, reproduces the disease. It will be objected to this proposal, that the corn is left unprotected, and at first it will be a little tender, but this will speedily go off, and at each shaving will become of less consequence; and it is better of the two evils to contend with the occurrence of accidental pressure from irregularities in the road, than the perpetual pressure of the shoe. In slight cases, after the shoe has been nailed on pretty firmly, we have taken a small saw, and sawed away the horn resting on the shoe at this part, so as to make it press less there than on any other part of the foot; but if the shoe be allowed to stay on too long, the nails, as we before stated, become relaxed, by the horn giving way, and pressure will occasionally take place on the corn.

Of late we have had several opportunities of using the shoe above described, and have found it in practice beyond our expectation; nor have we found it, though avowedly imperfect, produce any of the evils we had apprehended it would be subject to. There are other methods than those we have described, but we do not mention them, from finding them insufficient. Where pus has formed, the horn covering it being effectually removed, digestives of turpentine are used, as in any other wound, till the horning of the sore takes place, when the cause that originally produced it must be carefully avoided.

Corn-Buttle, in *Agriculture*. See CENTAURY and WEED.

Corn-Butterfly, in *Entomology*. See PAPHIO.

Corn-Creeperfoot, in *Agriculture*, is the common name of a plant of the weed kind, often found among corn crops, and which is very troublesome to the farmer. It has an upright stem, with pale green leaves, cut into long narrow acute segments, the flowers are of a pale colour. It is extremely difficult to be eradicated from places where it is established. See WEED.

Corn, Ears of, in *Natural History*. Under this name different authors have described a variety of organic remains found in the strata of the earth. M. Schuechzer, in particular, gives the figure of a fossil, which he describes as an ear of corn, and from its figure, and supposed fulness, he argues, that the Mosatic deluge took place in the month of May! but Mr Walsh considers this body rather as a zoophyte, the rays of which are divided by transverse lines, marking their separation into distinct vertebrae.

The spica fecalina, and graminis panicis of Dr Richardson, and the ear of barley which Mylius has figured, are of like doubtful origin; the latter, in particular, does not bear the proportions of an ear of barley.

The flangengraupen of the German mineralogists more nearly resemble ears of corn, than the above. These are flat, oblong, blackish, and sometimes greenish bodies; but, becoming white, and acquiring a metallic lustre on their prominent parts by friction. Many have supposed these to be mineral substances, to which mere accident has given their present form; but they seem to be real vegetable substances, impregnated with metallic particles. They vary considerably in form, but are in general flattened, and are fluted with little round prominences, bearing very much the appearance of corn. They are found but very rarely, and perhaps only in the copper mines of Frankenburg in Hesse. M. Lihman, who has written expressly on these substances, does not consider them as changed vegetable substances, but as being of mineral origin; he found them to consist of copper, arsenic, sulphur, and iron, with a small quantity of silver in their composition. Wolfart, who has delineated and described these substances, calls them *frumenti metallares*, acknowledging that he cannot refer them to any particular species of grain. Mr. Parkinson gives two figures of these substances, but concludes his description thus: "I am therefore of opinion, that we must be satisfied with considering them as fossils, whose origin must be referred to some hitherto unknown subject of the vegetable kingdom." Mr. Whitehurst, "Theory of the Earth," p. 169, mentions corn among the vegetable impressions found in the coal measures of Derbyshire; but this is doubtless as ill-founded as any of the foregoing; and we have the best reason to suppose, that minute and scientific examinations will place all these among the incognita of a former state of aquatic existence.

Corn-Farm, in *Agriculture*, is that sort of farm which is principally cultivated and conducted under the system of corn, or the chief produce of which is grain. All the more dry sorts of land are adapted to this purpose. See CORN and FARM.

Corn-Flag, in *Botany*. See GLADIOLUS.

Corn-Flags, in *Agriculture*, is the name of a troublesome plant of the weed kind, which increases greatly by the root; when established in the field, it is with difficulty extirpated, as it is capable of sending up new plants from every part of its roots. See WEED.

Corn, Indian. See INDIAN CORN and MAIZE.

Corn Land, that kind of land which is adapted to the growth of grain. See FARM.

Corn, Lent, is a term applied to that sort of grain which is usually sown, or put into the soil about that season.

