AN

HISTORICAL MISCELLANY

OF THE

CURIOSITIES AND RARITIES

IN

NATURE AND ART.

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DIRECTIONS TO THE BINDER.

The Copper-plate View of Dover Castle is to face the Title, by way of Frontispiece to the Volume.

HISTORY

HISTORY

OF THE

CURIOSITIES AND RARITIES

IN NATURE AND ART.

OF THE NATURE AND PHENOMENA OF COMETS.

[From the ENCYCLOPÆDIA LONDINENSIS.]

OF all the celeſtial phenomena, comets have given riſe to the greateſt number of ſpeculations and conjectures. Their ſtrange appearance has in all ages been a matter of terror to the uninformed, who have generally looked upon them to be evil omens, and forerunners of war, peſtilence, &c. Thus, in ancient times, they were imagined to be prodigies hung out by the immediate hand of God in the heavens, and intended to alarm the world. Their nature being now better underſtood, they are no longer terrible: but as there are ſtill many who think them to be ſupernatural warnings, portents of future events, it may not be improper to obſerve, that the architect of the univerſe has framed every part according to divine order, and ſubjected all things to laws and regulations; that he does not hurl at random ſtars and worlds, and diſorder the ſyſtem of the whole glorious frame, to produce falſe apprehenſions of diſtant events, fears without foundation and without uſe. Religion glories in the teſt of reaſon, of knowledge, and of true wiſdom; it is every way connected with, and is always elucidated by, them. From philoſophy we may learn, that, the more the works of the ſupreme Author of the univerſe are underſtood, the more he muſt be adored; and that his ſuperintendency over every portion is more clearly evinced, and more fully expreſſed, by their unvaried courſe, than by ten thouſand deviations.

The exiſtence of an univerſal connection between all parts of the ſiderial heavens is now generally admitted. Comets undoubtedly form a part of this great chain; but of the part they occupy, and of the uſes for which they exiſt, we are in a great meaſure ignorant. It is a portion of ſcience whoſe perfection is reſerved for ſome diſtant day, when theſe bodies, and their vaſt orbits, may, by long and

accurate obſervation, be added to the known parts of the ſolar ſyſtem; when aſtronomy will appear with new lights, after all our diſcoveries, great as we at preſent imagine them to be. Upon the whole, the aſtronomy of comets is very imperfect; for but little can be known with certainty where but little can be ſeen. Comets afford few obſervations on which to ground conjecture, and are for the greateſt part of their courſe beyond the reach of human viſion. They are ſometimes called blazing ſtars, becauſe they are uſually attended with a long train of light, tending always oppoſite to the ſun, and of a fainter luſtre the farther it is from the body of the comet. And hence ariſes the diviſion of comets into three kinds, viz. bearded, tailed, and hairy; though, in reality, 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 him, it is ſaid to be bearded, becauſe the light precedes it in the manner of a beard. When the comet is weſtward of the ſun, and ſets after him, it is ſaid to be tailed, becauſe the train of light follows it in the manner of a tail. And, laſtly, when the ſun and comet are diametrically oppoſite, the earth being between them, the train is hid behind the body of the comet, excepting the extremities, which, being broader than the body of the comet, appear as it were around it, like a border of hair, or *coma*, from whence the comet derives its name. But there have been comets whoſe diſk was clear, round, and well-defined, as that of Jupiter, without either tail, beard, or coma.

Philoſophers and aſtronomers, of all ages, have been much divided in their opinions as to the nature of comets. Diodorus Siculus and Apollonius Myndius, in Seneca, inform us, that many of the Chaldeans held them to be laſting bodies, having ſtated revolutions as well as the planets, but in orbits vaſtly more extenſive; on which account they are only viſible while near the earth, but diſappear again when they go into the higher regions. Others of them were of opinion, that the comets were only meteors raiſed very high in the air, which blaze for a while, and diſappear when the matter of which they conſiſt is conſumed or diſperſed. Some of the Greeks, before the time of Ariſtotle, ſuppoſed that a comet was a vaſt heap or aſſemblage of very ſmall ſtars meeting together, by reaſon of the inequalities of their motions, and ſo uniting into a viſible maſs, by the union of all their ſmall lights; which muſt again diſappear, as thoſe ſtars ſeparated, and each proceeded in its courſe. Pythagoras, however, accounted them a kind of planets or wandering ſtars, diſappearing in the ſuperior parts of their orbits, and becoming viſible only in the lower parts of them. But Ariſtotle held, that comets were only a kind of tranſient fires, or meteors, conſiſting of exhalations raiſed to the upper region of the air, and there ſet on fire; far below the courſe of the moon.

Seneca, who lived in the firſt century, and who had ſeen two or three comets himſelf, plainly intimates that he thought them above the moon; and argues ſtrongly againſt thoſe who ſuppoſed them to be meteors, or who held other abſurd opinions concerning them; declaring his belief that they were not fires ſuddenly kindled, but the eternal productions of nature. He points out alſo the only way to arrive at a certainty on this ſubject, viz. by collecting a number of obſervations concerning their appearance, in order to diſcover whether

whether they return periodically or not. "For this purpose (says he) one age is not sufficient; but the time will come when the nature of comets and their magnitudes will be demonstrated, and the routes they take, so different from the planets, explained. Posterity will then wonder, that the preceding ages should be ignorant of matters so plain and easy to be known." For a long time this prediction of Seneca seemed not likely to be fulfilled; and Tycho Brahe was the first among the moderns who restored the comets to their true rank in the creation; for, after diligently observing the comet of 1577, and finding that it had no sensible diurnal parallax, he assigned it its true place in the planetary regions. See his book de Cometa, anni 1577.

Hevelius, from a great number of observations, proposed it as his opinion, that the comets, like the solar maculæ, or spots, are formed or condensed out of the grosser exhalations of his body; in which he differs but little from the opinion of Kepler. James Bernoulli, in his Systema Cometarum, imagined that comets were no other than the satellites of some very distant planet, which was itself invisible to us on account of its distance, as were also the satellites unless when in a certain part of their orbits. Des Cartes advances another opinion: he conjectures that comets are only stars, formerly fixed, like the rest, in the heavens; but which becoming gradually covered with maculæ, or spots, and at length wholly deprived of their light, cannot keep their places, but are carried off by the vortices of the circumjacent stars; and, in proportion to their magnitude and solidity, moved in such a manner, as to be brought nearer the orb of Saturn, and thus, coming within the reach of the sun's light, rendered visible.

But the vanity of all these hypotheses now abundantly appears from the observed phenomena of comets, and from the doctrine of Sir Isaac Newton. The comets, he says, are compact, solid, fixed, and durable, bodies; in fact, a kind of planets, which move in very oblique and eccentric 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 and slender vapour, emitted by the head or nucleus of the comet, ignited or heated by the sun. This theory of comets at once solves their principal phenomena, which are as follow:

First, 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; but more swiftly if the earth be placed in a contrary part. On the other hand, those which proceed contrary to the order of the signs, move more swiftly than usual, if the earth be between them and the sun; and more slowly, or else are retrograde, when the earth is in a contrary part. 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 respect to the earth, must be changed; and, like the planets, they must sometimes appear to move swifter, sometimes slower, and sometimes to be retrograde. 2. So long as their velocity is increased, they nearly move in great circles; but, towards the end of their course, they deviate from those circles; and, when the earth proceeds one way, they go the contrary way. 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 move in ellipses, having one of their foci in the centre of the sun; and, by radii drawn to the sun, describe areas proportional to the times. Because they do not wander precariously from one fictitious vortex to another; but, making a part of the 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 which is most remote from the sun. And, from the curvity of the paths of comets, Sir Isaac Newton concludes, that, when they disappear, they are much beyond the orbit of Jupiter; and that, in their perihelion, they frequently descend within the orbits of Mars and the inferior planets. 4. The light of their nuclei, or bodies, increases as they recede from the earth towards the sun; and, on the contrary, it decreases as they recede from the sun. Because, as they are in the regions of the planets, their access towards the sun bears a considerable proportion to their whole distance. 5. Their tails appear the largest and brightest immediately after their transit through the region of the sun, or after their perihelion, Because then their heads, being the most heated, will emit the most vapours. From the light of the nucleus 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 always decline from a just opposition to the sun towards those parts which the nuclei or bodies 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. This declination, *cæteris paribus*, is the smallest when the nuclei approach nearest the sun: and it is also less near the nucleus, or head, than towards the extremity of the tail. Because the vapour ascends more swiftly near the head of the comet, than in the higher extremity of its tail; and also when the comet is nearer the sun, than when it is farther off. 8. The tails are somewhat brighter, and more distinctly defined, in their convex than in their concave part. Because the vapour in the convex part, which goes first, being somewhat nearer and denser, reflects the light more copiously. 9. The tails always appear broader at their upper extremity, than nearer the centre of the comet. Because the vapour in a free space continually rarefies and dilates. 10. The tails are always transparent, and the smallest stars appear through them. Because they consist of infinitely thin vapour.

The nuclei, which are the heads, or bodies, of comets, viewed through a telescope, shew a face very different from those of the fixed stars or planets. They are liable to apparent changes, which Sir Isaac Newton ascribes to changes in their atmosphere; and this opinion was confirmed by observations of the comet in 1744. Hist. Acad. Scienc. 1744. Sturmius says, that, by observing the comet of 1680 with a telescope, it appeared like a coal dimly glowing, or a rude mass of matter illuminated with a dusky fumid light, less sensible towards the extremes than in the middle; whereas a star appears with a round disk, and a vivid light.

Of

Of the comet of 1661, Hevelius obſerves, 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 by a much fainter, thinner, matter. Feb. 5, its head was ſomewhat larger and brighter, and of a gold colour; but its light more duſky than the ſtars: and here the nucleus appeared divided into ſeveral parts. February 6, the diſk was leſſened; the parts of the nucleus 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 16, the head ſomewhat more obſcure, and the nuclei more confuſed, but brighter at top than bottom. February 13, the head diminiſhed much both in ſize and ſplendour. March 2, its roundneſs a little impaired, and its edges lacerated, &c. March 28, very pale, and exceeding thin; its matter much diſperſed; and no diſtinct nucleus at all appearing. Weigelius, who ſaw the comet of 1664, as alſo the moon, and a ſmall cloud in the horizon illuminated by the ſun at the ſame time, obſerved, that through the teleſcope the moon appeared of a continued luminous ſurface: but the comet very different; being exactly like the little cloud. And from theſe obſervations it was that Hevelius formed his opinion, that comets are like maculæ or ſpots formed out of the ſolar exhalations.

The eſtimates that have been given of the magnitude of comets by Tycho Brahe, Hevelius, and ſome others, are not very accurate; as 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; and Hevelius made the diameter of the comet of 1652 to that of the earth, as 52 to 100. But the diameter of the atmoſphere is often 10 or 15 times as great as that of the nucleus: the former, in the comet of 1682, was meaſured by Flamſtead, and found to be 2′, when the diameter of the nucleus alone was only 11″ or 12″. Though ſome comets, eſtimated by a compariſon of their diſtance and apparent magnitude, have been judged 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′, which makes its diameter about three times that of the earth: at another time, the diameter of its nucleus was nearly equal to that of the planet Jupiter.

There have been various conjectures concerning the nature of the tails of comets. The opinion of the ancient philoſophers and of Ariſtotle himſelf, was, that the tail is a very thin fiery vapour ariſing from the comet. Apian, Cardan, Tycho, and others, believed, that the ſun's rays, being propagated through the tranſparent head of the comet, were refracted, as in a lens. But the figure of the tail does not anſwer to this; and, moreover, there ſhould be ſome reflecting ſubſtance to render the rays viſible, in like manner as there muſt be duſt or ſmoke flying about in a dark room, in order that a ray of light entering it may be ſeen by a ſpectator ſtanding ſide-ways from it. Kepler ſuppoſed, that the rays of the ſun carry away ſome of the groſs parts of the comet which reflects the ſun's rays, and gives the appearance of a tail. Hevelius thought, that the thinneſt parts of the atmoſphere of a comet are rarefied by the force of the

heat, and driven from the forepart and each side of the comet towards the parts turned from the sun. Sir Isaac Newton thinks, that the tail of a comet is a very thin vapour, which the head, or nucleus, of a comet, sends out by reason of its heat. He supposes, that, when a comet is descending to its perihelion, the vapours behind the comet, in respect to the sun, being rarefied by the sun's heat, ascend, and take up with them the reflecting particles with which the tail is composed, as air rarefied by heat carries up the particles of smoke in a chimney. But, as beyond the atmosphere of a comet, the ethereal air *(auram ætheream)* is extremely rare, he attributes something to the sun's rays carrying with them the particles of the atmosphere of the comet. And, when the tail is thus formed, it, like the nucleus, gravitates towards the sun; and, by the projectile force it received from the comet, it describes an ellipse about the sun, and accompanies the comet. It conduces also to the ascent of these vapours, that they revolve about the sun, and therefore endeavour to recede from it; whilst the atmosphere of the sun is either at rest or moves with such a slow motion as it can acquire from the rotation of the sun about its axis. These are the causes of the ascent of the tails in the neighbourhood of the sun, where the orbit has a greater curvature, and the comet moves in a denser atmosphere. The tail of the comet therefore, being formed from the heat of the sun, will increase till it comes to its perihelion, and decrease afterwards. The atmosphere of the comet is diminished as the tail increases, and is least immediately after the comet has passed its perihelion, where it sometimes appears covered with a thick black smoke. As the vapour receives two motions when it leaves the comet, it goes on with the compound motion, and therefore the tail will not be turned directly from the sun, but decline from it towards those parts which are left by the comet; and, meeting with a small resistance from the ether, will be a little curved. When the spectator therefore is in the plane of the comet's orbit, the curvature will not appear. The vapour, thus rarefied and dilated, may be at last scattered through the heavens, and be gathered up by the planets, to supply the place of those fluids which are spent in vegetation, and converted into earth. This is the substance of Sir Isaac Newton's account of the tails of comets.

But Mr. Rowning, not satisfied with this solution of the phenomena, accounts for the tails of comets in the following manner: It is well known, says he, that when the sun's light passes through the atmosphere of any body, as the earth, that which passes on one side is by the refraction made to converge towards that which passes on the opposite side; and this convergency is not wholly effected either at the entrance of the light into the atmosphere, or at its exit on 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 the comet, the rays are so far refracted towards each other, that they then begin sensibly to illuminate it, or rather the vapours floating in it, and so render 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 the form of a beam of the sun's light, and passes under the denomination of a comet's tail. Rowning's Nat. Philos. part 4, chap. 11.

M. Euler,

M. Euler, Mem. Berlin, tom. ii. p. 117, thinks there is a great affinity between the tails of comets, the zodiacal light, and the aurora borealis, and that the common cause of all of them is the action of the sun's light on the atmospheres 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 joining the centres of the sun and comet; and, that this deviation will be greater, as the orbit of the comet has the greater curvature, and as 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.

Dr. Hamilton, in his Philosophical Essays, urges several objections against the Newtonian hypothesis; and observes, that we have no absolute 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, 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. Also, if the splendour of the tails be owing to the reflection 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.

Dr. Halley, in his description of the aurora borealis in 1716, says, "The streams of light so much resembled the long tails of comets, that at first sight they might well be taken for such." And afterwards, "this light seems to have a great affinity to that which the effluvia of electric bodies emit in the dark." Phil. Transf. No. cccxlvii. D. de Mairan also calls the tail of a comet, the aurora borealis of the comet. This opinion Dr. Hamilton supports 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 is exactly like the appearance 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 matter of the same kind. We may add, as a farther confirmation of this opinion, that the comet

comet in 1607 appeared to shoot out the end of its tail. Le P. Cysat 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 took notice of the same appearance in the comet of 1769. These are circumstances exactly similar to the aurora borealis. Dr. Hamilton conjectures, that use of the comets may be to bring the electric matter, which continually escapes from the planets, back into the planetary regions. "These arguments (says Mr. Vince, Plumian Professor of Astronomy in the University of Cambridge) are strongly in favour of this hypothesis; and, if this be true, we may farther 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."

With respect to the motions of comets, Kepler, who had an opportunity of observing two of them, concluded, "that comets moved freely through the planetary orbs, with a motion not much different from a rectilinear one; but of what kind he could not precisely determine." Hevelius embraced the same hypothesis of a rectilinear motion; but, finding his calculations did not perfectly agree with his observations, he concluded, "that the path of a comet was bent in a curve line, concave towards the sun." He supposed a comet to be generated in the atmosphere of a planet, and to be discharged from it, partly by the rotation of the planet, and then to revolve about the sun in a parabola by the force of projection and its tendency to the sun, in the same manner as a projectile upon the earth's surface describes a parabola. At length, the famous comet in 1680, descending nearly in a right line towards the sun, arose again from it in like manner, which proved its motion in a curve about the sun. G. S. Doërfell, minister at Plaven in Upper Saxony, made observations upon this comet, and found that its motion might be very well represented by a parabola, having the sun in its focus. He was ignorant, however, of the laws by which the motion of a body in a parabola is regulated, and erred considerably in his parabola, making the perihelion distance about twelve times greater than it was. This was published five years before the Principia, in which work Sir Isaac Newton having proved that Kepler's law, by which the motions of the planets are regulated, was a necessary consequence of his theory of gravity, 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. 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

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 very great. Beſides, the ſpace between the ſun and 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 ellipſis is to the latus rectum of a parabola, which has the ſame diſtance in its perihelion, as the diſtance of the aphelion, in the ellipſis, is to the whole axis of the ellipſis: 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, continues Dr. Halley, of the Table of the elements of their motions, and that 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 foretel 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 that 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, though 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 foretel that it will return again in the year 1758."

Dr. Halley computed 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. He did not make his computations with the utmoſt accuracy, but, as he himſelf informs, *levi calamo*. 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 on 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

thirty-three 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 he did not consider, 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 the 14th day of December, in the year 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 answered remarkably to his prediction. He farther 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 1607. A learned professor (Dr. Long's Astronomy, p. 562) in Italy to an English gentleman writers thus: "Though M. de la Lande, and some other French gentlemen, have taken occasion to find fault with the inaccuracies of Halley's calculation, because he himself had said he only touched upon it slightly; nevertheless they can never rob him of the honour,—First, of finding out that it was one and the same comet which appeared in 1682, 1607, 1531, 1456, and 1305. Secondly, of having observed that the planet Jupiter would cause the inclination of the orbit of the comet to be greater, and the period longer. Thirdly, of having foretold that the return thereof might be retarded till the end of 1758, or the beginning of 1759." From the observations of M. Messier upon a comet in 1770, M. Edric Prosperin, 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 M. Lexell undertook, and has shewn that an ellipse, in which the periodic time is about five years and seven months, agrees very well with the observations. See the Phil. Transf. 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, its distance from the sun, the inclination of the plane of its orbit to the ecliptic, and the place of the node.