Corn Marygold, is the name of a plant of the weed kind, of which there are two species, one found commonly in arable land, and the other in pastures of the more moist kind. It is a great enemy to all sorts of corn crops. It is extirpated with much difficulty, as it multiplies both by its roots and seeds. Deep and effectual hoeings, frequently repeated, are of course requisite, before it runs up to seed. See WEED.

Corn Measure, in *Rural Economy*, that sort of measure which is used for grain. See MEASURE, and WEIGHTS and MEASURES.

Corn Mill, that sort of mill which is employed in the grinding of corn. See MILL.

Corn Parsley, in *Agriculture*, is the name of a low branching plant of the weed kind, often met with among corn crops. See WEED.

Corn Rent, that sort of rent which is regulated by the price of grain. See RENT.

Corn-Rents, in *Law*, denote those third parts of the old rents on college leases, which were to be reserved by the lesses. Stat. 18 Eliz. cap. 6. These were the invention of lord-treasurer Burleigh, and sir Thomas Smith, then principal secretary of state, for upholding the revenues of colleges.

These great statesmen, observing how much the value of money had sunk, and the price of all provisions risen, by the quantity of bullion imported from the new-found Indies, which effects were likely further to increase, devised this method. Their foresight and penetration have in this respect been very apparent; for though the rent so reserved in corn was at first but one-third of the old rent, or half of what was still reserved in money, yet now the proportion is nearly inverted; and the money arising from corn rents is, *communibus annis*, almost double to the rents reserved in money.

Corn-Rocket, in *Botany*. See BUNIAS.

Corn-Sallad, in *Agriculture*, a species of the Valerian. See VALERIAN.

Corn-Sharping. See SHARPING.

Corn, Spring, a term signifying such sorts of grain as are put into the earth in the spring season.

Corn-Stand. See STAND.

Corn-Stubble, that sort of stubble which remains after reaping or cutting any sort of grain crop. It should constantly be collected for the purpose of litter. See STUBBLE.

Corn-Stubble Rake, is a large kind of horse-rake, employed in some counties with much benefit. See RAKE.

Corn-trug. See TRUE-corn.

Corn-violet. See WEED.

Corn, white, a general term used to signify all sorts of grain.

Corn-Worm, a sort of insect of the caterpillar kind, which is said to be very detrimental to corn.

CORNA, in *Ancient Geography*, an episcopal town of Asia, in Lycania, mentioned in the acts of the council of Chalcedon, held in 451.

CORNA, in *Geography*, a town of Asiatic Turkey, in the Arabian Irak, on the Euphrates; 6 miles N. W. of Basora.

CORNACHINE POWDER, in *Pharmacy*, a purgative powder,

der, called also 'eal of Warwicks' powder, and pulvis diatribus. It is composed of equal parts of antimonium diareticum, diagrydium, and cream of tartar.

CORNACHINI, THOMAS, in *Biography*, born at Arezzo, in Tuscany, about the middle of the 16th century, obtained considerable celebrity, as professor of medicine at Pisa, where he lectured to large audiences several years. He died in 1555, and was succeeded in the professorship by his son Mark, who published at Venice, in 1607, in fol. "Tabule Medicæ," the only work left by his father, in which he has collected the descriptions and accounts of diseases left by the Greek and Arabian physicians, with commentaries upon them. His son had the credit of giving his name to a purging powder, Pulvis Cornachini, consisting of calomel, scammony, and burnt hartshorn, which still retains its credit, for its efficacy in destroying the ascarides, a small worm, infecting the bowels of children. Mark also published, "De Hominis Generatione, de vino, et aqua, balneisque Pisanis," Frankfurt, 1607. fol. and a "Discovery on the Method of Curing, tuto, cito, et jucundè," he says, all those diseases, which are said to be derived from peccant humours. Haller Bib. Med. Eloy Dist. Hist.

CORNACUM, in *Ancient Geography*, a town of Lower Pannonia, according to Ptolemy and Antonine's Itinerary.

CORNAGE, an ancient tenure, the service whereof was to blow a horn, when any invasion of the Scots was perceived.

This tenure, which was a species of grand serjeanty, was very frequent in the northern counties, near the Picts and the Roman walls; but by stat. 12 Car. II. all tenures are converted into free, and common socage.