But, concerning the return of comets, there have been, and still are, different opinions. Sir Isaac Newton, Flamstead, Halley, and other English astronomers, seem satisfied of the return of comets; Cassini and some of the French think it highly probable; but M. de la Hire, and others, oppose it. Those on the affirmative side suppose, that the comets describe orbits prodigiously eccentric, insomuch that we can see them only in a very small part of their revolution: out of this, they are lost in the immensity of space; hid not only from our eyes, but from our telescopes: that little part of their orbit next us passing sometimes within those of all the inferior planets. M. Cassini gives the following reasons in favour of their return: 1. It is found that they move a considerable time in the arch of a great circle, when referred to the fixed stars, that is a circle whose plane passes

passes through the centre of the earth; deviating but a little from it chiefly towards the end of their appearance; a deviation however common to them with the planets. 2. Comets, like 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 distance from the earth, their equal motion might be found: but we should not still be certain that this is their true motion: because they might have considerable inequalities, not distinguishable in that small part of their orbit visible to us. It is rather probable that 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 a just period of their revolution. 3. There are no two different planets whose orbits cut the ecliptic in the same angle, whose nodes are in the same points of the ecliptic, and have the same apparent velocity in their perigee: consequently, two comets seen at different times, yet agreeing in all those three circumstances, can only be one and the same comet. Not that this exact agreement in these circumstances is absolutely necessary to determine their identity: for the moon herself is irregular in all of them, so that it seems there may be cases in which the same comet, at different periods of revolution, may disagree in these points.

As to the objections against the return of comets, the principal is that of 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 again in the year 1668; which would imply a period of 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 Messrs. Bianchini and Maraldi, which the latter supposed was the same with that of 1664, both on account of his motion, velocity, and direction. M. de la Hire thought it had some relation to another he had observed in 1698, which Cassini refers to that of 1652; which would make it a period of forty-three months, and the number of revolutions, between 1652 and 1692, fourteen. Now, it is hard to suppose, that in this age, when the heavens are so narrowly watched, a star should make fourteen revolutions unperceived; especially such a star as this, which might appear above a month together; and consequently be often disengaged from the crepuscula. For this reason M. Cassini is very reserved in maintaining the hypothesis of the return of comets, and only proposes those for planets where the motions are easy and simple, and are solved without straining, or allowing any irregularities.

M. de la Hire proposes one general difficulty against the whole system of the return of comets, which would seem to prevent any comet from returning as a planet: which is this; that, by the disposition necessarily given to their courses, they ought to appear as small at first as at last; and always increase till they arrive at their nearest proximity to the earth; or, if they should not chance to be observed as soon as they are capable of being seen, it is yet hardly possible but they must often shew themselves before they have arrived at their full magnitude and brightness: but, adds he, none were ever

yet observed till they had arrived at it. However, 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, as well as the observations of several others since, may serve to remove this obstacle, and set the comets still on the same footing with the planets; or at least to support the prevalent opinion, that the revolution or return of the comets is certain. In short, the best way to ascertain the fact seems to be, to compare the elements of all those comets which have been computed, and, where we find they agree, we 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 may find 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; 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 forty-four years before Christ. He also conjectured, 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 1790, but it has never been observed. 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, and 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 $\frac{1}{497}$ of its distance from the sun, consequently the sun's action would be only $\frac{1}{224}$ 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. Trans. 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 might be expected to appear again about the year 1848.

Sir

Sir Isaac Newton conjectures, that, as those planets which are nearest to 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 the least orbits. As to their apparent velocity, the comet of 1472, as observed by Regiomontanus, was such as to carry it through forty degrees of a great circle in twenty-four hours; and it was observed, that the comet of 1770 moved through more than forty-five degrees in the last twenty-five hours. M. Fascio 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 a comet will be immensely swift, so its parallax will become very sensible; and its proportion to that of the sun will be given: whence, such transits of comets will afford the best means of determining the distance between the earth and sun. The comet of 1472, for instance, 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 appulse than that of 1680: for Dr. Halley finds, by calculation, that November 11, at 1h. 6′. after noon, that comet was not more than one semidiameter of the earth to the northward of the earth's path; at which time, had the earth been in that 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 appulse is at best uncertain. Mr. Whiston attributes the universal deluge in the time of Noah to the near approach of a comet. His opinion was, that the earth, passing through the atmosphere of the comet, attracted therefrom great part of the water of the flood; that the nearness of the comet raised a great tide in the subterraneous waters, so that the outer crust of the earth was changed from a spherical to an oval figure; that this could not be done without making fissures and cracks in it, through which the waters forced themselves, by the hollow of the earth being changed into a less capacious form; that, along with the water thus squeezed up on the surface of the earth, much slime or mud would rise; which, together with the grosser part 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. Thus he accounts for trees and bones of animals being found at very great depths in the earth. He also held 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 every revolution, a day and a year were then the same: but that a comet, striking obliquely upon some part of the earth, gave it the diurnal rotation; 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 flood, so retarded the revolution thereof round the sun, that it is not now performed in less than 365 days and about a quarter. The same comet he thought would probably, coming near the earth when heated in an immense degree in its perihelion, be the instrumental cause of that

great catastrophe, the general conflagration, foretold in the sacred writings, and conjectured from ancient tradition.

That this is very possible, admits not of a doubt; for, the heat of the comet of 1680, was to the heat of the summer sun as 28,000 to 1. The heat of boiling water is about three times greater than the heat which dry earth acquires from the summer sun; and the heat of red-hot iron about three or four times greater than the heat of boiling water. Therefore the heat of dry earth at the comet, when in its perihelion, was about 2000 times greater than red-hot iron. This heat of the comet must also be capable of being retained a very long time. For a red-hot globe of iron, of an inch diameter, exposed to the open air, scarcely loses all its heat in an hour; but a greater globe will retain its heat longer, in proportion to its diameter, because the surface, at which it grows cold, varies in that proportion less than the quantity of hot matter. Therefore a globe of red-hot iron, as big as our earth, would scarcely cool in fifty thousand years!

From the beginning of our era to this time, it is probable, according to the best accounts, that there have appeared about 500 comets. Before that time about 100 others are recorded to have been seen, but it is probable that not above half of them were comets. And, when we consider, that many others may not have been perceived, from being too near the sun, from appearing in moon-light, from being in the other hemisphere, from being too small to be perceived, or which may not have been recorded, we might imagine the whole number to be considerably greater; but it is likely, that, of the comets which are recorded to have been seen, the same may have appeared several times, and therefore the number may be less than is here stated. The comet in 1786, which appeared on August 1, was discovered by Miss Caroline Herschel, a sister of Dr. Herschel; and since that time she has discovered three others. A comet was also discovered at Paris, by M. Bouvard, on Aug. 14, 1797, which was seen in England, on the 18th of the same month, by the Hon. Capel Loft, of Froston, in Suffolk, and an account was given of it as follows: It was seen at half past eight in the evening, nearly in the pole of the ecliptic; composing a rhomboides or lozenge-shaped figure with β and γ Draconis, and a star of the 4th magnitude in the left heel of Hercules. It was then distinctly visible to the naked eye as a faint star. With a good telescope, it appeared to most advantage when a power of about forty was used. It was then a diffused milky haziness, like the nebula of Andromeda. Its motion in twenty-four hours was about twelve degrees. It had no distinct nucleus; but its southern side was most luminous, and several stars were seen distinctly through it. On the 26th at 8h. 53′ it was above α Ophinchi, with four degrees greater altitude than that star; the comet being 50° 5′. It had seventy-three degrees polar distance, and was very near an unnamed star, from which it was passing south-east. Its right ascension twenty degrees of Sagittarius. In passing near its node it came very near to the earth, and, when first seen, it was returning from the sun, having passed its perihelion some weeks. Its ascending node is calculated in the sign twenty-eight degrees of Aquarius, and its perihelion distance computed at near one-sixteenth of the earth's, consequently nearer to the sun than Venus. If the comet was, when nearest to the earth, on the 16th of August, about five or six millions of miles from us, or more than

than twenty times the moon's diſtance, which appears to have been the caſe, its obſerved apparent diameter could hardly be leſs than one-third larger that the moon. This would make it about 3000 miles in diameter, and ſomewhat conſiderably larger than Mercury. If the perihelion place could be reconciled, the other elements would bring this comet to a very near agreement with that of 1596 and 1699, ſo as to make it probable they might be one and the ſame. This would give a period varying from 103½ to 108½ years.

From what has been diſcovered in general concerning comets, it is poſſible they may ſometimes approach ſo near to the primary planets, as to cauſe an eclipſe of the ſun to thoſe planets; and, as the body of a comet bears a much larger proportion to the bulk of a primary planet than any ſecondary, it is plain that a cometary eclipſe would both be of much longer continuance, and attended with much greater darkneſs, than that occaſioned by the moon; and, if we ſuppoſe the primary planet and comet to be moved both the ſame way, the duration of ſuch an eclipſe would be prodigiouſly lengthened; and thus, inſtead of four minutes, the ſun might be totally darkened to the inhabitants of certain places for as many hours. Hence we may account for that prodigious darkneſs which we ſometimes read of in hiſtory, at times when no eclipſe of the ſun by the moon could poſſibly happen. Such are thoſe mentioned by Herodotus, lib. vii. c. 37, and lib. ix. c. 70; likewiſe the eclipſe mentioned by Dion, which happened a little before the death of Auguſtus; and it is obſervable, that Seneca noticed a comet the ſame year. It is remarkable, however, that no comet hath ever been obſerved paſſing over the diſk of the ſun like a ſpot, as Venus and Mercury are; yet this muſt certainly happen, when the comet is in its perihelion, and the earth on the ſame ſide of its annual orbit. Such a phenomenon well deſerves the watchful attention of aſtronomers, as it would be a a greater confirmation of the planetary nature of the comets than any thing hitherto obſerved.

THE LAND OF PHILOSOPHERS.

[From the ITER SUBTERRANEUM of KLIMIUS.]

THIS land is named ſo by its inhabitants, who are wholly immerſed in ſtudious and philoſophical reſearches. I was very eager to ſee a country which I repreſented to myſelf as the centre of all the ſciences, and the real ſeat of the muſes. Full of this I haſtened forwards, thinking every moment an hour: the paths I had to paſs were full of ſtones, impeded with holes and deep pits; ſometimes I was up to the waiſt in the mire; there were no bridges, and I dragged my clogged and wounded feet with difficulty along: but to all theſe troubles I ſubmitted with great reſolution, well-knowing we muſt firſt ſubmit to pain, to get at pleaſure; having ſtruggled with my fatigue for the ſpace of an hour, I met a countryman, whom addreſſing civilly, I aſked him how far I might be from the Land of Philoſophers? "You had better enquire," ſaid he, "how far it is to the extremity of it, for you are now in the middle of the country." Full of aſtoniſhment, "How happens it," returned I, "that a land, inhabited by philoſophers only, ſhould exhibit an appearance of rudeneſs and deſolation, rather than of culture?" He anſwered, "that the

the face of the country would soon be improved, if once the inhabitants could get leisure from business of superior importance. At present," he continued, "they are all employed upon celestial matters; namely, in discovering a way to the sun; they may well therefore be excused, if for awhile they leave their fields uncultivated, for it is not easy at the same time to fly and to creep." I soon found out what the shrewd countryman meant to insinuate, and, pursuing my journey, I came at length to Caska, the principal city. At the gates, instead of centinels, I observed geese, hens, and chickens, a multitude of birds nests and spiders webs. In the streets I saw pigs and philosophers wandering promiscuously together, distinguished only by the shapes of their bodies, being perfectly alike as to filth and dirt. The philosophers had all a vest of the same shape, but what its colour was, no one could tell, it was so smeared with all manner of nastiness: I said to one of them, who absorbed in meditation was advancing towards me, "Pray, sir, what is the name of this city?" He, without moving his eyes or stirring a limb, stood still, as if his soul had been totally abstracted from his body; at length raising his eyes slowly to the skies, he returned, "I think it is almost noon." So absurd an answer, indicating a mind totally deranged, induced me to think it were better to study rather too little, than to be mad from excess of learning. I proceeded to examine the interior parts of the city, wishing to know, whether besides these philosophers, I could find some rational beings. I found the great square very commodious, full of statues and columns, on which were various inscriptions; I went up to one of them, intending to try if I could make out what was written; as I stood in this posture, I found on a sudden my back become very warm and wet: turning round, that I might get rid of this warm stream, I observed a philosopher making water upon me: lost in thought, he supposed me to be a statue, against which he might ease nature. Angry at so gross an insult, and still more so when I perceived the philosopher grinning at me, as if in scorn, I gave him a sound box on the ear; at which, in a great rage, he caught me by the hair, and dragged me bawling round the square; but, when I found his resentment still unappeased, I determined to resist, and give him as good as he brought, so that the account betwixt us was tolerably equal: after a sharp contest, we both fell down; a crowd of philosophers ran up to us, attacking me with their fists and sticks in a furious manner, and dragged me half dead round the square by my hair; tired at length, but not satisfied, they led me to a large building; I placed my feet against the door, and stoutly refused to enter; but seizing me by the neck, bellowing like a boar, they thrust me in, and threw me sprawling on the ground; I then began to entreat their wisdoms in a most suppliant tone, to moderate their anger, and give place to pity, urging how inconsistent it was with those who studied wisdom and philosophy, to imitate the fury of wild beasts, and to indulge those passions against the excess of which they seriously declaimed. They turned a deaf ear to me, and the philosopher who first affronted me renewed his blows, beating me as if I had been an anvil; and as if nothing short of my death could pacify him. Thus I was taught that no anger exceeds that of philosophers, and that commenting upon virtue was very different from practising it. At length four philosophers entered the apartment, whose dress indicated a different sect; by their interposing partly with

with words, and partly with personal exertions, they appeared to pity my condition; and, often talking apart with the rest, they removed me to another dwelling. Great was my exultation at being delivered from the hands of assassins, and meeting with honest men; on their enquiring about what had happened, I told them every particular: they smiled at the humour of the accident, remarking that it was usual for philosophers, when walking in the great square, so to use the statues, for one of which my opponent, lost in profound meditation, mistook me: they added that he was an astronomer of high reputation, and that the others, who had beaten me with such rage and virulence, were teachers of moral philosophy! I thought myself arrived at a safe port, and, free from all apprehensions, I listened to them, telling me these and many other things, with great delight: I began at length to have some suspicion from their minute examination of my person; neither did I like their questions concerning my manner of life, the occasion of my travels, my country, all which, again and again repeated, together with their frequent whispers, I considered as bad omens; but I was almost overpowered with terror, when I was carried to an anatomical theatre, where I beheld fragments of bones and carcases scattered about, filling all the place with a most offensive stench. I at first supposed myself in a den of robbers, but my fears were somewhat alleviated by the anatomical instruments suspended from the walls, which made it sufficiently obvious that my host was either a student of medicine or practitioner of surgery. After I had been left to my private meditations in this place for the space of about half an hour, an elderly woman entered with the dinner she had provided for me; she seemed particularly humane, contemplating me with great attention, and at intervals sighing very deeply: upon my asking her the cause of her uneasiness, she replied, that it was my impending fate which provoked her sighs. "This is an honourable place indeed that you are come to," she continued. "My husband is the principal personage of this city, he is the public physician and a teacher of medicine; those you saw with him are his colleagues: astonished at the unusual structure of your person, they have determined to dissect you, in order to examine your interior parts, and hoping to make some discovery which may extend the science of anatomy." These words struck horror to my soul. "And can these," cried I, "be called worthy men, who without scruple can cut to pieces an helpless and unoffending individual?" Then falling upon my knees at her feet, I implored her with tears to intercede for me. "My intercession," she replied, "would be of little avail against a decree of the faculty; however I will endeavour at least that you may not lose your life in this manner." Saying this, she took me by the hand, and, leading me by a false passage, she conducted me, trembling like a leaf, to the gates of the city. I then turned to my benefactress, endeavouring to express my gratitude in some well-adapted expressions, but she avowed herself determined not to quit me till she saw me in a place of perfect safety; she then proceeded to accompany me, not at all reluctant. As we walked on together, we had various discourse on the subject of the country, to which I listened with great avidity; she at length introduced a conversation by no means of an agreeable nature, because it compelled me to conclude that she expected a compensation totally inconsistent with good morals: she expatiated

with much sensibility on the unjust condition of wives in this country, since these philosophical pedagogues, buried as it were in learning, neglected their domestic duties. "I could safely swear," said she, "that we should be totally undone, if now and then an honest and compassionate stranger did not pity our misfortunes." I pretended not to understand the mark at which she aimed; I hastened my pace, but my coldness increased her warmth; at length in plain terms, she reproached me with ingratitude; I nevertheless continued to proceed, till, taking hold of my garments, she endeavoured forcibly to detain me; thus obliged to exert myself, I forced myself from her, and, my exertions giving wings to my feet, I was very soon out of sight.

OF THE ORIGIN AND USE OF BELLS.

UPON the origin of church-bells, Mr. Whitaker, in his History of Manchester, observes, That bells being used, among other purposes, by the Romans, to signify the times of bathing, were naturally applied by the Christians of Italy to denote the hours of devotion, and summon the people to church. The first application of them to this purpose is, by Polydore Virgil and others, ascribed to Paulinus bishop of Nola, a city of Campania, about the year 400. Hence, it is said, the names *nolæ* and *campanæ* were given them; the one referring to the city, the other to the country. Though others say they took the latter of these names, not from their being invented in Campania, but because it was here the manner of hanging and balancing them, now in use, was first practised; at least that they were hung on the model of a sort of balance invented or used in Campania; for in Latin writers we find *campana statera*, for a steel-yard; and in the Greek καμπανίζειν, and *ponderare*, "to weigh." Bells, on their first introduction into the church, were called *saints*; hence *toc-saint*, or *toc-sin*, the corruption which in process of time followed. Pliny reports, that many ages before his time, bells were in use, and called *tintinnabulæ*; and Suetonius says, that Augustus had one put at the gate of the temple of Jupiter, to call the meeting of the people. In Britain, bells were applied to church-purposes, before the conclusion of the seventh century, in the monastic societies of Northumbria, and as early as the sixth even in those of Caledonia. And they were therefore used from the first erection of parish-churches among us.—Those of France and England appear to have been furnished with several bells. In the time of Clotaire II. king of France, and in the year 610, the army of that king was frightened from the siege of the city of Sens, by ringing the bells of St. Stephen's church. The second excerption of Egbert, about the year 750, which is adopted in a French Capitulary of 801, commands every priest, at the proper hours, to sound the bells of his church, and then to go through the sacred offices to God. And the council of Enham, in 1011, requires all the mulcts for sins to be expended in the reparation of the church, the purchase of church-vestments, and church-bells. These were sometimes composed of iron in France; and in England, as formerly at Rome, were frequently made of brass. And as early as the ninth century, there were many cast of a large size and deep note.

Ingolphus mentions, that Turketulus abbot of Croyland, who died about the year 870, gave a great bell to the church of that abbey, which he named *Guthlac*; and afterwards six others, viz. two which he called *Bartholomew* and *Bettelin*, two called *Turketul* and *Tatwin*, and two named *Pega* and *Bega*, all which rang together; the same author says, *Non erat tunc tanta consonantia campanarum in tota Anglia*. Not long after, Kinseus archbishop of York gave two great bells to the church of St. John at Beverly, and at the same time provided that other churches in his diocese should be furnished with bells. Mention is made by St. Aldhem, and William of Malmesbury, of bells given by St. Dunstan to the churches in the west. The number of bells in every church gave occasion to the curious and singular piece of architecture in the campanile or bell-tower; an addition, which is more susceptible of the grander beauties of architecture than any other part of the edifice, and is generally therefore the principle or rudiments of it. It was the constant appendage to every parish-church of the Saxons, and is actually mentioned as such in the laws of Athelstan.

The Greek Christians are usually said to have been unacquainted with bells till the ninth century, when their construction was first taught them by a Venetian. Indeed, it is not true that the use of bells was entirely unknown in the ancient eastern churches, and that they called the people to church, as at present, with wooden mallets. Leo Alatius, in his dissertations on the Greek temples, proves the contrary from several ancient writers. It is his opinion, that bells first began to be disused among them after the taking of Constantinople by the Turks; who, it seems, prohibited them lest their sound should disturb the repose of souls, which, according to them, wander in the air. He adds, that they still retain the use of bells in places remote from the intercourse of the Turks; particularly, very ancient ones in Mount Athos. F. Simon thinks the Turks prohibited the Christians the use of bells, rather out of political than religious reasons; inasmuch as the ringing of bells might serve as a signal for the execution of revolts, &c.

In the ancient monasteries we find six kinds of bells enumerated by Durandus, viz, *Squilla*, rung in the refectory; *cymbalum*, in the cloister; *nola*, in the choir; *nolula* or *dupla*, in the clock; *campana*, in the steeple; and *signum* in the tower. Belethus has much the same; only that for *squilla*, he puts *tintinnabulum*, and places the *campana* in the tower, and *campanella* in the cloister. Others place the *tintinnabulum* or *tinniolum*, in the refectory or dormitory; and add another bell called *corrigiuncula*, rung at the time of giving discipline, to call the monks to be flogged. The *cymbalum* is sometimes also said to have been rung in the cloister, to call the monks to meat. In the funeral monuments of Weever, are the following particulars relating to bells: "Bells had frequently these inscriptions on them:

"Funera plango, Fulgura frango, Sabbata pango,
Excito lentos, Dissipo ventos, Paco cruentos.

"In the Little Sanctuary at Westminster King Edward III. erected a clochier, and placed therein three bells for the use of St. Stephen's chapel: about the biggest of them were cast in the metal these words:

"King Edward made mee thirtie thousand weight and three,
Take me down and wey me, and more you shall fynd me.

"But these bells being to be taken down in the reign of King Henry VIII. one writes underneath with a coale:

"But Henry the eight
Will bait me of my weight." *Ibid.* 492.

This last distich alludes to a fact mentioned by Stow in his Survey of London, ward of Farringdon Within, to wit, that near to St. Paul's school stood a clochier, in which were four bells called *Jesus's bells*, the greatest in all England, against which Sir Miles Partridge staked an hundred pounds, and won them of King Henry VIII. at a cast of dice. Nevertheless it appears that abroad there are bells of greater magnitude. In the steeple at the great church at Roan in Normandy is a bell with this inscription:

Je suis George d'Ambois,
Qui trente cinque mille pois.
Mes lui qui me pesera,
Trente six mille me trouera.

I am George of Ambois,
Thirtie five thousand in pois:
But he that shall weigh me,
Thirtie six thousand shall find me. *Ibid.*

And it is a common tradition that the bells of King's-college chapel, in the university of Cambridge, were taken by Henry V. from some church in France, after the battle of Agincourt. They were taken down some years ago, and sold to Phelps the bell-founder in Whitechapel. The uses of bells were summed up in the following distich, as well as that first above mentioned:

Laudo Deum verum, plebem voco, conjugo clerum,
Defunctos ploro, pestem fugo, festa decoro.

Matthew Paris observes, that anciently the use of bells was prohibited in time of mourning; though at present they make one of the principal ceremonies of mourning. Mabillon adds, that it was an ancient custom to ring the bells for persons about to expire, to advertise the people to pray for them; whence our passing-bells. The passing bell, indeed, was anciently rung for two purposes: one, to bespeak the prayers of all good Christians for a soul just departing; the other, to drive away the evil spirits who stood at the bed's foot, and about the house, ready to seize their prey, or at least to molest and terrify the soul in its passage: but by the ringing of that bell (for Durandus informs us, evil spirits are much afraid of bells), they were kept aloof; and the soul, like a hunted hare, gained the start, or had what is by sportsmen termed *law*. Hence, perhaps, exclusive of the additional labour, was occasioned the high price demanded for tolling the greatest bell of the church; for, that being louder, the evil spirits must go farther off to be clear of its sound, by which the poor soul got so much more the start of them: besides, being heard farther off, it would likewise procure the dying man a greater number of prayers. This dislike of spirits to bells is mentioned in the Golden Legend, by W. de Worde. "It is said, the evill spirytes that ben in the regyon of thayre, doubte moche when they here the belles rongen: and this is the cause why the belles ben rongen

rongen whan it thondreth, and whan grete tempeste and outrages of wether happen, *to the ende that the feinds and wycked spirytes shold* be abashed and flee, and cease of the movynge of tempeste." Lobineau observes, that the custom of ringing bells at the approach of thunder, is of some antiquity; but that the design was not so much to shake the air, and so dissipate the thunder, as to call the people to church to pray that the parish might be preserved from that terrible meteor.

In the Romish church, bells were baptized and anointed *oleo Chrismatis*: they were exorcised, and blessed by the bishop; from a belief, that, when these ceremonies were performed, they had power to drive the devil out of the air, to calm tempests, to extinguish fire, and to recreate even the dead. The ritual for these ceremonies is contained in the Roman pontifical; whence the origin of giving to bells the name of some saint. *In Chauncey's History of Hertfordshire*, page 383, is a relation of the baptism of a set of bells in Italy with great ceremony, a short time before the writing that book. The bells of the parish-church of Winnington in Bedfordshire had their names cast about the verge of every one in particular, with these rhiming hexameters:

Nomina Campanis hæc indita sunt quoque nostris.
1. Hoc signum Petri pulsatur nomine Christi.
2. Nomen Magdalene campana sonat melode.
3. Sit nomen Domini benedictum semper in cælum.
4. Musa Raphaelis sonat auribus Immannuelis.
5. Sum Rosa pulsata mundique Maria vocata. *Weev. Fun.* 122.

By an old chartulary, once in the possession of Weever the antiquary, it appears that the bells of the priory of Little Dunmow in Essex were, anno 1501, new cast, and baptized by the following names:

Prima in honore Sancti Michaelis Archangeli.
Secunda in honore S. Johannis Evangelisti.
Tertia in honore S. Johannis Baptisti.
Quarta in honore Assumptionis beatæ Mariæ.
Quinta in honore sancti Trinitatis, et omnium sanctorum. *Ib.* 633.

The bells of Osney abbey near Oxford were very famous; their several names were Douce, Clement, Austin, Hautecter [potius Hauncleri], Gabriel, and John.

The Russians, it is said, have a great passion for bell-ringing; and we are told, that the great bell of Moscow, weighs, according to Mr. Coxe, "432,000 pounds, and which exceeds in bigness every bell in the *known world. Its size is so enormous*, that I could scarcely have given credit to the account of its magnitude, if I had not examined it myself, and ascertained its dimensions with great exactness. Its height is nineteen feet, its circumference at the bottom twenty-one yards eleven inches, its greatest thickness twenty-*three inches*." *It was cast in the reign of the empress Anne*; but, the beam on which it hung being burnt, it fell, and a large piece is broken out of it; so that it lately lay in a manner useless. Mr. Bruce, in his late memoirs, *mentions a bell at Moscow*, founded in czar Boris's time, nineteen feet high, twenty-three in diameter, and two in thickness, that weighed 336,000 pounds.

Nankin in China was anciently famous for the largeness of its bells; but their enormous weight brought down the tower, the whole

whole building fell to ruin, and the bells have ever since lain on the ground. One of these bells is near twelve English feet high, the diameter seven and a half, and its circumference twenty-three; its figure almost cylindric, except for a swelling in the middle; and the thickness of the metal about the edges seven inches. From the dimensions of this bell, its weight is computed at 50,000 pounds, which is more than double the weight of that of Erfort, said by Father Kircher to be the greatest bell in the world. These bells were cast by the first emperor of the preceding dynasty, about 300 years ago. They have each their name; the hanger *(tchoui)*, the eater *(che)*, the sleeper *(choui)*, the will *(si)*. Father le Compte adds, that there are seven other bells in Pekin, cast in the reign of Youlo, each of which weighs 120,000 pounds. But the sounds even of their biggest bells are very poor; being struck with a wooden in lieu of an iron clapper.

The practice of ringing bells in change, or regular peals, is said to be peculiar to England; whence Britain has been termed the *ringing island*. The custom seems to have commenced in the time of the Saxons, and was common before the conquest. The ringing of bells, though a recreation chiefly of the lower sort, is in itself not incurious. The tolling a bell is nothing more than the producing a sound by a stroke of the clapper against the side of the bell, the bell itself being in a pendant position and at rest. In ringing, the bell, by means of a wheel and a rope, is elevated to a perpendicular: in its motion to this situation, the clapper strikes forcibly on one side, and in its return downwards on the other side of the bell, producing at each stroke a sound. There are in London several societies of ringers, particularly one known by the name of the *College Youths*: of this it is said Sir Matthew Hale, lord chief justice of the court of King's Bench, was, in his youthful days, a member; and in the life of this learned and upright judge, written by Bishop Burnet, some facts are mentioned which favour this relation. In England the practice of ringing is reduced to a science, and peals have been composed which bear the name of their inventors. Some of the most celebrated peals now known were composed about fifty years ago by one Patrick. This man was a maker of barometers: in his advertisements he styled himself *Torricellian Operator*, from Torricelli, who invented instruments of this kind. In the year 1684, Abraham Rudhall, of the city of Gloucester, brought the art of bell-founding to great perfection. His descendants in succession have continued the business of casting bells; and by a list published by them it appears, that at Lady-day 1774 the family, in peals and odd bells, had cast to the amount of 3594. The peals of St. Dunstan's in the East, and St. Bride's, London, and St. Martin's in the Fields, Westminster, are in the number. The music of bells is altogether melody; but the pleasure arising from it consists in the variety of interchanges, and the various succession and general predominance of the consonances in the sounds produced. Musical authors however, have written but little upon this subject.

The sound of a bell is conjectured to consist in a vibratory motion of its parts, much like that of a musical chord. The stroke of the clapper must necessarily change the figure of the bell, and of a round make it oval: but, the metal having a great degree of elasticity, that will

will return back again which the stroke drove farthest off from the centre, and that even some small matter nearer the centre than before; so that the two parts which before were extremes of the longest diameter, do then become those of the shortest; and thus the external surface of the bell undergoes alternate changes of figure, and by that means gives that tremulous motion to the air in which the sound consists. *M. Perrault maintains, that the sound of the same bell or* chord is a compound of the sounds of the several parts thereof; so that where the parts are homogeneous, and the dimensions of the figure uniform, there is such a perfect mixture of all these sounds as constitutes one uniform, smooth, even, sound; and the contrary circumstances produce harshness. This he proves from the bells differing in tone according to the part you strike; and yet, strike it any where, there is a motion of all the parts. He therefore considers bells as a compound of an *infinite number of rings*, which according to their different dimensions have different tones, as chords of different lengths have; and, when struck, the vibrations of the parts immediately struck determine the tone, being supported by a sufficient number of consonant tones in the other parts. Bells are observed to be heard farther placed on plains than on hills; and still farther in valleys than on plains: the reason of which will not be difficult to assign, if it be considered, that, the higher the sonorous body is, the rarer is its medium: consequently, the less impulse it receives, and the less proper vehicle it is to convey it to a distance.

Mr. Reaumur, in the Memoirs of the Paris Academy, has the following observations relating to the shape most proper for bells, to give them the loudest and clearest sound. He observes, "that as pots and other vessels *more immediately necessary to the service* of life were doubtless made before bells, it probably happened that the observing these vessels to have a sound when struck, gave occasion to making bells, intended only for sound, in that form; but, that it does not appear that this is the most eligible figure; for lead, a metal which is in its common state not at all sonorous, yet becomes greatly so on its being cast into a particular form, and that very different from the common shape of bells. In melting lead for the common occasions of casting *in small quantities, it is usually done in an iron* ladle: and, as the whole is seldom poured out, the remainder, which falls to the bottom of the ladle, cools into a mass of the shape of that bottom. This is consequently a segment of a sphere, thickest in the middle, and thinner towards the edges; nor is the ladle any necessary part of the operation, since, if a mass of lead be cast in that form in a mould of earth or sand, in any of these cases it is found to be very sonorous. Now, if this shape alone can give sound to a metal which in other forms is perfectly mute, how much more must it necessarily give it to other metals naturally sonorous in whatever form? It should seem, that bells would much better perform their office in this than in any other form: and that it must particularly be a thing of great advantage to the small bells of common house-clocks, which are required to have a shrill note, and yet are not allowed any great size." He adds, "that had our forefathers had opportunities of being acquainted with the sound of metals in this shape, we should probably have had all our bells at present of this form."

The use of bells is very ancient, as well as extensive, both among Jews, Greeks, Romans, Christians, and Heathens, variously applied;

plied; as on the necks of men, beasts, birds, horses, sheep, &c. Among the Jews it was ordained, that the lower part of the blue tunic which the high-priest wore when he performed religious ceremonies, should be adorned with pomegranates and gold bells, intermixed equally and at equal distances. As to the number of the bells worn by the high priest, the scripture is silent; and authors are not very well agreed: but the sacred historian has let us into the use and intent of them in these words: (Exod. xxviii. 33—35.) "And it shall be upon Aaron to minister, and his sound shall be heard when he goeth into the holy place before the Lord, and when he cometh out, that he die not." The Kings of Persia are said to have the hem of their robes adorned like the Jewish high-priests with pomegranates and gold bells. It was, in the opinion of Calmet, with a design of giving notice that the high-priest was passing by, that he wore little bells on the hem of his robe; or rather it was as it were a kind of public notice that he was going to the sanctuary: for as, in the King of Persia's court, no one was suffered to enter the apartments without giving notice thereof by the sound of something; so the high-priest, out of respect to the divine presence residing in the holy of holies, did, by the sound of little bells fastened to the bottom of his robe, desire as it were permission to enter, that the sound of the bells might be heard, and he not be punished with death for an unmannerly intrusion. The figure of these bells is not known to us. The prophet Zachariah (xiv. 20.) speaks of bells hung to war-horses. "In that day (says the prophet) there shall be upon the bells of horses, Holiness unto the Lord."

Among the Greeks, those who went the nightly rounds in camps or garrisons, carried with them a little bell, which they rung at each centry-box to see that the soldiers on watch were awake. A codonophorous or bell-man also walked in funeral processions, at a distance before the corps, not only to keep off the crowd, but to advertise the *flamen dialis* to keep out of the way, for fear of being polluted by the sight, or by the funerary music. The priest of Proserpine at Athens, called *hierophantus*, rung a bell to call the people to sacrifice. There were also bells in the houses of great men to call up the servants in a morning. Zonara assures us, that bells were hung with whips on the triumphal chariots of their victorious generals, to put them in mind that they were still liable to public justice. Bells were put on the necks of criminals going to execution, that persons might be warned by the noise to get out of the way of so ill an omen as the sight of the hangman or the condemned criminal, who was devoted and just going to be sacrificed to the *dii manes*.

In England, the *curfew*, or evening bell, was established by William the Conqueror, who appointed, under a severe penalty, that, at the ringing of this bell at eight o'clock in the evening, every one should put their fires and candle, and go to bed. It is remarkable, that this institution, though a mark of national disgrace and slavery, is continued in almost every town and city in the kingdom, to the present day. Bells on the necks of brutes, are expressly mentioned in Phædras,—*Celsa cervice eminens, Clarumque collo jactans tintinnabulum*. Taking these bells away was construed by the civil law, theft; and, if the beast was lost by this means, the person who took away the bells was to make satisfaction.

ACCOUNT

ACCOUNT OF THE ROCK-SALT AT NORTHWICH, AND THE BRINE-PITS AT DROITWICH.

ROCK-salt is found from twenty-eight to forty-eight yards beneath the surface of the earth. The first stratum or mine met with is from fifteen to twenty-one yards in thickness, perfectly solid, and so hard as to be cut with great difficulty with iron picks and wedges. Of late the workmen have blasted it with gunpowder, by which they loosen and remove many tons together. The appearance of the salt is extremely resembling that of brown sugar-candy. Beneath this stratum is a bed of hard stone, consisting of large veins of flag, intermixed with some rock-salt, the whole from twenty-five to thirty-five yards in thickness. Under this bed is a second stratum, or mine, of salt, from five to six yards thick, many parts of it perfectly white, and clear as crystal, others browner, but all purer than the upper stratum, yet reckoned not so strong. Above the whole mass of salt lies a bed of whitish clay, which has been used in the Liverpool earthen ware; and in the same place is found a good deal of gypsum, or plaister-stone.

Rock-salt pits are sunk at great expence, and are very uncertain in their duration, being frequently destroyed by the brine springs bursting into them, and dissolving the pillars, by which the whole work falls in, leaving vast chasms on the surface of the earth. In forming a pit, a shaft or eye is sunk, similar to that of a coal-pit, but more extensive. After the workmen have got down to the salt-rock, and made a proper cavity, they leave a sufficient substance of the rock, about seven yards in thickness, to form a solid roof, and, as they proceed, they hew pillars out of the rock for the support of that roof, and then employ gunpowder to separate what they mean to raise. When well illuminated, the crystalline surface of the roof, pillars, and sides, of a large pit, make a glittering and magnificent appearance. Fresh air is conveyed from the mouth of the pit by means of a tube, to which is fixed a pair of forge bellows, forming a continual current between the outer air and that in the pit. The pits at the greatest depth are dry, and of a comfortable temperature.

The largest rock-salt pit now worked, is in the township of Witton, and in the lands of Nicholas Ashton, Esq. It is worked in a circular form, 108 yards in diameter, its roof supported by twenty-five pillars, each three yards wide at the front, four at the back, and its sides extending six yards. The pit is fourteen yards hollow; consequently each pillar contains 294 solid yards of rock-salt; and the whole area of the pit contains 9160 superficial yards, little less than two acres of land.

The average quantity of rock-salt annually delivered from the pits in the neighbourhood of Northwich for the last seven years is 50,484 tons. Another account states the annual average (no period mentioned) at about 65,000 tons. Upon this last calculation, the mode in which the rock-salt is disposed of is stated to be, exported to Dunkirk, Ostend, Riga, Bruges, Nieuport, Pillau, Elsineur, &c. from 45 to 50,000 tons; ditto to Ireland, from 3000 to 4000 tons; refined in England, at Northwich, 5000 tons; Liverpool, 3000 tons; Frodsham, 3000 tons; Dungeon works, 2500 tons.

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The rock-ſalt, as well as the white ſalt, made at Northwich, is conveyed down the Weaver, and thence by the Merſey to Liverpool in veſſels from fifty to eighty tons burthen, and there re-ſhipped for foreign countries, or kept for refinement.

The brine-pits at Droitwich are immenſe, and continually running over, owing to the greatneſs of the ſprings. The brine is ſuppoſed to be the ſtrongeſt ever known, containing about 1-4th ſalt, while thoſe of Nantwich in Cheſhire yield only 1-6th, and thoſe of Weſton in Staffordſhire only 1-9th part. This laſt indeed is the weakeſt brine commonly boiled in England; but in Germany, and other places, where ſalt is ſcarce, they work the ſprings whoſe water is not higher impregnated than common ſea-water, containing about 3-40ths ſalt. Here we may obſerve, that ſea-water, briſe-ſprings, and rock-ſalt, generally contain, beſides common ſalt, various other earthy and ſaline ingredients, ſuch as calcareous earth, magneſia, Epſom ſalts, ſelenites, Glauber's ſalts, fixed alkali uncombined with any acid, &c. Theſe ſubſtances are foreign to the nature of ſalt, and injure its quality; and hence it muſt appear, that common ſalt may have very different properties, according to the quality of the water from which it is made, or the ſkill of the ſalt-maker in ſeparating thoſe heterogeneous ſubſtances from it.