An old rental calls *cornage*, *newgeld*, q. d. *neat geld*. Lord Coke says, in old books, it is called HORNGELD.

CORNARISTS, in *Ecclesiastical History*, the disciples of Theodore Cornbert, an enthusiastic secretary of the states of Holland. He writ at the same time against the Catholics, Lutherans, and Calvinists. He maintained that every religious communion needed reformation; but he added, that no person had a right to engage in accomplishing it, without a mission supported by miracles. He was also of opinion, that a person might be a good Christian, without being a member of any visible church.

CORNARIUS, JOHN, in *Biography*, a physician of great eminence, and author of numerous treatises on the theory and practice of medicine, was born at Zwickaw, in Upper Saxony, in the year 1500. Haller says, his proper name was Hagenbot or Hanbut, but that following the custom of the time, he took the name of Cornarius, which he affixed to all his publications. He is said to have attached himself to the study of medicine, in the hope of discovering some method, or medicine, capable of restoring, or invigorating his constitution, naturally feeble and delicate. With this view, he resided in succession, at several German universities, and at length at Basle, in Switzerland, where he met with copies of Hippocrates, Ætius, and other of the Greek fathers, in their own language, which he had not before been able to procure. Returning with this treasure to his own country, having previously taken the degree of doctor in medicine at Padua, he set himself down to translate first the works of Hippocrates into Latin, which he completed in five years, and published at Basle, in folio, in 1543; then Ætius, and Paul of Ægina. He had before published, viz. in 1529. "Universæ rei medicæ, epigraphæ, seu enumeratio," which has been several times reprinted. "De rebus medicæ studiiis amplexendis" "De conviviis veterum Græcorum" "De peste libri duo; de Podagræ laudibus," in 1553, with various other

dissertations. While thus employed, he did not neglect the practice of medicine, of which he is said to have had a considerable portion. His translations of Hippocrates, having been rudely attacked by Fuchsius, he answered it by a satirical effusion, which he called, *Vulpecula excorata*. This was printed at Franckfort, in 1543, in 4to. Fuchsius answered this by a similar piece of satire, *Cornarius furens*. The translation of Hippocrates has long since been superseded by those of Vander Linden, and Fucsius, and those of Ætius, and Paulus Ægineta, were not much longer lived. They were however works of great labour, and contributed to lessen the difficulties of the task to those that followed. Cornarius died at Jena, March the 16th, 1558. His son, Diomedes, succeeded to his practice. He was appointed professor of medicine, in the university of Vienna, and physician to the emperor Maximilian II. He published at Leipzig, in 1595, in 4to. "Consiliorum medicinalium tractatus;" also "Historiæ admirandæ, rare, et orationis medicinales." Haller Bib. Eloy. Dist. Hist.

CORNARO, FRANCIS, cardinal and bishop of Brescia in the sixteenth century, began his career as a military man, during the contests in Italy excited by the rival interests of Charles V. and Francis I. in which the Venetian republic was involved. Upon a general pacification, he quitted the army and devoted himself to the pursuits of literature and the study of politics. He was afterwards fixed upon as ambassador from the republic to the emperor Charles V. In 1527 he was raised to the dignity of cardinal by pope Clement VII. and after his admission into the college, he confined his labours to the deliberations of that body, where his learning and experience were highly appreciated. He died in his sixty-fifth year, A. D. 1543, of the gout, with which he had been long afflicted. Moreri.

CORNARO, GEORGE BASIL, cardinal and bishop of Padua, was born in 1658. He also began life in the army, which he left for the church. He was member of the order of Malta, and grand prior of Cyprus, an office which was hereditary in his family. His application to literature, and his acquirements by foreign travel, pointed him out as a person well and highly qualified to fill offices of great responsibility in the republic. He was first appointed to the superintendency of the marine, and would have been sent as ambassador to France, had not his preference led him to embrace an ecclesiastical life. He accordingly went to Rome, where he was entrusted with certain commissions which led him to high preferment and great dignities in the church.

In 1692 he was appointed ambassador to the court of Portugal, and was made titular archbishop of Rhodes. On his return, he was created cardinal by Innocent XII. and nominated to the bishopric of Padua. He died in the year 1722. Moreri.