At Droitwich the brine is pumped out of the pits chiefly with horſes by engines (though at ſome of the ſmall pits it is pumped up by men) into large reſervoirs, from which there are trees laid to the different ſalt-works; then they have only to turn a large braſs cock to let the brine run into the pans in which it is boiled. Theſe pans are of wrought iron, from fourteen to twenty-four feet long, from twelve to twenty feet wide, and from two to two feet and a half deep. One pan of brine will take about fifteen or twenty hours boiling, and will make from 15 cwt. to one ton of ſalt. The brine regularly boils and ſimmers to ſalt, which falls to the bottom of the pans, and is then raked out and put into wooden barrows or baſkets made oval, then carried into a ſtove to dry, which it does in about forty hours, after which it is fit for uſe.

The following artificial method of promoting the evaporation of ſea-water (when there is not ſufficient heat of weather to perform it quick enough), and to preſerve the brine in the pits from being diluted with rain, is the diſcovery of Dr. Brownrigg, and we hope will not appear miſplaced under this article.—A number of ſalt-pits ſhould be made in a row in the marſh, from eaſt to weſt, and their bottoms lined with plaiſter, or ſome ſtrong cement, that will not eaſily break up; and, by this caution, the ſalt may be drawn white and pure like the Portugal kind, not grey like the French. Over each pit covers ſhould be made of thin boards, or rather of canvas painted white, and ſtretched on frames of wood, and theſe ſhould be fixed to ſtrong poſts, erected on the north ſide of the pits, and contrived to be eaſily drawn back to them, in the manner of draw-bridges. Theſe covers, thus fixed, may be let down over the pits, in manner of a ſhed or penthouſe, in rainy weather, to keep the brine from being diluted with freſh water; and in dry weather they may be raiſed almoſt to a perpendicular, but inclining a little toward the ſouth, ſo as to form a wall with a ſouth aſpect; and thus they would ſerve for a double uſe, being a covering to the pits in rainy weather, and reflectors of the ſun's heat in dry weather. The

reflection

reflection of so large a body of the sun's rays, in the course of a bright day, would greatly promote the evaporation of the brine; and the hinges, on which the reflectors turn, being placed at ten inches from the ground, when the reflectors stand upright, there will be a space under them, through which the air will continually flow in a brisk current, and this will greatly promote the evaporation of the water.

The passages of communication between the pits must be narrow and winding, and must be wholly stopped up in wet weather, that no fresh water run into the brine. This channel should be covered also with boards; and, at the entrance of the pits, there must not be a pond, as is the custom in France, but only a narrow covered trench, running parallel with the side of the pits, which is opposite to the reflectors; and the pond, which forms the entrance of the pits in the French salt-marshes, must in these be detached from them, and instead of it there must be formed a fourth brine-pond, communicating with the third by a long and narrow channel.

If these contrivances should be reduced to practice in England, the salt will probably crystallize much faster there than in the French marshes, and the brine may be kept as deep and even deeper than in the French pits; and a shower of rain will only retard the work for the small time in which it is falling: whereas, in the French works, it throws them back three or four days, as no salt can be formed till all the water it brought be evaporated.

Four cisterns may be dug adjoining to the brine-pits, to admit the brine in the salt-ponds, when the weather is very rainy; and, as to the salt-water in the reservoir, if it should be found necessary to preserve it from rain in cisterns, when so much rain falls as to make it fresher than sea-water, it may be let out, and sea-water admitted in its place. And, in order to promote the evaporation, and to make the salt-water in the reservoir fitter to supply the first brine-pond with brine of a due strength, it may be proper, by means of a small fire-engine, continually to force up the salt-water in the reservoir, as often as occasion requires, and, by means of a diverger, fitted to the engine, to make it descend again into the reservoir, like a shower of rain; by which means the evaporation of the watery vapours will be greatly promoted, after much the same manner as is practised at several of the salt-works in Germany, where the brine is very weak.

Thus, by augmenting the force of the sun's heat, and of the air, by promoting the evaporation of the watery vapours, and preventing the brine from being diluted with rain, it is very probable that, during the summer season, double the quantity of salt might be prepared at an English work, with these contrivances, that is usually prepared at a French salt-marsh of equal magnitude.

Besides these methods of managing sea-water, it is certain, that very large quantities of bay-salt might be prepared in England with great ease, from the natural brine of salt-springs, and from the common fossile or rock-salt of Cheshire, dissolved in weak brine, or in sea-water. Upon the whole, the bay-salt might thus be made here at a moderate price, and in sufficient quantities to supply both the nation itself and all our colonies.

The following are the duties on salt, and laws relating thereto:—The duties upon salt are under the management of a distinct office, called the Salt-office, established in 1694, subject to the direction of

five commissioners, at an annual salary of 500l. each, who have, by statute 1 Anne, cap. 21. the same powers, and must observe the same regulations, as those of other excises. To this office belong also a comptroller, with an annual salary of 350l. deputy and clerks; a treasurer, who has for himself and clerks 430l. per annum; his deputy and clerk; a secretary at 200l. per annum; assistant-secretary and clerk; an accomptant-general at 200l. per annum, and clerk; solicitor at 150l. per annum; correspondent at 100l. per annum, and clerk; chief accomptant and clerk of securities at 180l. per annum; two accomptants and assistant clerks; housekeeper at 100l. a-year; storekeeper and clerk of the charity and diaries; collector of London port; assistant-searcher; two surveyors, &c.

By 5 W. cap. 7. a duty is laid on home salt of 1½d. a gallon; which, by 7 and 8 W. cap. 31. is extended to all salt made from rock-salt, salt refined, and salt made from salt. And by 9 and 10 W. cap. 44. a farther duty is imposed on all such salt of 3½d. gallon; the same amounting in the whole to 3s. 4d. a bushel: salt being estimated at 56lb. to the bushel. These duties were repealed by 3 Geo. II. cap. 20. but were revived by 5 Geo. II. cap. 6. for three years, continued from time to time, and made perpetual by 26 Geo. II. cap. 3. By 5 W. cap. 7. there shall be paid for every gallon of foreign salt imported 3d. over and above other duties; and by 9 and 10 W. c. 44. an additional duty is laid of 7d. a gallon: the same amounting in the whole to 6s. 8d. a bushel: the gallon to be rated after 8 gallons to the bushel Winchester measure; and 84lb. of foreign salt shall be deemed a bushel. 1 Anne, stat. i. cap. 21. By 9 Anne, cap. 23. a farther duty, over and above the duty on home salt, 9s. a ton, is laid on all rock-salt exported to Ireland; and rock-salt shall be ascertained, as to payment of the duties, at 65lb. weight to the bushel. By 20 Geo. III. cap. 34, an additional duty upon salt is charged, as follows: viz. for every gallon of salt imported, not being the product or manufacture of Great Britain, the sum of 2½d. for every gallon of salt and rock-salt, made at any salt-works or taken out of any pit in England, 1½d. for every bushel of salt, made at any salt-works or taken out of any pit in Scotland, 3d. and for every bushel of salt imported from Scotland into England, 7d. By 8 Geo. III. cap. 25, foul salt, produced in the manufacturing of white salt, not fit to be applied to the curing of provisions, but which may be beneficial to agriculture, shall be charged only with a duty of 4d. in a bushel. The duties on foreign salt shall be paid by the importer, on entry, and before landing; who, on giving security to the collector, shall be allowed six months for payment, or at the rate of 10l. per cent. per annum, upon paying ready money, 9 and 10 W. cap. 44. Farther time is allowed, if the salt imported amounts to more than forty bushels, under certain restrictions, by 5 Anne, cap. 29. No foreign salt shall be imported in any ship of less burthen than forty tons, on pain of forfeiting the salt, and double its value, 3 Geo. II. cap. 20. and salt that is landed before payment of the duty is forfeited, and also 10s. a bushel; and every person assisting therein shall forfeit 10l. Obstructing an officer searching a ship incurs a forfeiture of 40l. 5 Geo. cap. 18. Importing or landing British salt in England incurs a forfeiture of the same, and also of the ship and tackle; and every person assisting forfeits 20l. or is liable to six months imprisonment; which regulation is also extended

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to salt shipped for exportation, and put on-shore again or taken out of the vessel, 1, 2, and 3, Anne, cap. 14. 5 Geo. cap. 18. The duties on rock-salt refined into white salt shall be allowed, 10 and 11 W. cap. 22. but no rock-salt shall be refined, or made into white salt, in any place, except within ten miles of the pit, &c. on pain of 40s. a bushel, 1 Anne, stat. i. cap. 21. By the same act, every maker of salt, refiner of rock-salt, and proprietor of any salt-works or pits, who shall set up or use any salt-work, pit, pan, storehouse, warehouse, &c. for making, laying, refining, or keeping, of salt, without giving notice at the next salt-office, shall forfeit 40l. and the officer shall be allowed to enter and survey, under a forfeiture of 40l. and obstructing the officer in his duty incurs a forfeiture of 20l. Nor shall any salt be delivered from any works or pits without notice to the officer, on pain of forfeiting the same, 10s. a bushel, and 20l. 5 W. cap. 7. 9 and 10 W. cap. 44. Any officer neglecting or violating his duty incurs a forfeiture of double the value of the salt clandestinely conveyed away and landed, and also 10s. a bushel. 5 Geo. III. cap. 43. Salt shall be weighed before removal, in the presence of the salt-officer, or the proprietor shall forfeit 20l. and double the value. 10 and 11 W. cap. 22. Upon entry of salt, made or imported, the officer shall give a warrant, impowering the removal of it, on paying or securing the duty in nine months; but any person, paying ready money, shall be allowed at the rate of 10 per cent. per annum. 5 W. cap. 7. 5 Anne, cap. 29. The duties on rock-salt shall be paid, or security given to pay, in twelve months, on pain of double value of the duties; or, if they are paid within two days after the charge is made, 10l. per cent. per annum shall be allowed. Officers may seize salt carried before entry without a permit, which, if not claimed within ten days, shall be forfeited and sold; but, if it be claimed without evidence of entry and warrant for removing it, it shall be forfeited: and every person, who shall carry it before entry and warrant, shall forfeit double the value, and 10s. a bushel. 5 W. cap. 7. 9 and 10 W. cap. 44. And by 5 Anne, cap. 21, the officer may seize and secure the offender. By 2 and 3 Anne, cap. 14, he that shall carry salt without a permit shall forfeit 20l. Permits shall be delivered gratis by the salt-officers. 7 and 8 W. cap. 31. And sight of these may be demanded. 5 Geo. III. cap. 43. The lord-mayor and aldermen in London, and the justices of the peace in the county, at their general sessions, may set and publish in writing the prices of salt, and alter the same as occasion requires; and persons refusing to sell at such price, or selling at a higher price, shall forfeit 5l. half to the king, and half to the informer. 7 and 8 W. cap. 31. No person, dealing in salt, shall sell it otherwise than by weight, after the rate of 56lb. to the bushel, on pain of 5l. to the informer. 9 and 10 W. cap. 6. Nor shall any person buy salt otherwise than by weight, on pain of 10s. a bushel. 1 Anne, stat. i. cap. 21. No salt shall be carried coastwise before the duty is paid or secured. 5 W. cap. 7. It shall be weighed when put on-board, and a permit given, on pain of forfeiture of 10s. a bushel. 10 and 11 W. cap. 22. And the cocquet, signed by the salt-office, shall express the quantity. 1 Anne, stat. i. cap. 11. Allowance shall be made for waste, at the rate of three bushels for forty of white salt, and one bushel and a half for forty of rock-salt. 5 Anne, cap. 29. 6 Anne, cap. 12. The officer at the unlading port may demand a sight of the

the permit, and weigh the ſalt upon unlading; and, if it weighs more than the permit expreſſes, the ſurpluſage ſhall be forfeited. There ſhall be a drawback of the duties on ſalt exported; beſides an allowance of four buſhels for forty of white ſalt, and two buſhels for forty of rock-ſalt, exported to Ireland, on account of the waſte of carriage: but, if any ſuch be relanded without entry and payment of duties, the offender ſhall forfeit double value and 10s. a buſhel, and the other penalties for foreign ſalt landed unentered. 5 W. cap. 7. 9 and 10 W. cap. 14. 10 and 11 W. cap. 22. 5 Anne, cap. 29. The curers of fiſh for exportation may import foreign ſalt, or take from the pit or work Britiſh ſalt, or rock-ſalt refined, without duty, except the cuſtoms on importation, entering the quantity, and an account of the ſame being kept by the officer. 5 Geo. cap. 18. For the various regulations relating to this buſineſs, we muſt refer alſo to 8 Geo. cap. 16. 11 Geo. cap. 30. 8 Geo. II. cap. 12. 19 Geo. III. cap. 52. By 5 Anne, cap. 29. there ſhall be allowed five ſhillings for every barrel of ſalted beef or pork exported for ſale; but, if ſuch beef or pork be relanded, it ſhall be forfeited, and 40s. a buſhel. By 1 Anne, ſtat. i. cap. 21. no perſon ſhall uſe any brine before it is boiled into ſalt, or any rock-ſalt before it is refined, for pickling or curing fleſh or fiſh, on pain of 40s. for every gallon of brine or pound of rock-ſalt. See Burn's Juſtice, art. Exciſe. There is a cuſtom-duty in the city of London, called granage, payable to the lord-mayor, &c. for ſalt brought to the port of London, being the twentieth part.

The annual amount of the duty on the ſalt made at Droitwich is from 150,000 to 200,000l. which duty is paid regularly every Wedneſday into the collector's hands by the different proprietors of the ſalt-works. Here are a number of officers appointed by the commiſſioners of the ſalt-duties, viz. a collector, a ſupervisor, and a clerk for their uſe; about twenty officers, at a ſalary of 40l. per annum each, whoſe buſineſs is to take an account of the weight of the ſalt weighed at the different ſalt-works; a number of ſupernumeraries and watchmen to attend veſſels whilſt they are loading ſalt, and to keep watch over the ſalt-works at night, to prevent the people from carrying on the practice of running ſalt; their ſalaries are from 20 to 25l. a-year. The hours for the officers to attend weighing ſalt is from ſun-riſe to ſun-ſet. The quantity of ſalt made here in 1772 amounted to 604,579 buſhels, at the rate of 3s. 6d. a buſhel; and in 1773 to 721,694 buſhels, at 2s. 11d.

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.

OF INGREDIENTS AND COMPOSITIONS.

SALTPETRE being the principal ingredient in fire-works, and a volatile body, by reaſon of its aqueous and aerial parts, is eaſily rarefied by fire; but not ſo ſoon when foul and groſs as when purified from its crude and earthy parts, which greatly retard its velocity: therefore, when any quantity of fire-works are to be made, it ſhould be examined; for if it is not well cleanſed, and of a good ſort, your works will not have their proper effect; neither will it agree with the ſtanding proportions of compoſitions. Therefore,

To refine it, put into a copper, or any other veſſel, 100lb. of rough nitre with 14 gallons of clean water; let it boil gently half an hour, and

and as it boils take off the ſcum: then ſtir it, and before it ſettles put it into your filtering bags, which muſt be hung on a rack, with glazed earthen pans under them, in which muſt be ſticks laid acroſs for the cryſtals to adhere to: it muſt ſtand in the pans two or three days to ſhoot; then take out the cryſtals, and let them dry. The water that remains in the pans boil again an hour, and ſtrain it into the pans as before, and the ſaltpetre will be quite clear and tranſparent; if not, it wants more refining; to do which proceed as uſual, till it is well cleanſed of all its earthy parts. Thoſe who do not chooſe to procure their ſaltpetre by the above method, may buy it ready made.

To pulveriſe Saltpetre. Take a copper kettle, whoſe bottom muſt be ſpherical, and put into it 14lb. of refined ſaltpetre, with two quarts or five pints of clean water: then put the kettle on a ſlow fire; and when the ſaltpetre is diſſolved, if any impurities ariſe, ſkim them off, and keep conſtantly ſtirring with two large ſpatulas, till all the water exhales; and, when done enough, it will appear like white ſand, and as fine as flour; but, if it ſhould boil too faſt, take the kettle off the fire, and ſet it on ſome wet ſand, which will prevent the nitre from ſticking to the kettle. When you have pulveriſed a quantity of ſaltpetre, be careful to keep it in a dry place.

To extract Saltpetre from damaged Gunpowder.—Have ſome filtering bags, hung on a rack, with glazed earthen pans under them, in the ſame manner as thoſe for refining ſaltpetre; then take any quantity of damaged powder, and put it into a copper, with as much clean water as will cover it: when it begins to boil, take off the ſcum; and, after it has boiled a few minutes, ſtir it up: then take it out of the copper with a ſmall hand-kettle for that purpoſe, and put ſome into each bag, beginning at one end of the rack, ſo that by the time you have got to the laſt bag, the firſt will be ready for more. Continue thus till all the bags are full: then take the liquor out of the pans; which boil and filter, as before, two or three times, till the water run quite clear, which you muſt let ſtand in the pan ſome time, and the ſaltpetre will appear at top. To get the ſaltpetre entirely out of the powder, take the water from that already extracted, to which add ſome freſh, and the dregs of the powder that remain in the bags, and put them in a veſſel, to ſtand as long as you pleaſe: and, when you want to extract the nitre, you muſt proceed with this mixture as with the powder at firſt, by which means you will draw out all the ſaltpetre; but this proceſs muſt be boiled longer than the firſt.

SULPHUR, OR BRIMSTONE.—Sulphur is one of the principal ingredients in gunpowder, and almoſt in all compoſitions of fire-works; and therefore great care muſt be taken of its being good, and brought to the higheſt perfection. To know when ſulphur is good, you are to obſerve that it is of a high yellow; and if, when held in one's hand, it crackles and bounces, it is a ſign that it is freſh and good: but, as the method of reducing brimſtone to a powder is very troubleſome, it is better to buy the flour ready made, which is done in large quantities, and in great perfection; though when a grand collection of fire-works is to be made, the ſtrongeſt and beſt ſulphur is the lump brimſtone ground in the manner directed farther on.

CHARCOAL.—Charcoal is a preſervative by which the ſaltpetre and brimſtone are made into gunpowder, by preventing the ſulphur

from suffocating the strong and windy exhalation of the nitre. Charcoal for fire-works must always be soft and well burnt, which may be bought ready done.

GUNPOWDER.—Take four ounces of refined saltpetre, an ounce of brimstone, and six drams of small-coal; reduce these to a fine powder, and continue beating them for some time in a stone mortar with a wooden pestle, wetting the mixture between whiles with water, so as to form the whole into an uniform paste, which is reduced to grains by passing it through a wire sieve fit for the purpose; and in this form being carefully dried, it becomes the common gunpowder. For making great quantities mills are built, by means of which more work may be done in one day than a man can do in a hundred.

CAMPHOR.—This may be had in the shops; and is of two kinds, differing in regard to the degree of their purity, and distinguished by the name of *rough* and *refined*. Refined camphor must be chosen of a perfectly clean white colour, very bright and pellucid, of the same smell and taste with the rough, but more acrid and pungent. It is so volatile, that merchants usually inclose it in lintseed, that the viscosity of that grain may keep its particles together.

BENJAMIN.—This is a resin found of different sorts; and distinguished by their colours, viz. yellow, grey, and brown; but the best is that which is easy to break, and full of white spots. It is one of the ingredients in odoriferous fire-works, when reduced to a fine flour; which may be done by putting into a deep and narrow earthen pot 3 or 4 oz. of benjamin grossly pounded; cover the pot with paper, which tie very close round the edge; then set the pot on a slow fire, and once in an hour take off the paper, and you will find some flour sticking to it, which return again into the pot; this you must continue till the flour appears white and fine. There is also an oil of benjamin, which is sometimes drawn from the dregs of the flour; it affords a very good scent, and may be used in wet compositions.

SPUR-FIRE.—This fire is the most beautiful and curious of any yet known; and was invented by the Chinese, but now is in greater perfection in England than in China. As it requires great trouble to make it to perfection, it will be necessary that beginners should have full instructions; therefore care should be taken that all the ingredients are of the best, that the lamp-black is not damp and clodded, that the saltpetre and brimstone are thoroughly refined. This composition is generally rammed in 1 or 2 oz. cases about 5 or 6 inches long, but not driven very hard; and the cases must have their concave stroke struck very smooth, and the choak or vent not quite so large as the usual proportion: this charge, when driven and kept a few months, will be much better than when rammed; and will not spoil, if kept dry, in many years.

As the beauty of this composition cannot be seen at so great a distance as brilliant fire, it has a better effect in a room than in the open air, and may be fired in a chamber without any danger: it is of so innocent a nature, that, though with an improper phrase, it may be called a *cold fire*; and so extraordinary is the fire produced from this composition, that, if well made, the sparks will not burn a handkerchief when held in the midst of them; you may hold them in your hand while burning, with as much safety as a candle; and, if you put your hand within a foot of the mouth of the case, you will

will feel the sparks like drops of rain.—When any of these spur-fires are fired singly, they are called *artificial flower-pots*; but some of them placed round a transparent pyramid of paper, and fired in a large room, make a very pretty appearance.

The composition consists of saltpetre 4lb. 8 oz. sulphur 2lb. and lamp-black 1lb. 8 oz. or; saltpetre 1lb. sulphur ½lb. and lamp-black 4 quarts.—This composition is very difficult to mix. The saltpetre and brimstone must be first sifted together, and then put into a marble mortar, and the lamp-black with them, which you work down by degrees with a wooden pestle, till all the ingredients appear of one colour, which will be something greyish, but very near black: then drive a little into a case for trial, and fire it in a dark place; and if the sparks, which are called *stars*, or *pinks*, come out in clusters, and afterwards spread well without any other sparks, it is a sign of its being good, otherwise not; for if any drossy sparks appear, and the stars not full, it is then not mixed enough; but if the pinks are very small, and soon break, it is a sign that you have rubbed it too much.

This mixture, when rubbed too much, will be too fierce, and hardly shew any stars; and, on the contrary, when not mixed enough, will be too weak, and throw out an obscure smoke, and lumps of dross, without any stars. The reason of this charge being called the spur-fire, is because the sparks it yields have a great resemblance to the rowel of a spur, from whence it takes its name.

To meal Gunpowder, Brimstone, and Charcoal.

There have been many methods used to grind these ingredients to a powder for fire-works, such as large mortars and pestles made of ebony and other hard wood, and horizontal mills with brass barrels: but none have proved so effectual and speedy as the last invention, that of the mealing-table, made of elm, with a rim round its edge four or five inches high; and at the narrow end is a slider that runs in a groove, and forms part of the rim: so that, when you have taken out of the table as much powder as you can with the copper shovel, sweep all clean out at the slider. When you are going to meal a quantity of powder, observe not to put too much in the table at once; but, when you have put in a good proportion, take the muller and rub it till all the grains are broke: then searce it in a lawn sieve that has a receiver and top to it; and that which does not pass through the sieve, return again to the table, and grind it till you have brought it all fine enough to go through the sieve. Brimstone and charcoal are ground in the same manner, only the muller must be made of ebony; for these ingredients, being harder than powder, would stick in the grain of elm, and be difficult to grind. As brimstone is apt to stick and clod to the table, it will be best to keep one for that purpose, by which means you will always have your brimstone clean and well ground. These may be purchased at any of the turners shops in London.

To make Wheels and other Works incombustible.

It being necessary, when your works are new, to paint them of some dark colour; therefore, if, instead of paint, you make use of the following composition, it will give them a good colour, and in a great measure prevent their taking fire so soon as if painted. Take

brick-duſt, coal-aſhes, and iron-filings, of each an equal quantity, and mix them with a double ſize, made hot. With this waſh over your works, and when dry waſh them over again; this will preſerve the wood greatly againſt fire. Let the brick-duſt and aſhes be beat to a fine powder.

To prepare Caſt-iron for Gerbes, white Fountains, and Chineſe Fire.

Caſt-iron being of ſo hard a nature as not to be cut by a file, we are obliged to reduce it into grains, though ſomewhat difficult to perform; but, if we conſider what beautiful ſparks this ſort of iron yields, no pains ſhould be ſpared to granulate ſuch an eſſential material: to do which, get at an iron-foundery ſome thin pieces of iron, ſuch as generally run over the mould at the time of caſting: then have a ſquare block made of caſt-iron, and an iron ſquare hammer about four pounds weight; then, having covered the floor with cloth or ſomething to catch the beatings, lay the thin pieces of iron on the block, and beat them with the hammer till reduced into ſmall grains; which afterwards ſearce with a very fine ſieve, to ſeparate the fine duſt, which is ſometimes uſed in ſmall caſes of brilliant fire, inſtead of ſteel-duſt; and, when you have got out all the duſt, ſift what remains with a ſieve a little larger, and ſo on with ſieves of different ſizes, till the iron paſſes through about the bigneſs of ſmall bird-ſhot: your iron thus beat and ſifted, put each ſort into wooden boxes or oiled paper, to keep it from ruſting. When you uſe it, obſerve the difference of its ſize, in proportion to the caſes for which the charge is intended; for the coarſe ſort is only deſigned for very large gerbes of 6 or 8lb.

Charges for Sky-rockets, &c.

Rockets of four ounces.—Mealed powder 1lb. 4 oz. ſaltpetre 4 oz. and charcoal 2 oz.

Rockets of eight ounces.—Method I. Mealed powder 1lb. ſaltpetre 4 oz. brimſtone 3 oz. and charcoal 1½ oz. Method II. Meal-powder 1½lb. and charcoal 4½ oz.

Rockets of one pound.—Meal-powder 2lb. ſaltpetre 8 oz. brimſtone 4 oz. charcoal 2 oz. and ſteel-filings 1½ oz.

Sky-rockets in general.—Method I. Saltpetre 4lb. brimſtone 1lb. and charcoal 1½lb. II. Saltpetre 4lb. brimſtone 1½lb. charcoal 1lb. 12 oz. and meal-powder 2 oz.

Large Sky-rockets.—Saltpetre 4lb. meal-powder 1lb. and brimſtone 1lb.

Rockets of a middling ſize.—Method I. Saltpetre 8lb. ſulphur 3lb. meal-powder 3lb. II. Saltpetre 3lb. ſulphur 2lb. meal-powder 1lb. charcoal 1lb.

For Rocket Stars.

White Stars.—Meal-powder 4 oz. ſaltpetre 12 oz. ſulphur vivum 6 oz. oil of ſpike 2 oz. and camphor 5 oz.

Blue ſtars.—Meal-powder 8 oz. ſaltpetre 4; ſulphur 2, ſpirit of wine 2, and oil of ſpike 2.

Coloured or variegated ſtars.—Meal-powder 8 drams, rochpetre 4 oz. ſulphum vivum 2, and camphor 2.

Brilliant ſtars.—Saltpetre 3½ oz. ſulphur 1½, and meal-powder ¾, worked up with ſpirits of wine only.

Common ſtars.—Saltpetre 1lb. brimſtone 4 oz. antimony 4¾, iſinglaſs ½, camphor ½, and ſpirit of wine ¾.

Tailed stars or snakes.—Meal-powder 3 oz. brimstone 2, saltpetre 1, and charcoal (coarsely ground) $\frac{3}{4}$.

Drove stars.—Method I. Saltpetre 3lb. sulphur 1lb. brass dust 12 oz. antimony 3. II. Saltpetre 1lb. antimony 4 oz. and sulphur 8.

Fixed pointed stars.—Saltpetre $8\frac{1}{2}$oz. sulphur 2, antimony 10z. 10 dr.

Stars of a fine colour.—Sulphur 1 oz. meal-powder 1, saltpetre 1, camphor 4 dr. oil of turpentine 4 dr.

Rains.

Gold rain for sky-rockets.—Method I. Saltpetre 1lb. meal-powder 4 oz. sulphur 4, brass-dust 1, saw-dust $2\frac{1}{2}$, and glass-dust 6 dr. II. Meal-powder 12 oz. saltpetre 2, charcoal 4. III. Saltpetre 8 oz. brimstone 2, glass-dust 1, antimony $\frac{3}{4}$, brass-dust $\frac{1}{4}$, and saw-dust 12 dr.

Silver rain.—Method I. Saltpetre 4 oz. sulphur, meal-powder, and antimony, of each 2 oz. sal prunella $\frac{1}{2}$ oz. II. Saltpetre $\frac{1}{2}$lb. brimstone 2 oz. and charcoal 4. III. Saltpetre 1lb. brimstone $\frac{1}{4}$lb. antimony 6 oz. IV. Saltpetre 4 oz. brimstone 1, powder 2, and steel-dust $\frac{3}{4}$ oz.

Water Rockets.

Method I. Meal-powder 6lb. saltpetre 4, brimstone 3, charcoal 5. II. Saltpetre 1lb. brimstone $4\frac{1}{2}$ oz. charcoal 6. III. Saltpetre 1lb. brimstone 4 oz. charcoal 12. IV. Saltpetre 4lb. brimstone $1\frac{1}{2}$lb. charcoal 1lb. 12 oz. V. Brimstone 2lb. saltpetre 4lb. and meal-powder 4. VI. Saltpetre 1lb. meal-powder 4 oz. brimstone $8\frac{1}{2}$, charcoal 2. VII. Meal-powder 1lb. saltpetre 3, brimstone 1; sea-coal 1 oz. charcoal $8\frac{1}{2}$, saw-dust $\frac{3}{4}$, steel-dust $\frac{1}{2}$, and coarse charcoal $\frac{1}{4}$ oz. VIII. Meal-powder $1\frac{3}{4}$lb. saltpetre 3, sulphur $1\frac{1}{2}$, charcoal 12 oz. saw-dust 2.

Sinking charges for water-rockets.—Meal-powder 8 oz. charcoal $\frac{3}{4}$ oz.

Of Wheels.

Wheel-cases from two ounces to four pounds.—Method I. Meal-powder 2lb. saltpetre 4 oz. iron-filings 7. II. Meal-powder 2lb. saltpetre 12 oz. sulphur 4, steel-dust 3. III. Meal-powder 4lb. saltpetre 1lb. brimstone 8 oz. charcoal $4\frac{1}{2}$. IV. Meal-powder 8 oz. saltpetre 4, saw-dust $1\frac{1}{4}$, sea-coal $\frac{1}{4}$. V. Meal-powder 1lb. 4 oz. brimstone 4 oz. 10 dr. saltpetre 8 oz. glass-dust $2\frac{1}{2}$. VI. Meal-powder 12 oz. charcoal 1, saw-dust $\frac{1}{2}$. VII. Saltpetre 1lb. 9 oz. brimstone 4 oz. charcoal $4\frac{1}{2}$. VIII. Meal-powder 2lb. saltpetre 1, brimstone $\frac{1}{2}$, and sea-coal 2 oz. IX. Saltpetre 2lb. brimstone 1, meal-powder 4, and glass-dust 4 oz. X. Meal-powder 1lb. saltpetre 2 oz. and steel-dust $3\frac{1}{2}$. XI. Meal-powder 2lb. and steel-dust $2\frac{1}{2}$ oz. with $2\frac{1}{2}$ of the fine dust of beat iron. XII. Saltpetre 2lb. 13 oz. brimstone 8 oz. and charcoal.

Slow fire of wheels.—Method I. Saltpetre 4 oz. brimstone 2, and meal-powder $1\frac{1}{2}$. II. Saltpetre 4 oz. brimstone 1, and antimony 1 oz. 6 dr. III. Saltpetre $4\frac{1}{4}$ oz. brimstone 1 oz. and mealed powder $1\frac{1}{4}$.

Dead fire for wheels.—Method I. Saltpetre $1\frac{1}{4}$ oz. brimstone $\frac{1}{2}$, lapis-calaminaris $\frac{1}{4}$, and antimony 2 dr.

Standing on fixed Cases.

Method I. Meal-powder 4lb. saltpetre 2, brimstone and charcoal 1. II. Meal-powder 2lb. saltpetre 1, and steel-dust 8 oz. III. Meal-powder 1lb. 4 oz. and charcoal 4 oz. IV. Meal-powder 1lb. and

steel-dust 4 oz. V. Meal-powder 2½lb. brimstone 4 oz. and sea-coal 6. VI. Meal-powder 3lb. charcoal 5 oz. and saw-dust 1½.

Sun Cases.

Method I. Meal-powder 8½lb. saltpetre 1lb. 2 oz. steel-dust 2lb. 10 oz. brimstone 4. II. Meal-powder 3lb. saltpetre 6 oz. and steel-dust 7½.

A brilliant Fire.

Meal-powder 11lb. saltpetre 1, brimstone 4 oz. steel-dust 1½lb.

Gerbes.

Meal-powder 6lb. and beat-iron 2lb. 1½ oz.

Chinese Fire.

Saltpetre 12 oz. meal-powder 2lb. brimstone 1lb. 2 oz. and beat iron 12 oz.

Tourbillons.

Charge for four-ounce Tourbillons.—Meal-powder 2lb. 4 oz. and charcoal 4½ oz.

Eight-ounce Tourbillons.—Meal-powder 2lb. and charcoal 4¾ oz.

Large Tourbillons.—Meal-powder 2lb. saltpetre 1, brimstone 8 oz. and beat iron 8. Tourbillons may be made very large, and of different coloured fires; only you are to observe, that the larger they are, the weaker must be the charge; and, on the contrary, the smaller, the stronger their charge.

Water Balloons.

Method I. Saltpetre 4lb. brimstone 2, meal-powder 2, antimony 4 oz. saw-dust 4, and glass-dust 1¼. II. Saltpetre 9lb. brimstone 3lb. meal-powder 6lb. rosin 12 oz. and antimony 8 oz.

Water Squibs.

Method I. Meal-powder 1lb. and charcoal 1lb. II. Meal-powder 1lb. and charcoal 9 oz.

Mine Ports or Serpents.

Method I. Meal-power 1lb. and charcoal 1lb. II. Meal-powder 1lb. charcoal 9 oz.

Port-fires.

For firing rockets, &c.—Method I. Saltpetre 12 oz. brimstone 4 oz. and meal-powder 2 oz. II. Saltpetre 8 oz. brimstone 4 oz. and meal-powder 2 oz. III. Saltpetre 1lb. 2 oz. meal-powder 1½lb. and brimstone 10 oz. This composition must be moistened with one gill of linseed-oil. IV. Meal-powder 6 oz. saltpetre 2lb. 2 oz. and brimstone 10 oz. V. Saltpetre 1lb. 4 oz. meal-powder 4 oz. brimstone 5 oz. saw-dust 8 oz. VI. Saltpetre 8 oz. brimstone 2 oz. and meal-powder 2 oz.

For illuminations.—Saltpetre 1lb. brimstone 8 oz. and meal-powder 6 oz.

Cones or spiral Wheels.

Saltpetre 1½lb. brimstone 6 oz. meal-powder 14 oz. and glass-dust 14 oz.

Crowns or Globes.

Saltpetre 6 oz. brimstone 2lb. antimony 4 oz. and camphor 2 oz.

Air

Air Balloon Fuzes.

Method I. Saltpetre 1lb. 10 oz. brimstone 8 oz. and meal-powder 1lb. 6 oz. II. Saltpetre 1½lb. brimstone 8 oz. and meal-powder 1lb. 8 oz.

Serpents for Pots de Brins.

Meal-powder 1lb. 8 oz. saltpetre 12 oz. and charcoal 2 oz.

Fire-pumps.

Method I. Saltpetre 5 lb. brimstone 1lb. meal-powder 1½ lb. and glass-dust 1lb. II. Saltpetre 5 lb. 8 oz. brimstone 2 lb. meal-powder 1lb. 8 oz. and glass-dust 1lb. 8 oz.

A Slow White Flame.

Method I. Saltpetre 2 lb. brimstone 3 lb. antimony 1lb. II. Saltpetre 3½ lb. sulphur 2½ lb. meal-powder 1 lb. antimony ½ lb. glass-dust 4 oz. brass-dust 1 oz. These compositions, driven 1½ inch in a 1 oz. case, will burn one minute, which is a much longer time than an equal quantity of any composition yet known will last.

Amber Lights.

Meal-powder 9 oz. amber 3 oz. This charge may be driven in small cases, for illuminations.

Lights of another Kind.

Saltpetre 3 lb. brimstone 1 lb. meal-powder 1 lb. antimony 10½ oz. All these must be mixed with the oil of spike.

A Red Fire.

Meal-powder 3 lb. charcoal 12 oz. and saw-dust 8 oz.

A common Fire.

Saltpetre 3 lb. charcoal 10 oz. and brimstone 2 oz.

To make an artificial Earthquake.

Mix the following ingredients to a paste with water, and then bury it in the ground, and in a few hours the earth will break and open in several places. The composition: sulphur 4 lb. and steel-dust 4 lb.

Compositions for Stars of different Colours.

Method I. Meal-powder 4 oz. saltpetre 2 oz. brimstone 2 oz. steel-dust 1½ oz. and camphor, white amber, antimony, and mercury-sublimate, of each ½ oz. II. Rochpetre 10 oz. brimstone, charcoal, antimony, meal-powder, and camphor, each ¾ oz. moistened with oil of turpentine. These compositions are made into stars, by being worked to a paste with aqua vitæ, in which has been dissolved some gum-tragacanth; and, after you have rolled them in powder, make a hole through the middle of each, and string them on quick-match, leaving about two inches between each. III. Saltpetre 8 oz. brimstone 2 oz. yellow amber 1 oz. antimony 1 oz. and powder 3 oz. IV. Brimstone 2½ oz. saltpetre 6 oz. olibanum or frankincense in drops 4 oz. mastic, and mercury-sublimate, of each 4 oz. meal-powder 5 oz. white amber, yellow amber, and camphor, of each 1 oz. antimony and orpiment ½ oz. each. V. Saltpetre 1lb. brimstone ½ lb. and

and meal-powder 8 oz. moistened with petrolio-oil. VI. Powder ½ lb. brimstone and saltpetre of each 4 oz. VII. Saltpetre 4 oz. brimstone 2 oz. and meal-powder 1 oz.

Stars that carry Tails of Sparks.—Method I. Brimstone 6 oz. antimony crude 2 oz. saltpetre 4 oz. and rosin 4 oz. II. Saltpetre, rosin, and charcoal, of each 2 oz. brimstone 1 oz. and pitch 1 oz. These compositions are sometimes melted in an earthen pan, and mixed with chopped cotton-match, before they are rolled into stars; but will do as well if wetted, and worked up in the usual manner.

Stars that yield some Sparks.—Method I. Camphor 2 oz. saltpetre 1 oz. meal-powder 1 oz. II. Saltpetre 1 oz. ditto melted ½ oz. and camphor 2 oz. When you would make stars of either of these compositions, you must wet them with gum-water, or spirit of wine, in which has been dissolved some gum-arabic, or gum-tragacanth, that the whole may have the consistence of a pretty thick liquid; having thus done, take 1 oz. of lint, and stir it about in the composition till it becomes dry enough to roll into stars.

Stars of a Yellowish Colour.—Take 4 oz. of gum-tragacanth or gum-arabic, pounded and sifted through a sieve, camphor dissolved in brandy 2 oz. salt-petre 1 lb. sulphur ½ lb. coarse powder of glass 4 oz. white amber 1½ oz. orpiment 2 oz. Being well incorporated, make them into stars after the common method.