CORNARO, LEWIS, of a noble Venetian family, though from his not enjoying the honours attached to it, supposed not to have been legitimate, was born in 1467. He lived to a great age, which he attributed, and probably with justice, to a strict, abstemious regimen, adopted by him, on his recovering from a severe illness, when he was more than forty years of age. His health had been declining several years, prior to this attack, owing as he acknowledges to his living a debauched and voluptuous life. In entering on his new regimen, he took care to avoid, he says, the extremes of heat, or cold, together with all violent exercise, and to live in a pure dry air; all which, he contended, were equally important in attaining the end proposed, the restoration of a decayed constitution, as temperance and diet. During the remainder of his life, he only took twelve ounces of solid food,

fool, viz. bread, soups, yolks of eggs, and meat, and fourteen ounces of wine in the day. This portion, as he grew old, he rather diminished than increased, observing that the power of concoction is then less vigorous, and as that weakens, the ingesta should be lessened. He married a lady of the house of Spil-berg, at Udina, by whom he had an only child, a daughter, when they were both advanced in years. At the age of 83 he wrote his "Discorsi della vita sobria;" a short treatise on the advantages of temperance, from which this account is principally taken. The work has been repeatedly translated, and printed in every country in Europe. He was then, he says, so brisk, lively, and active, that he could mount his horse, without assistance from any rising ground. Sometimes he retired to his villa, seated in a valley, watered by the Brenta, encircled with large, well cultivated fields, and a considerable number of buildings, made habitable by his own industry. "It had been full of fens and bogs, he says, a habitation, more fit for snakes, toads, and serpents, than for man." He had the pleasure of enjoying the society of his daughter and eleven grandchildren he had produced; who amused him with their musical exhibitions, in which science as well as in that of architecture, he had no inconsiderable skill. He died at Padua, April 26th, 1566, at the age of 68. His wife, who survived him, lived also to nearly the same age. Sir John Sinclair, in his "Code of health and longevity," mentions the edition of 1779 as the best English translation of Cornaro's works. There are four discourses on one subject, penned at different times; the first, which he wrote at the age of 83, is intitled "A treatise on a sober life," in which he declares war against every kind of intemperance. The second was composed three years after, and contains directions for repairing a bad constitution. The third he wrote when he was 91, entitled "An earnest exhortation to a sober life;" and the last is a letter to Barbaro, patriarch of Aquileia, written when he was 95, which contains a lively description of the health, vigour, and perfect use of all his faculties, which he had the happiness of enjoying at that advanced period of life. Eloy. D.ct. Hill. Gen. Biog.

CORNARO-PISCOPIA, LUCRETIA HELENA, an illustrious Venetian lady, was born at Venice in 1646. At the age of eleven having imbibed a devotional temper, and an ardent love of literature, she took a vow of chastity, which she maintained through life, though a dispensation was obtained from it, without her knowledge. She was an excellent linguist, being thoroughly conversant with several of the modern languages and with the Latin, the Greek, Hebrew, and Arabic. She had a taste for poetry and music, and composed verses which she sung to her instrument. In many of the abstruse sciences she was deeply read, and acquired so much reputation, that it was proposed to give her a seat among the doctors of theology at Padua; this was opposed by the bishop; she was however honoured with a cap of doctor in philosophy. The ceremony used on the occasion was performed in 1678 in the cathedral of Padua, at which an immense concourse of people was assembled as witnesses of so extraordinary a sight. She was elected a member of all the principal literary societies in Italy, and no person of distinction visited the country without paying his respects to this excellent lady. She had a great desire to enter into some religious society; but by the entreaties of her father she remained under his roof, contenting herself with wearing the habit of the Benedictine nuns, and observing the rules of the order. She died in the year 1684, and her works were collected and published in 8vo. at Parma, 1688, but their merit is not equal to the

high reputation which the author sustained during life. Monren.

CORNAU, in *Geography*, a town of Germany, in the circle of Westphalia, and county of Diepholz; 6 miles N. of Diepholz.

CORNAVII, in *Ancient Geography*, a people of the isle of Albion, who were situated to the west of the Coritani or Cor-Iceni, in that country, according to Camden, which is now divided into Warwickshire, Worcester-shire, Shropshire, and Cheshire. There were several British tribes of this name, in other parts of this island; and particularly in the most northerly part of Britain, called Strathavern, which seems to retain some vestige of the name of its first possessors; and they all seem to have been called Cornavi, from the two British words *Corn*, a horn, and *Av*, a river, descriptive of the form and situation of their respective countries. Besides the Cornavii, there was another British tribe or nation, seated in the countries above mentioned; and seeming to have possessed the best part of the two counties of Warwick and Worcester. This nation is called by Tacitus (*Annal.* l. xii. c. 38.) the Jugantes, by a mistake as it is thought of his transcribers, for Wigantes, or Huicri, their real name.

The Wigantes, signifying in the ancient language of Britain, brave men, seem to have been an independent nation under their own prince Venutius, who married the famous Cartesmandua, queen of the Brigantes. But both the Wigantes and Cornavii, were in such strict alliance with the Iceni and Cor-Iceni, that they were reduced at the same time, and by the same generals, under the dominion of the Romans. (*Tacit. Annal.* l. xii. c. 29, 30.) That brave and industrious people built many forts, stations, and towers in the country of the Cornavii and Wigantes, to keep the inhabitants in subjection.

As the second journey of Antonius from beyond the wall of Severus to Richborough in Kent, passes through this country from north to south, it will conduct us to several of these Roman towns and stations. The most northerly of these towns was Condate, supposed to be Northwich in Cheshire. We come next to Diva or Deva, now Chester, which was a city of great consideration in the time of the Romans, a colony, and the station of the 20th legion. Pursuing the same route southward, we meet with the following towns in their order; Bovium, near Stretton; Mediolanum near Drayton; Rutonium, near Wem; Uriconium, near Wroxeter, the ancient capital of the Cornavii; Uxacona, near Sheriff-Hales; Pennoerucium, near the river Penk; Erocetum, Wall near Litchfield; and Manduessum, near Manchester, in Warwickshire. The precise boundaries of the several Roman provinces in Britain are so little known, that we cannot be certain whether the whole country of the Cornavii and Wigantes was within the limits of that which was called Britannia Prima, or some part of it belonged to Britannia Secunda.

CORNAX, MATTHIAS, in *Biography*, a native of Meldola, a small town in Italy, studied medicine at Venice, where he afterwards continued to practise, and was appointed one of the teachers in the art. He is here noticed, on account of his having published a case of a woman who had carried an extra fetus in the abdomen, for the space of five years. An abscess at length forming, near the navel, and bursting, our practitioner enlarged the aperture, and extracted through the wound, a half putrid fetus. The woman recovered, but becoming again pregnant, and it not being practicable to deliver her by the natural passage, she died.

It does not appear that the body was opened. The case was originally published at Venice in 1550, in 4to, "Historia quinquennis fere gestationis," &c. It was republished in 1564, with other similar cases, in the author's "Enchiridion Medicæ consultationis apud Ægrotos, &c; Basilee," 8vo. Haller Bib. Ch.

CORNAZZANI, ΑΝΘΩΝΥ, an eminent Italian poet, who flourished in the sixteenth century. He was born at Placentia, but resided chiefly in the early part of life at Milan, but after the death of Sforza he was obliged to take refuge at Venice, where he was hospitably received by Bartholomew Colleone, whose life he afterwards wrote. From Venice he went to France, and from thence to Ferrara, where he finally settled under the patronage of Duke Hercules the first, and his duchess Lucretia Borgia. He is chiefly known by his sonnets and lyric poems, some of which are

reckoned the most perfect of their kind in the language. He wrote the lives of the Virgin Mary and of Christ in verse; and among his prose works, we have, besides the life of Colleone, a treatise "De Mulieribus admirandis;" and another entitled "De excellentum Virorum principibus."

CORNE, or CORNA, in *Ancient Geography*, a town of Cappadocia, towards the Euphrates, to the south of Melitene.

CORNE, in *Geography*, an island, ten miles long and one wide, in the gulf of Mexico, near the coast of West Florida. N. lat. 30° 11'. W. long. 83° 32'.

CORNE, a town of France, in the department of the Mayne and Loire; 7 miles E. of Angers.

CORNE. See HORN-work.

CORNE a amorcer, priming-horn. An ox-horn filled with fine powder for priming cannon.

END OF VOL. IX.





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