Stars of another kind.—Take 1 lb. of camphor, and melt it in a pint of spirit of wine over a slow fire; then add to it 1 lb. of gum-arabic that has been dissolved; with this liquor mix 1 lb. of saltpetre, 6 oz. of sulphur, and 5 oz. of meal-powder; and, after you have stirred them well together, roll them into stars proportionable to the rockets for which you intend them.

Colours produced by the different Compositions.

As variety of fires adds greatly to a collection of works, it is necessary that every artist should know the different effect of each ingredient. For which reason, we shall here explain the colours they produce of themselves; and likewise how to make them retain the same when mixed with other bodies: as for example, sulphur gives a blue, camphor a white or pale colour, saltpetre a clear white yellow, amber a colour inclining to yellow, sal-ammoniac a green, antimony a reddish, rosin a copper, colour, and Greek pitch a kind of bronze, or between red and yellow. All these ingredients are such as shew themselves in a flame, viz.

White Flame.—Saltpetre, sulphur, meal-powder, and camphor; the saltpetre must be the chief part.

Blue Flame.—Meal-powder, saltpetre, and sulphur vivum; sulphur must be the chief: or, meal-powder, saltpetre, brimstone, spirit of wine, and oil of spike; but let the powder be the principal part.

Flame inclining to Red.—Saltpetre, sulphur, antimony, and Greek-pitch; saltpetre the chief. By the above method may be made various colours of fire, as the practitioner pleases; for, by making a few trials, he may cause any ingredient to be predominant in colour.

Ingredients that shew in Sparks when rammed in choaked Cases.

The set colours of fire produced by sparks are divided into four sorts, viz. the black, white, grey, and red. The black charges are composed of two ingredients, which are meal-powder and charcoal; the

the white of three, viz. saltpetre, sulphur, and charcoal; the grey of four, viz. meal-powder, salt-petre, brimstone, and charcoal; and the rest of three, viz. meal-powder, charcoal, and saw-dust. There are, besides these four regular or set charges, two others, which are distinguished by the names of *compound* and *brilliant charges*; the compound being made of many ingredients, such as meal-powder, saltpetre, brimstone, charcoal, saw-dust, sea-coal, antimony, glass-dust, brass-dust, steel filings, cast iron, tanner's dust, &c. or any thing that will yield sparks; all which must be managed with discretion. The brilliant fires are composed of meal-powder, saltpetre, brimstone, and steel-dust; or with meal-powder and steel filings only.

Cotton Quick-match

Is generally made of such cotton as is put in candles, of several sizes, from one to six threads thick, according to the pipe it is designed for; which pipe must be large enough for the match, when made, to be pushed in easily without breaking it. Having doubled the cotton into as many threads as you think proper, coil it very lightly into a flat-bottomed copper or earthen pan; then put in the saltpetre and the liquor, and boil them about twenty minutes; after which coil it again into another pan, and pour on it what liquor remains; then put in some meal-powder, and press it down with your hands till it is quite wet; afterwards place the pan before a wooden frame, which must be suspended by a point in the centre of each end; and place yourself before the pan, tying the upper end of the cotton to the end of one of the sides of the frame. When every thing is ready, you must have one to turn the frame round, while you let the cotton pass through your hands, holding it very lightly, and at the same time keeping your hands full of the wet powder; but, if the powder should be too wet to stick to the cotton, put more in the pan, so as to keep a continual supply till the match is all wound up; you may wind it as close on the frame as you please, so that it do not stick together; when the frame is full, take it off the points, and sift dry meal-powder on both sides the match, till it appear quite dry: in winter the match will be a fortnight before it is fit for use; when it is thoroughly dry, cut it along the outside of one of the sides of the frame, and tie it up in skins for use. The match must be wound tight on the frames. *The ingredients for the match*, are, cotton 1 lb. 12 oz. saltpetre 1 lb. spirit of wine 2 quarts, water 3 quarts, isinglass 3 gills, and meal-powder 1 lb. To dissolve 4 oz. of isinglass, take 3 pints of water.

Touch-paper for capping of Serpents, Crackers, &c.

Dissolve, in spirits of wine or vinegar, a little saltpetre; then take some purple or blue paper, and wet it with this liquor, and when dry it will be fit for use; when you paste this paper on any of your works, take care that the paste does not touch that part which is to burn. The method of using this paper is by cutting it into slips, long enough to go once round the mouth of a serpent, cracker, &c. When you paste on these slips, leave a little above the mouth of the case not pasted; then prime the case with meal-powder, and twist the paper to a point.

(To be continued.)

ON THE EFFECTS OF OPIUM.

OPIUM is the juice of the papaver album, or white poppy, with which the fields of Asia Minor are in many places sown, as ours are with corn. When the heads are near ripening, they wound them with an instrument that has five edges, which on being stuck into the head makes at once five long cuts in it: and from these wounds the opium flows, and is next day taken off by a person who goes round the field, and put up in a vessel which he carries fastened to his girdle; at the same time that this opium is collected, the opposite side of the poppy-head is wounded, and the opium collected from it the next day. They distinguish, however, the produce of the first wounds from that of the succeeding ones; for the first juice afforded by the plant is greatly superior to what is obtained afterwards. After they have collected the opium, they moisten it with a small quantity of water or honey, and work it a long time upon a flat, hard, and smooth, board, with a thick and strong instrument of the same wood, till it becomes of the consistence of pitch; and then work it up with their hands, and form it into cakes or rolls for sale.

Opium at present is in great esteem, and is one of the most valuable of all the simple medicines. In its effects on the animal system, it is the most extraordinary substance in nature. It touches the nerves as it were by magic and irresistible power, and steeps the senses in forgetfulness; even in opposition to the determined will of the philosopher or physiologist, apprised of its narcotic effect. The modification of matter is infinite; and who shall truly say by what peculiar or specific configuration of its parts, opium, even in the quantity of a single grain, administered to the human body, shall assuage the most raging pain, and procure profound sleep? The action of matter upon matter, thus exemplified in the effect of opium on the animal system, is not less astonishing and incomprehensible, than that of spirit upon matter or the agency of mind on the motive powers of the body.

The first effects of opium are like those of a strong stimulating cordial, but are soon succeeded by universal languor or irresistible propensity to sleep, attended with dreams of the most rapturous and enthusiastic kind. After those contrary effects are over, which are generally terminated by a profuse sweat, the body becomes cold and torpid; the mind pensive and desponding; the head is affected with stupor, and the stomach with sickness and nausea. It is not in our power to reconcile that diversity of opinion which has lately prevailed concerning the manner in which opium produces its effects; or to determine whether it acts simply on the brain and nerves, or, according to the experiments of Fontana, on the mass of blood only.

Opium is the most sovereign remedy in the materia medica, for easing pain and procuring sleep, and also the most certain antispasmodic yet known; but, like other powerful medicines, becomes highly noxious to the human constitution, and even mortal, when improperly administered. Its liberal and long-continued use has been observed greatly to injure the brain and nerves, and to diminish their influence on the vital organs of the body. By its first effects, which are exhilarating, it excites a kind of temporary delirium, which dissipates and exhausts the spirits; and, by its subsequent narcotic power,

power, occasions confusion of ideas and loss of memory, attended with nausea, giddiness, head-ach, and constipation of the bowels; in a word, it seems to suspend or diminish all the natural secretions and excretions of the body, that of perspiration only excepted.

Those who take opium to excess become enervated and soon look old; when deprived of it, they are faint, and experience the languor and dejection common to such men as drink spirituous liquors in excess; to the bad effects of which it is similar, since, like those, they are not easily removed without a repetition of the dose. By the indiscriminate use of that preparation of opium called *Godfrey's cordial*, many children are yearly cut off; for it is frequently given dose after dose, without moderation, by ignorant women and mercenary nurses, to silence the cries of infants and lull them to sleep, by which they are at last rendered stupid, inactive, and rickety.

Opium is universally known to be used as a luxury in the east. Mr. Grose informs us that most of the hard-labouring people at Surat, and especially the porters, take great quantities of this drug, which, they pretend, enables them to work, and carry heavier burdens than they otherwise could do. Some of these, our author assures us, will take more than an ounce at a time without detriment. Many people in opulent circumstances follow the same custom, but with very different motives. Some use it merely for the sake of the pleasing delirium it occasions; others for venereal purposes, as by means they can lengthen the amorous congress to what length they please, though they thus are certain to bring on an absolute impotency and premature old age at last. For this purpose it is usually taken in milk; and, when they have a mind to check or put an end to its operation, they swallow a spoonful or two of lime-juice, or any other similar acid.

Besides these effects of opium, it is said by the Indians to have a very singular one in bringing on a seeming heaviness of the head and sleepiness of the eye, at the same time it really produces great watchfulness. It is also considered as a great inspirer of courage, or rather insensibility to danger; so that the commanders make no scruple of allowing large quantities of it to the soldiers when they are going to battle or engaged in any hazardous enterprize.

The best opium in the world is said to come from Patna on the river Ganges, where, at least, the greatest traffic of it is made, and from whence it is exported all over India; though in some parts, especially on the Malay coasts, it is prohibited under pain of death, on account of the madness, and murders consequent upon that madness, which are occasioned by it; notwithstanding which severe prohibition, however, it is plentifully smuggled into all these countries. —The soil about the Ganges is accounted best for producing the strongest kinds of opium; of which the following remarkable instance is related. "A nabob of these parts having invited an English factory to an entertainment, a young gentleman, a writer in the company's service, sauntering about the garden, plucked a poppy and sucked the head of it. In consequence of this he fell into a profound sleep; of which the nabob being apprised, and likewise informed of the particular bed out of which he had taken the flower, expressed his sorrow; acquainting his friends at the same time that the poison was too strong to admit of any remedy; which accordingly proved true, and the unfortunate gentleman never awaked."

Opium applied externally is emollient, relaxing, and discutient, and greatly promotes suppuration: if long kept upon the skin, it takes off the hair, and always occasions an itching in it; sometimes it exulcerates it, and raises little blisters if applied to a tender part. Sometimes on external application, it allays pain, and even occasions sleep: but it must by no means be applied to the head, especially to the sutures of the skull; for it has been known to have the most terrible effects in this application, and even to bring on death itself. It appears, too, from some curious experiments made by Dr. Leigh, to act as the most powerful of all styptics. "Having laid bare the crural artery of a rabbit (says the doctor), I divided it, when the blood instantly flew out with considerable velocity; some of a strong solution was then applied to the divided artery, the ends of which in a short space of time contracted, and the hæmorrhagy ceased. The same experiment was performed on the brachial artery with like success."

The effects of a strong solution of opium upon the heart, appears from the same experiments to be very extraordinary. "I opened the thorax of a rabbit (says the doctor), and by dissection placed the heart in full view; the aorta was then divided, and the animal bled till it expired. After the heart had remained motionless ten minutes, and every appearance of life had ceased for the same length of time, I poured on the heart a quantity of my strong solution; it was instantly thrown into motion, which continued two minutes: I then added more of the solution, and the action was again renewed. By thus repeating my applications, the motions of the heart were supported more than ten minutes. I afterwards opened the thorax of a rabbit, and, without doing any injury to the large blood-vessels, placed the heart in view. A quantity of my strong solution was then applied to it, which so accelerated the motions as to render it impossible to number them: by renewing the application, these were continued for some considerable time. The surface of the heart now appeared uncommonly red, and continued so some time." Opium contains gum, resin, essential oil, salt, and earthy matter; but its narcotic or somniferous power has been experimentally found to reside in its essential oil.

THE VISION OF OSREIDAN.

OSREIDAN of Damascus was a heretic of the sect of Kadir, who believe in the freedom of the human will, and that good works are essential to the attainment of future happiness. Venerable for age and integrity, he was drawing nigh unto death. By the slow, yet progressive and perceptible, decay of his vital powers, he felt his dissolution approaching. Affected, but not weakly affected, with the prospect of bidding adieu for ever to all earthly enjoyments, he retired into a lonely grove by the margin of the river Abana; and, considering himself as soon about to appear in the presence of Allah and his holy prophet, he pondered the past events of his life. Solemn silence prevailed; the stream flowed gently, and without any noise! the shade from surrounding poplars became so gloomy as to seem preternatural; veneration and awe seized the soul of Osreidan. 'Holy Allah!' he exclaimed, 'before whom I am soon to appear, let my departure be tranquil, and may thy favour receive me!'

A sudden

A ſudden light beamed around him. It flowed from the ſnow-white raiment and ſhining treſſes of a ſpirit, that in the form of a man addreſſed him. "Be of good cheer!" ſaid the gentle viſitant; "I am thy genius, the guardian of thy life, the witneſs, and as far as was given me, and as far as the freedom of thy will permitted, the director of all thine actions. I have heard thy ſincere effuſion; and am commiſſioned, in conſideration of thine integrity, of thy piety, and of thy mercy, to animate at thy parting hour, and inſtruct, thy devotion. Lift up thy ſoul to the Ruler and Creator of all things; and pour out the tribute of thankſgiving *for all that has ever befallen thee.*"

"Alas!" ſaid Oſreidan, "my heart recoils from that awful office. I have never hitherto, from ſervile fear, nor will I now, at the cloſe of life, diſguiſe the thoughts of my ſoul. I will not feign a gratitude I cannot feel; nor appear before my Judge and his holy prophet, with baſe proſtration, and the homage of lying lips. I will thank him for the good he has rendered me; for the cup of proſperity which I have held; for the robe of honour which I have worn; and theſe hoary locks of reverend old age: but I cannot thank him for evil."

The genius, with a ſmile of ſoftneſs, replied,—"No real evil has ever befallen thee."—"How!" anſwered Oſreidan, with ſurpriſe bordering on indignation; "when my ſon, my only child, the youthful and bold Albazan, whoſe ſtature was like mount Taurus; and whoſe fame ſaluted me, like the breath of Arabian odour; when Albazan periſhed, did I not feel as a father? and did I feel no pain?"—"Wouldſt thou not rather," ſaid the genius, "that thy ſon, unſeduced by corruption, and unaſſailed by diſgrace, ſhould have died in the morning of life extolled and lamented, than that he ſhould have ſuffered, in the noontide of his age, the infamy and the puniſhment due to enormous guilt?"—"Would Albazan," exclaimed the father; "would Albazan have ſtooped to guilt? His ſoul was pure as the empyreal ſky; and as the brilliant ſtars that diverſify its expanſe, were his numerous and ſplendid virtues."

"Tell me what thou beholdeſt," ſaid the friend of Oſreidan. He ſaw, in the ſpirit of viſion, a young man of prepoſſeſſing appearance. By the rapidity and intuition of the preternatural mood, he ſaw him aſcending the heights of Honour, diverſified as they ſeemed with groves, temples, triumphant arches, and obeliſks inſcribed with everlaſting characters.—He ſaw him aſſailed by a troop of Temptations. The phantoms were of various ſhapes, and their appearances ſhifting. They diſplayed to the ſprightly but devoted youth, cozened by magic ſpells, the pomp of illuſtrious attendance, the glare of the gorgeous banquent, the domes of the loſty palace, the ſeduction of ſmiling maids; they ſubdued and enſlaved him. For, deviating from his upward courſe, he followed his gay enticers, and deſcended imperceptibly into the mazes of Error. The winding path was bordered with ſhrubs and flowers; and was frequently darkened or overſhadowed with fragrant groves. Ever and anon he partook of the delicious fruit that from the neighbouring branches enticed him; but, inſtead of refreſhing, they made him weak, and brought on an unquenchable thirſt. He then drank of a meandering ſtream that crept gently by him; but the muddy ſtream of Corruption, inſtead of relieving, rendered him ſtill more languid. He looked up with

a figh to the mountain of Honour; but he had ſtrayed ſo far around, that in his languor he could not think of returning; and the ſide now expoſed to his view was a rugged and unſurmountable precipice.

Faint and hopeleſs, he retired for reſpite to an adjoining tent, garniſhed with flaunting banners, and glittering with the unreal appearance of gold and precious ſtones. He knew not, alas! the receſs and the retirement of Falſehood. Reclining on ſilken couches, the couches of Vain Enjoyment, he drew around him curtains embroidered with various colours, the curtains of Self-deceit; and was lulled to repoſe by the tinkling cymbal of Folly. Short were the ſlumbers of his witleſs reſt: he was waked by the croaking of Infamy, a large and preternatural raven, whoſe hoarſe noiſe ſhook the rocks and the groves; and was preſently after devoured by an enormous crocodile, that had watched him as he entered the maze, and had lurked by the noiſeleſs ſtream.

"Thou beholdeſt," continued the genius, "the lot of thy lamented ſon, had not the angel of death, by the ſhaft of ſudden and unexpected diſtemper, prevented his guilty ſhame. Stupified by Diſſipation, and enſnared by Falſehood, he would not have been rouſed from his vicious indulgence, but by the peal of Infamy, and the gripe of Deſtruction. Sorrow for his crimes and his ſufferings would have blaſted the ſtrength of his father's mind, and rendered him incapable of virtuous exertion. Be thankful for the death of thy ſon!"

The aged check of Ofreidan was bathed in a flood of tears. He wept bitterly; and for a ſpace, the anguiſh of his grief was ſilent. At length, in interrupted accents,—"Why did I ever exiſt? Or why was I hailed with the name of father? But the will of Allah be done! He, whoſe arm is almighty, and whoſe bleſſedneſs is unimpaired, can never injure, nor without a cauſe afflict, the leaſt of his creatures. The will of Allah be done!"

The countenance of the genius was for a moment bedimmed; and his viſage ſeemed indiſtinct. But his form remained; and in an inſtant recovered its brightneſs. His eye was rekindled with the pureſt intelligence; and the ſmile that played on his lip was of the kindeſt benignity. He had withdrawn from Ofreidan, and had left aſſumed appearance behind him. With a celerity tranſcending all human conception, he had ariſen to the ſapphire throne; and had preſented himſelf, for farther inſtruction, before the Ancient of Days. He had then returned; re-animated his human appearance; and, reſuming his ſpeech in tones of ſoft conſolation, "I am permitted," he ſaid, "as the recompence of thy humility, of thy juſt, rational, and meek, reſignation, to reveal a part, ſo far at leaſt as thou art able to underſtand, of an awful myſtery.—Thy ſon was called into exiſtence for the diſcharge of important functions; and to ſhare, in proceſs of time, and after various changes, the ſupremeſt happineſs that man can enjoy—the happineſs ariſing from his powers and virtues. Some part of his office he has already performed; for he has afforded exerciſe to thoſe virtues of thine, which, by having been proved, and by having received their proper exerciſe, ſhall, in the ſequel, exalt thy nature. Having done ſo, and not having ſufficient powers to oppoſe the perils that muſt as thy ſon have aſſailed him, he he has been called, in conſideration of the merit he had already acquired, and by the mercy of Heaven, to the trials of a new condition. He is expoſed again to temptation. But aided by thy coun-

cils,

cils, and by the habits of early life, though he is at present unconscious of the sources from which his assistance flows, he has power to oppose them. He will thus acquire still higher endowments; and be enabled to combat even fiercer temptations, fiercer and more seducing than those which the vision shadowed.—Renovation of life, the reinstated memory of past events, renewal and increase of affection, in ways too mysterious for human conception, shall, in another state, be the portion of both father and son. For, to intelligent beings, death is not the close, but the means of awful and important variety in their mode of existence."

"But," said Ofreidan, emboldened by the condescension of his celestial friend, "could not this have been accomplished without the the smallest intermixture of evil?"—"What proportion," answered the genius, "what proportion can you establish between an instant of time, and a million of ages?—What proportion can you establish between the smallest drop of dew that hangs on the point of the finest needle employed by the maidens of Cosimer in the needle-work of their queen, and the waters of the mighty deep? Far less the proportion of the present life to the duration of future existence. Thy sufferings will vanish from thy remembrance as the white vapour on the breast of the sky dispersed by the blazing sun. Consider too, that if the suffering thou accountest painful, transient as it must seem, shall become the means of securing, exalting, and improving, the relish of thy future enjoyments, as the spices of Java improve the feast of the caliph, what thou pronouncest suffering is no longer to be accounted evil."

The genius disappeared. All remembrance of the facts and sayings that occurred in his visitation was instantly effaced from the mind of Ofreidan. He seemed to have had a vision; but could not tell what it was.—Yet its parting gleam had been bright and delightful. He felt its benign effects; for the remaining days of his life were soothed with complacency, with good will to mankind, consolation, and peace.

The writing of the vision was afterward revealed to the hermit of Carmel, who was also a Kadarite; and by him set forth in a book for the consolation and hope of the faithful.

THE VENTRILOQUIST.

VENTRILOQUISM is an art by which certain persons can so modify their voice, as to make it appear to the audience to proceed from any distance, and in any direction. Some faint traces of this art are to be found in the writings of the ancients; and it is the opinion of M. de la Chapelle, who in the year 1772 published an ingenious work on the subject, that the responses of many of the oracles were delivered by persons thus qualified to serve the purposes of priest-craft and delusion. As the ancient ventriloquists, when exercising their art, seemed generally to speak from their own bellies, the name by which they were designed was abundantly significant: but it is with no great propriety that modern performers are called *ventriloquists*, and their art *ventriloquism*, since they appear more frequently to speak from the pockets of their neighbours, or from the roof or distant corners of the room, than from their own mouths or their own bellies.

From

From Brodeau, a learned critic of the 16th century, we have the following account of the feats of a capital ventriloquist and cheat, who was valet de chambre to Francis I. The fellow, whose name was Louis Brabant, had fallen desperately in love with a young, handsome, and rich, heiress; but was rejected by the parents as an unsuitable match for their daughter, on account of the lowness of his circumstances. The young lady's father dying, he made a visit to the widow, who was totally ignorant of his singular talent. Suddenly, on his first appearance, in open day, in her own house, and in the presence of several persons who were with her, she heard herself accosted, in a voice perfectly resembling that of her dead husband, and which seemed to proceed from above, exclaiming, "Give my daughter in marriage to Louis Brabant:—he is a man of great fortune, and of an excellent character. I now endure the inexpressible torments of purgatory, for having refused her to him. If you obey this admonition, I shall soon be delivered from this place of torment. You will at the same time provide a worthy husband for your daughter, and procure everlasting repose to the soul of your poor husband."

The widow could not for a moment resist this dread summons, which had not the most distant appearance of proceeding from Louis Brabant; whose countenance exhibited no visible change, and whose lips were close and motionless, during the delivery of it. Accordingly, she consented immediately to receive him for her son-in-law. Louis's finances, however, were in a very low situation; and the formalities attending the marriage contract rendered it necessary for him to exhibit some show of riches, and not to give the ghost the lie direct. He accordingly went to work upon a fresh subject, one Cornu, an old and rich banker at Lyons; who had accumulated immense wealth by usury and extortion, and was known to be haunted by remorse of conscience on account of the manner in which he had acquired it.

Having contracted an intimate acquaintance with this man, he, one day while they were sitting together in the usurer's little back parlour, artfully turned the conversation on religious subjects, on demons and spectres, the pains of purgatory, and the torments of hell. During an interval of silence between them, a voice was heard, which to the astonished banker seemed to be that of his deceased father, complaining, as in the former case, of his dreadful situation in purgatory, and calling upon him to deliver him instantly from thence, by putting into the hands of Louis Brabant, then with him, a large sum for the redemption of Christians then in slavery with the Turks; threatening him at the same time with eternal damnation if he did not take this method to expiate likewise his own sins. The reader will naturally suppose that Louis Brabant affected a due degree of astonishment on the occasion; and farther promoted the deception, by acknowledging his having devoted himself to the prosecution of the charitable design imputed to him by the ghost. An old usurer is naturally suspicious. Accordingly the wary banker made a second appointment with the ghost's delegate for the next day; and, to render any design of imposing upon him utterly abortive, took him into the open fields, where not a house, or a tree, or even a bush, or a pit, were in sight, capable of screening any supposed confederate. This extraordinary caution excited the ventriloquist to

exert all the powers of his art. Wherever the banker conducted him, at every ſtep his ears were ſaluted on all ſides with the complaints and groans not only of his father, but of all his deceaſed relations, imploring him for the love of God, and in the name of every ſaint in the kalendar, to have mercy on his own ſoul, and theirs, by effectually ſeconding with his purſe the intentions of his worthy companion. Cornu could no longer reſiſt the voice of heaven, and accordingly carried his gueſt home with him, and paid him down 10,000 crowns; with which the honeſt ventriloquiſt returned to Paris, and married his miſtreſs.—The cataſtrophe was fatal. The ſecret was afterwards blown, and reached the uſurer's ears, who was ſo much affected by the loſs of his money, and the mortifying railleries of his neighbours, that he took to his bed and died.

This trick of Louis Brabant is even exceeded by an innocent piece of waggery played off not forty years ago by another French ventriloquiſt on a whole community. We have the ſtory from M. de la Chapelle, who informs us, that M. St. Gill the ventriloquiſt and his intimate friend, returning home from a place whither his buſineſs had carried him, ſought for ſhelter from an approaching thunderſtorm in a neighbouring convent. Finding the whole community in mourning, he inquired the cauſe, and was told that one of their body had died lately, who was the ornament and delight of the whole ſociety. To paſs away the time, he walked into the church, attended by ſome of the religious, who ſhewed him the tomb of their deceaſed brother, and ſpoke feelingly of the ſcanty honours they had beſtowed on his memory. Suddenly a voice was heard, apparently proceeding from the roof of the choir, lamenting the ſituation of the defunct in purgatory, and reproaching the brotherhood with their lukewarmneſs and want of zeal on his account. The friars, as ſoon as their aſtoniſhment gave them power to ſpeak, conſulted together, and agreed to acquaint the reſt of the community with this ſingular event, ſo intereſting to the whole ſociety. M. St. Gill, who wiſhed to carry on the joke ſtill farther, diſſuaded them from taking this ſtep; telling them that they would be treated by their abſent brethren as a ſet of fools and viſionaries. He recommended to them, however, the immediately calling of the whole community into the church, where the ghoſt of their departed brother might probably reiterate his complaints. Accordingly all the friars, novices, lay-brothers, and even the domeſtics of the convent, were immediately ſummoned and collected together. In a ſhort time the voice from the roof renewed its lamentation and reproaches, and the whole convent fell on their faces, and vowed a ſolemn reparation. As a firſt ſtep, they chanted a *De profundis* in a full choir; during the intervals of which the ghoſt occaſionally expreſſed the comfort he received from their pious exerciſes and ejaculations on his behalf. When all was over, the prior entered into a ſerious converſation with M. St. Gill; and, on the ſtrength of what had juſt paſſed, ſagaciouſly inveighed againſt the abſurd incredulity of our modern ſceptics and pretended philoſophers on the article of ghoſts or apparitions. M. St. Gill thought it now high time to undeceive the good fathers. This purpoſe, however, he found it extremely difficult to effect, till he had prevailed upon them to return with him into the church, and

there be witnesses of the manner in which he had conducted this ludicrous deception.

A ventriloquist, who performed feats somewhat similar to these, lately made his appearance in many parts of England and Scotland. He imitated successfully the voice of a squeaking child, and made it appear to proceed from whatever place he chose; from the pockets of the company, from a wooden doll, with which he held many spirited conversations; from beneath a hat or a wine-glass, and out of any person's foot or hand. When the voice seemed to come from beneath a glass or hat, it was dull and on a low key, as sounds confined always are; and what evinced his dexterity was, that, when the glass was raised from the table during the time of his speaking, the words or syllables uttered afterwards were on a higher key, in consequence, one would have thought, of the air being re-admitted to the speaker. This part of the experiment failed, however, when the management of the glass was at a distance committed to any of the company; but, as the room was not well illuminated, we are inclined to attribute this failure to the ventriloquist's not being able to perceive at what precise instant of time the glass was removed from the table. The same artist imitated the tones of a scolding old woman, disturbed at unseasonable hours by a person demanding admission into her house; but this exhibition did not appear masterly. The tones of the old woman and the child were not accurately discriminated: the child was a young scold, and the scold spoke like an angry child. We have heard that the same practitioner astonished a number of persons in a fish-market, by making a fish appear to speak, and give the lie to its vender, who affirmed that it was fresh, and caught in the morning; and, whether this fact was really performed or not, we cannot doubt, from what we saw and heard him do, but that he was fully equal to its performance.

This ventriloquist was an illiterate man; and, though sufficiently communicative, could not make intelligible the manner in which he produced these acoustic deceptions. Yet the speculative principles on which it is founded must be obvious to every man who has studied the philosophy of the human mind, and has ever witnessed the feats of mimickry. It is certain that, previous to experience, we could not refer sound to any external cause; it does not therefore give immediate indication of the place or distance of the sonorous body; hence it is only by the association of place with sound that the latter becomes an indication of the former. This being admitted, nothing seems requisite to fit a man for becoming an expert ventriloquist but a delicate ear, flexibility of the organs of speech, and long practice of those rules which repeated trials would enable him to discover. A delicate ear perceives every difference which change of place produces in the same sound; and, if a person possessed of such an ear have sufficient command over his organs of speech, to produce by them a sound in all respects similar to another proceeding from any distant object, it is evident that to the audience the sound which he utters must appear to proceed from that object. If this be the true theory of ventriloquism, it does not seem to be possible for the most expert ventriloquist to speak in his usual tones of conversation, and at the same time make the voice appear to come from a distance; for these tones must be supposed familiar to his audience, and to be in their minds associated with the ideas of his figure, place, and distance.

tance. Hence the ventriloquist whom we saw appeared to speak from various places only in the tones of the squeaking child, while Louis Brabant and M. St. Gille, in their great feats, imitated the voices of ghosts, to which no man could be familiar, and where terror would greatly contribute to the deception. There can, however, be no doubt, but that if, by a peculiar modification of the organs of speech, a sound of any kind can be produced, which in faintness, tone, [illegible], and in short every other sensible quality, perfectly resembles a sound delivered from the roof of an opposite house; the ear will naturally, without examination, refer it to that situation and distance, the sound which the person hears being only a sign, which he has from his infancy been constantly accustomed, by experience, to associate with the idea of a person speaking from a house-top. It is evident too, that, when there is no particular ground of suspicion, any small disparity between the two sounds will not be perceptible. But if our theory be just, that experience or habit which misleads a person who has seldom heard the ventriloquist, and is a stranger to his powers, at length sets another person right who is acquainted with them, and has been a frequent witness of their effects. This was actually the case of M. de la Chapelle, with whom the illusion at length ceased, in consequence of repeated visits to M. St. Gille: so that while others, ignorant of his talent, and possessed only of their old or habitual experience with regard to articulate sounds, considered his voice as coming from the top of a tree, or from a deep cellar under ground; our author, well acquainted with the powers of the ventriloquist, and having acquired a new kind of experience, at once referred it directly to the mouth of the speaker.

REMARKS ON THE PECULIAR EXCELLENCIES IN HANDEL'S MUSIC.

HANDEL's music, particularly his oratorios, being still annually and occasionally performed in London and elsewhere, it may not be incurious to enquire from what causes this constant repetition arises, and why the works of this master have had a fate so very different from that of contemporary composers, the greatest part of which seems consigned to oblivion.

This inquiry will naturally lead to the speaking of general principles, so far as they are applicable to the present subject; to the state of instrumental and vocal music; and to a comparison between Handel and other composers of note which flourished at this period. Nothing more being intended than a few miscellaneous observations set down just as they occur, method will not be attempted, and of course must be excused.

As the compositions which are the subject of the following remarks were produced in England, and set to English words, the mention of foreign musicians, and their works, is excluded, as not appertaining to the subject, unless so connected with it as to render the mention indispensable.

Music, in its common application, is considered merely as an entertainment: when bad, it disgusts; when good, it creates sensations unknown from other sources; and, if it reach the sublime, our feel-

ings are more powerfully excited than from the utmost perfection that poetry alone, or painting, has yet attained.

With the latter, music cannot be connected: but when joined, or, as Milton phrases it, *wedded* with poetry, it reaches the highest pitch of excellence, and soars a height which, disjoined from its powerful ally, was impossible to be obtained.

Before Handel, we cannot recollect any instance of this perfection. Our best vocal music was in the church, and our best composers were Purcel, Wise, Weldon, and, a little later, Croft, whose merit, as far as it reached, will be ever felt and acknowledged.

Instrumental music was, perhaps, universally barbarous until the time of Corelli, whose compositions seemed to open a new world. Even in these our times, when instrumental music is so much improved, Corelli is still a favourite, and not only with old-fashioned people. The reason why he is so, would carry me too far from my subject. What Corelli did for bow-instruments, Handel did for the harpsichord. We acknowledge the improvements of our modern symphonists, but we still relish a concerto of Corelli, and no great performer on the harpsichord but sits down with pleasure to the *Suites des Pieces pour le Clavecin.*

The music for the stage was thoroughly wretched, and continued so until the little musical entertainments of Carey and the Beggar's Opera, which made their appearance long after the time of Handel's first residence in England. Such was the state of our music at the beginning of this century, and long after.

What are called Handel's Hautbois Concertos have so much subject, real air, and solid composition, that they always are heard with the greatest pleasure, and are undoubtedly the best things of their class. We believe they were the first attempt to unite wind-instruments with violins, which union was long reprobated in Italy.

The operas of Handel are confessedly superior to all preceding and contemporary ones. His oratorios, though called by a well-known name, may be justly esteemed original, both in design and execution. These last being the pieces which are so frequently performed, we shall, with the utmost impartiality, consider their merits and defects, and how far they deserve their continued approbation.

Any works of a fashionable composer, especially if exhibited by performers we are in the habit of applauding, will take a present hold on our attention, to the exclusion of works of superior merit not possessing the same advantages; but, when they have had their day, they set to rise no more. On the contrary, those compositions which depend on their own intrinsic merit may make their way slowly, or perhaps, by being cut off from a possibility of taking the first step, may never get forward at all; yet, if once they are presented to the public, and their effect felt and understood, they are always heard with new pleasure, and claim an equal immortality with poetry and painting. Let us consider what are the essentials of good music, and how far Handel's compositions possess them.

The first essential (and without which all others are of no consequence) is what in popular music is called tune; in more refined, is denominated air; and, in the superior class of composition, subject. Music, having this property alone, is entitled to a long existence, and possesses it. The next essential is harmony, the strongest ally by which air can be assisted, but which receives from air more consequence

quence than it communicates. To these must be added expression, giving a grace to the former; and facility, which has the effect of immediate emanation, and, as the term imports, seems to accomplish with ease what from its apparent difficulty should be rather sought for than found.

If words are to be connected with music, they ought like that to be light and airy for tune, passionate for air, and both passionate and sublime for subject; but in every case (except particular applications) must appeal to the heart. The accent and emphasis must be expressed, and whatever effect the reading of the words is to produce must be increased by the music.

There are but few examples of Handel's possessing tune in the popular sense. He seldom is without air in its most refined application, and most commonly has an exuberance of subject for greater purposes. His harmony is in general well-chosen and full; his expression sometimes faulty, but frequently just; and his facility great from so much practice, sinking now and then to carelessness.

In consequence of this general character, we find no songs of his in the style of Carey's tunes and the real English ballad. Most of his oratorio and opera songs have air in them, some very fine. His choruses are as yet unrivalled, and those form the broad base on which his fame is built. They possess subject and contrivance, frequently expression, and most commonly facility, altogether producing a superior effect to any other choruses yet known to the public. Their great number and variety shew his invention, that strong criterion of genius. It will be found to hold true as a general remark, that, where the words are most sublime, the composition has most subject and expression; and this ought to be considered by those who hold words of no consequence: if they have no other than exalting the fancy of the composer, (which effect they certainly produce,) we should, for the sake of music, independently considered, make choice of works of imagination.

Besides the advantages of superior genius and knowledge, Handel possessed another, without which his genius and knowledge might have remained for ever unknown. He had an opportunity of presenting his works to the public, performed by the best band of the times, and of repeating his pieces until they were understood, and their superior merit felt. By these means they were impressed upon the mind, and at last became so congenial to our feelings, as almost to exclude the possibility of other music being performed.

Handel's music, then, having the great essentials of genius, skill, and facility, and being at first performed often enough to have its intention comprehended, and its merit felt and acknowledged, it necessarily keeps possession of the public favour, and its annual performance is expected with pleasure, and always considered as an entertainment of a superior kind.

After this unequivocal praise, we may venture to point out what appear to be defects in this great musician. The first thing that an enlightened modern composer would notice, is an inattention to the *sort* of the different instruments, more particularly apparent in the parts for trumpets and other wind-instruments, which in general lie awkward and unkindly. At the time we acknowledge this, we should remark, that in those days such niceties did not exist, for they are some of the real improvements of modern music. Handel's con-

certoes and choruſſes, without the leaſt alteration of harmony or melody in the ſubject (as every real muſician well knows), might be improved in this point, and produce a very ſuperior and increaſed effect.

OF THE ORIGIN OF OMENS.

AN Omen ſignifies a ſign or indication of ſome future event, taken from the language of a perſon ſpeaking without any intent to prophecy. Hence Tully ſays, "Pythagorei non ſolum voces deorum obſervarunt, ſed etiam hominum, quæ vocent *omina*;" "the Pythagoreans attend to the diſcourſe not only of gods, but alſo of men, which they call *omens*." This ſort of omen was ſuppoſed to depend much upon the will of the perſon concerned in the event; whence the phraſes *accepit omen, arripuit omen*. Such were the original *omens*; but they were afterwards derived from *things* as well as from words. Thus Paterculus, ſpeaking of the head of Sulpicius on the roſtrum, ſays, it was *velut omen imminentis proſcriptionis*, "the omen of an impending proſcription." Suetonius ſays of Auguſtus, that he believed implicitly in certain omens; and that, *ſi mane ſibi calceus perperam, ac ſiniſter pro dextero induceretur, ut dirum*, "if his ſhoes were improperly put on in the morning, eſpecially if the left ſhoe was put upon his right foot, he held it for a bad omen." Omen was uſed in a ſtill larger ſenſe, to ſignify an *augury*; as in the following line of Tully: "Sic aquilæ clarum firmavit Jupiter *omen*;" "thus Jove confirmed the bright omen of the eagle." It was laſtly uſed, in the moſt generic ſenſe of all, for a portent or prodigy; as in the third book of the Æneid, where a myrtle torn up by Æneas dropped blood. Upon this appearance, ſays the hero,

> ——— Mihi frigidus horror
> Membra quatit, gelidusque coit formidine ſanguis.

And, the ſame thing being repeated upon his breaking a branch from another tree, he prayed to the gods to avert the *omen*:

> Multa movens animo Nymphas venerabar agreſtes,
> Gradivumque patrem, Geticis qui præſidet arvis,
> Rite ſecundarent viſus, *omen* que levarent.

Inſtead of tranſlating theſe ſhort quotations, we ſhall here give Dryden's verſion of the whole of this portentous adventure; as we are perſuaded that the mere Engliſh reader, who alone can wiſh for a tranſlation, will be glad to have the fulleſt account of the bleeding myrtle, together with its effects on the mind of the hero. It is as follows:

> Not far, a riſing hillock ſtood in view;
> Sharp myrtles on the ſides and corners grew.
> There, while I went to crop the ſylvan ſcenes,
> And ſhade our altar with their leafy greens,
> I pull'd a plant (with horror I relate
> A prodigy ſo ſtrange, and full of fate):
> The rooted fibres roſe; and from the wound
> Black bloody drops diſtill'd upon the ground.
> Mute and amaz'd, my hair with terror ſtood;
> Fear ſhrunk my ſinews, and congeal'd my blood.

Mann'd

Mann'd once again, another plant I try;
That other gush'd with the same sanguine dye.
Then, fearing guilt for some offence unknown,
With prayers and vows the Dryads I atone,
With all the sisters of the woods, and most
The god of arms, who rules the Thracian coast:
That they, or he, these omens would avert,
Release our fears, and better signs impart.

These portentous or supernatural omens were either external or internal. Of the former sort were those showers of blood so frequently occurring in the Roman history, which were much of the same nature with this adventure of Æneas, which he calls MONSTRA DEUM. Of the second sort were those sudden consternations, which, seizing upon men without any visible cause, were imputed to the agency of the god *Pan*, and hence called *panic fears*. But indeed there was hardly any thing, however trivial, from which the ancients did not draw omens. That it should have been thought a direful omen when any thing befel the temples, altars, or statues of the GODS, need excite no wonder; but that the meeting of a eunuch, a negro, a bitch with whelps, or a snake lying in the road, should have been looked upon as portending bad fortune, is a deplorable instance of human weakness, and of the pernicious influence of superstition on the mind.

It is more than probable that this practice of making ordinary events ominous of good or bad fortune took its rise in Egypt, the parent country of almost every superstition of paganism; but wherever it may have arisen, it spreads itself over the whole inhabited globe, and at this day prevails in a greater or less degree among the vulgar of all nations. In England, it is reckoned a good omen, or a sign of future happiness, if the sun shines on a couple coming out of the church after having been married. It is also esteemed a good sign if it rains whilst a corpse is burying:

Happy is the bride that the sun shines on;
Happy is the corpse that the rain rains on.

To break a looking-glass is extremely unlucky; the party to whom it belongs will lose his best friend. If, going a journey on business, a sow cross the road, you will probably meet with a disappointment, if not a bodily accident, before you return home. To avert this, you must endeavour to prevent her crossing you; and, if that cannot be done, you must ride round on fresh ground. If the sow is attended with her litter of pigs, it is lucky, and denotes a successful journey. It is unlucky to see, first one magpye, and then more; but to see two, denotes marriage or merriment; three, a successful journey; four, an unexpected piece of good news; five, you will shortly be in a great company. To kill a magpye, will certainly be punished with some terrible misfortune.

If, in a family, the youngest daughter should be married before her elder sisters, they must all dance at her wedding without shoes: this will counteract their ill luck, and procure them husbands. If you meet a funeral procession, or one passes by you, always take off your hat; this keeps all evil spirits attending the body in good humour.

If,

If, in eating, you miss your mouth, and the victuals fall, it is very unlucky, and denotes approaching sickness. It is lucky to put on a stocking the wrong side outwards: changing it alters the luck. When a person goes out to transact any important business, it is lucky to throw an old shoe after him. It is unlucky to present a knife, scissars, razor, or any sharp or cutting instrument, to one's mistress or friend, as they are apt to cut love and friendship. To avoid the ill effects of this, a pin, a farthing, or some trifling recompense, must be taken. To find a knife or razor, denotes ill luck and disappointment to the party.

In the Highlands of Scotland, it is thought unlucky if a person setting out upon a journey stumble over the threshold, or be obliged to return for any thing forgotten. If a sportsman see any person stepping over his gun or fishing-rod, he expects but little success in that day's diversion. Sneezing is also deemed ominous. If one sneeze when making a bed, a little of the straw or heath is taken out and thrown into the fire, that nothing may disturb the rest of the person who is to sleep in the bed. Among the same people, success in any enterprize is believed to depend greatly upon the first creature that presents itself after the enterprize is undertaken. Thus, upon going to shoot, it is reckoned lucky to meet a horse, but very unfortunate to see a hare, if she escape; and, upon meeting any creature deemed unlucky, the best means of averting the omen is to roll a stone towards it. The Greeks attributed the same efficacy to the rolling of a stone, though they greatly preferred killing the ominous animal, that the evil portended might fall on its own head.

The motions and appearances of the clouds were not long ago considered as certain signs by which the skilful Highlander might attain to the knowledge of futurity. On the evening before New-year's Day, if a black cloud appeared in any part of the horizon, it was thought to prognosticate a plague, a famine, or the death of some great man in that part of the country over which it should appear to sit; and, in order to ascertain the place threatened by the omen, the motions of this cloud were often watched through the whole night, if it happened to continue so long visible above the horizon. By the believers in this superstition, there are days, as well as words and events, which are deemed ominous of good or bad fortune. The first day of every quarter, Midsummer, and New-year's Day, are reckoned the most fortunate days in the year for accomplishing any design. In the Isle of Mull, ploughing, sowing, and reaping, are always begun on Tuesday, though the most favourable weather for these purposes be in this way frequently lost. That day of the week on which the third of May falls is deemed unlucky throughout the whole year. In Morven, none will upon any account dig peat or turf for fuel on Friday; and it is reckoned unlucky to number the people or cattle belonging to any family, and doubly so if the number be taken on Friday. The age of the moon is also much attended to by the vulgar Highlanders. It is alleged, that during the increase things have a tendency to grow and stick together; and hence, in the Isle of Sky, fences, which are there made of turf, are built only at that time; whilst turf or peats for fuel are never, even in the most favourable weather, either made or stacked up but while the moon is in its wane. An opinion prevails

in

in some places, that, if a house take fire during the increase of the moon, the family to which it belongs will prosper in the world; but that, if the fire happen while the moon is in the decrease, the family will from that time decline in its circumstances, and sink into poverty. In attributing such influence to the moon, the superstitious Highlanders have the honour to agree with the philosophic Virgil, who in his Georgics gives the following sage instructions to the husbandman:

Ipsa dies alios dedit ordine Luna
Felices operum. Quintam fuge:
* * * *
Septima post decimam felix et ponere vitem,
Et prensos domitare boves, et licia telæ
Addere: nona fugæ melior, contraria furtis.

The lucky days in each revolving moon
For labour choose: the *fifth* be sure to shun.
* * * *
The *seventh* is next the *tenth*, the best to join
Young oxen to the yoke, and plant the vine.
Then, weavers, stretch your stays upon the waft:
The *ninth* is good for travel, bad for theft.

DRYDEN.

From this coincidence of the superstition of the Roman poet with that of the natives of Mull and Morven, we are strongly inclined to adopt the hypothesis of the gentleman who favoured us with this accurate account of Highland omens. He justly observes, that this superstitious practice of auguring good or ill from trifling events, and from the particular phases of the moon, has no connection whatever with popish priestcraft: he shews that the Romish clergy, even in the darkest age, were at pains to eradicate it as idle and impious; and he therefore infers, that it must be a relic of Druidism handed down by tradition from an era prior to the introduction of Christianity into the Highlands and isles of Scotland. That the Druids were acquainted with the particular doctrines of Pythagoras has been clearly proved; that Virgil was no stranger to the Pythagorean philosophy is known to every scholar; that Pythagoras and his followers were addicted to the dotages of Magic has been likewise demonstrated; and therefore it appears to us probable at least, that the attention paid to pretended omens, not only in the Highlands, but also in the low country of Scotland, and indeed among the vulgar in every country of Europe, is a remnant of one of the many superstitions which the Druids imposed upon their deluded followers. That it is contrary to every principle of sound philosophy, all philosophers will readily acknowledge; and whoever has studied the writings of St. Paul must be convinced that it is inconsistent with the spirit of genuine Christianity.

INFLUENCE OF THE PASSIONS ON THE HUMAN MIND.

SO intimately are our perceptions, passions, and actions, connected, it would be wonderful if they should have no mutual influence. That our actions are too much influenced by passion, is a known truth;

truth; but it is not less certain, though not so well known, that passion hath also an influence upon our perceptions, opinions, and belief. For example, the opinions we form of men and things are generally directed by affection:—An advice given by a man of figure hath great weight; the same advice from one in a low condition is despised or neglected: a man of courage under-rates danger; and to the indolent the slightest obstacle appears unsurmountable. All this may be accounted for by the simple principle of association.

There is no truth more universally known, than that tranquillity and sedateness are the proper state of mind for accurate perception and cool deliberation; and for that reason, we never regard the opinion even of the wisest man, when we discover prejudice or passion behind the curtain. Passion hath such influence over us, as to give a false light to all its objects. Agreeable passions prepossess the mind in favour of their objects; and disagreeable passions, not less against their objects:—A woman is all perfection in her lover's opinion, while in the eye of a rival beauty she is aukward and disagreeable: when the passion of love is gone, beauty vanishes with it;—nothing is left of that genteel motion, that sprightly conversation, those numberless graces, which formerly, in the lover's opinion, charmed all hearts. To a zealot every one of his own sect is a saint, while the most upright of a different sect are to him children of perdition: the talent of speaking in a friend, is more regarded than prudent conduct in any other. Nor will this surprize any one acquainted with the world; our opinions, the result frequently of various and complicated views, are commonly so slight and wavering, as readily to be susceptible of a bias from passion.

With that natural bias another circumstance concurs, to give passion an undue influence on our opinions and belief; and that is a strong tendency in our nature to justify our passions as well as our actions, not to others only, but even to ourselves. That tendency is peculiarly remarkable with respect to disagreeable passions: by its influence, objects are magnified or lessened, circumstances supplied or suppressed, every thing coloured and disguised, to answer the end of justification. Hence the foundation of self-deceit, where a man imposes upon himself innocently, and even without suspicion of a bias.

We shall proceed to illustrate the foregoing observations by proper examples.

Gratitude, when warm, is often exerted upon the children of the benefactor; especially where he is removed out of reach by death or absence. The passion in this case, being exerted for the sake of the benefactor, requires no peculiar excellence in his children: but the practice of doing good to these children produces affection for them, which never fails to advance them in our esteem. By such means, strong connections of affection are often formed among individuals, upon the slight foundation now mentioned.

Envy is a passion, which, being altogether unjustifiable, cannot be excused but by disguising it under some plausible name. At the same time, no passion is more eager than envy to give its object a disagreeable appearance: it magnifies every bad quality, and fixes on the most humbling circumstances:

CASSIUS. I cannot tell what you and other men
Think of this life; but, for my single self,
I had as lief not be, as live to be

In awe of such a thing as I myself.
I was born free as Cæsar, so were you;
We both have fed as well; and we can both
Endure the winter's cold as well as he.
For once, upon a raw and gusty day,
The troubled Tyber chasing with his shores,
Cæsar says to me, Dar'st thou, Cassius, now
Leap in with me into this angry flood,
And swim to yonder point?—Upon the word,
Accoutred as I was, I plunged in,
And bid him follow; so indeed he did.
The torrent roar'd, and we did buffet it
With lusty sinews; throwing it aside,
And stemming it with hearts of controversy.
But, ere we could arrive the point propos'd,
Cæsar cry'd, Help me, Cassius, or I sink.
I, as Æneas, our great ancestor,
Did from the flames of Troy upon his shoulder
The old Anchises bear; so from the waves of Tyber
Did I the tired Cæsar: and this man
Is now become a god; and Cassius is
A wretched creature, and must bend his body
If Cæsar carelessly but nod on him.
He had a fever when he was in Spain;
And, when the fit was on him, I did mark
How he did shake. 'Tis true, this god did shake;
His coward lips did from their colour fly;
And, that same eye whose bend both awe the world
Did lose its lustre: I did hear him groan;
Ay, and that tongue of his, that bade the Romans
Mark him, and write his speeches in their books,
Alas! it cry'd—Give me some drink, Titinius,—
As a sick girl. Ye gods, it doth amaze me,
A man of such a feeble temper should
So get the start of the majestic world,
And bear the palm alone. JULIUS CÆSAR, act. 1. sc. 3.

Glo'ster, inflamed with resentment against his son Edgar, could even force himself into a momentary conviction that they were not related:

O strange fasten'd villain!
Would he deny his letter?—I never got him.
KING LEAR, act 2. sc. 3.

When by great sensibility of heart, or other means, grief becomes immoderate, the mind, in order to justify itself, is prone to magnify the cause; and if the real cause admit not of being magnified, the mind seeks a cause for its grief in imagined future events:

BUSBY. Madam, your majesty is much too sad:
You promis'd, when you parted with the king,
To lay aside self-harming heaviness,
And entertain a cheerful disposition.
QUEEN. To please the king, I did; to please myself,
I cannot do it. Yet I know no cause

Why I ſhould welcome ſuch a gueſt as grief;
Save bidding farewell to ſo ſweet a gueſt
As my ſweet Richard: yet again, methinks,
Some unborn ſorrow, ripe in Fortune's womb,
Is coming tow'rd me; and my inward ſoul
With ſomething trembles, yet at nothing grieves,
More than with parting from my lord the king.

RICHARD II. act 2. ſc. 5.

Reſentment at firſt is vented on the relations of the offender, in order to puniſh him: but as reſentment, when ſo outrageous, is contrary to conſcience, the mind, to juſtify its paſſion, is diſpoſed to paint theſe relations in the blackeſt colours; and it comes at laſt to be convinced, that they ought to be puniſhed for their own demerits.

Anger, raiſed by an accidental ſtroke upon a tender part of the body, is ſometimes vented upon the undeſigning cauſe. But as the paſſion in that caſe is abſurd, and as there can be no ſolid gratification in puniſhing the innocent, the mind, prone to juſtify as well as to gratify its paſſion, deludes itſelf into a conviction of the action's being voluntary. The conviction, however, is but momentary; the firſt reflection ſhews it to be erroneous: and the paſſion vaniſheth almoſt inſtantaneouſly with the conviction. But anger, the moſt violent of all paſſions, has ſtill greater influence: it ſometimes forces the mind to perſonify a ſtock or a ſtone if it happen to occaſion bodily pain, and even to believe it a voluntary agent, in order to be a proper object of reſentment. And that we have really a momentary conviction of its being a voluntary agent, muſt be evident from conſidering, that without ſuch conviction the paſſion can neither be juſtified nor gratified: the imagination can give no aid; for a ſtock or a ſtone, imagined inſenſible, cannot be an object of puniſhment, if the mind be conſcious that it is an imagination merely without any reality. Of ſuch perſonification, involving a conviction of reality, there is one illuſtrious inſtance. When the firſt bridge of boats over the Helleſpot was deſtroyed by a ſtorm, Xerxes fell into a tranſport of rage ſo exceſſive, that he commanded the ſea to be puniſhed with three hundred ſtripes; and a pair of fetters to be thrown into it, enjoining the following words to be pronounced: "O thou ſalt and bitter water! thy maſter hath condemned thee to this puniſhment for offending him without cauſe; and is reſolved to paſs over thee in deſpite of thy inſolence: with reaſon all men neglect to ſacrifice to thee, becauſe thou art both diſagreeable and treacherous."

Shakeſpear exhibits beautiful examples of the irregular influence of paſſion in making us believe things to be otherwiſe than they are. King Lear, in his diſtreſs, perſonifies the rain, wind, and thunder; and, in order to juſtify his reſentment, believes them to be taking part with his daughters:

LEAR. Rumble thy bellyful, ſpit fire, ſpout rain!
Nor rain, wind, thunder, fire, are my daughters.
I tax not you, ye elements, with unkindneſs;
I never gave you kingdoms, call'd you children;
You owe me no ſubſcription. Then let fall
Your horrible pleaſure.—Here I ſtand, your brave;
A poor, infirm, weak, and deſpis'd, old man!
But yet I call you ſervile miniſters,

That

That have with two pernicious daughters join'd
Your high-engender'd battles 'gainſt a head
So old and white as this. Oh! oh! 'tis foul! Act. 3. ſc. 2.

King Richard, full of indignation againſt his favourite horſe for carrying Bolingbroke, is led into the conviction of his being rational:

GROOM. Oh! how it yearn'd my heart, when I beheld
In London ſtreets, that coronation-day,
When Bolingbroke rode on Roan Barbary,
That horſe that thou ſo often haſt beſtrid,
That horſe that I ſo carefully have dreſs'd.
K. RICH. Rode he on Barbary? tell me, gentle friend,
How went he under him?
GROOM. So proudly as he had diſdain'd the ground.
K. RICH. So proud that Bolingbroke was on his back!
That jade had eat bread from my royal hand.
This hand hath made him proud with clapping him.
Would he not ſtumble? would he not fall down,
(Since pride muſt have a fall,) and break the neck
Of that proud man that did uſurp his back?
RICHARD II. act 5. ſc. 11.

Hamlet, ſwelled with indignation at his mother's ſecond marriage, was ſtrongly inclined to leſſen the time of her widowhood, the ſhortneſs of the time being a violent circumſtance againſt her; and he deludes himſelf by degrees into the opinion of an interval ſhorter than the real one:

HAMLET.——————That it ſhould come to this!
But two months dead! nay, not ſo much; not two—
So excellent a king, that was, to this,
Hyperion to a ſatyr: ſo loving to my mother,
That he permitted not the wind of heav'n
Viſit her face too roughly. Heav'n and earth!
Muſt I remember—why, ſhe would hang on him,
As if increaſe of appetite had grown
By what it fed on: yet, within a month——
Let me not think—Frailty, thy name is *Woman!*
A little month! or ere thoſe ſhoes were old,
With which ſhe follow'd my poor father's body,
Like Niobe, all tears——why ſhe, ev'n ſhe—
(O heav'n! a beaſt, that wants diſcourſe of reaſon,
Wou'd have mourn'd longer) married with mine uncle,
My father's brother; but no more like my father
Than I to Hercules. Within a month!—
Ere yet the ſalt of moſt unrighteous tears
Had left the flushing in her galled eyes,
She married——Oh, moſt wicked ſpeed! to poſt
With ſuch dexterity to inceſtuous ſheets!
It is not, nor it cannot, come to good,
But break, my heart, for I muſt hold my tongue.
Act. 1. ſc. 3.

The power of paſſion to falſify the computation of time is remarkable in this inſtance; becauſe time, which hath an accurate

measure, is less obsequious to our desires and wishes than objects which have no precise standard of less or more.

Good news are greedily swallowed upon very slender evidence; our wishes magnify the probability of the event, as well as the veracity of the relater; and we believe as certain what at best is doubtful. For the same reason, bad news gain also credit upon the slightest evidence: fear, if once alarmed, has the same effect with hope, to magnify every circumstance that tends to conviction. Shakespeare, who shews more knowledge of human nature than any of our philosophers, hath in his Cymbeline represented this bias of the mind; for he makes the person, who alone was affected with the bad news, yield to evidence that did not convince any of his companions. And Othello is convinced of his wife's infidelity from circumstances too slight to move any person less interested.

If the news interest us in so low a degree as to give place to reason, the effect will not be altogether the same: judging of the probability of the story, the mind settles in a rational conviction either that it is true or not. But even in that case, the mind is not allowed to rest in that degree of conviction which is produced by rational evidence: if the news be in any degree favourable, our belief is raised by hope to an improper height; and, if unfavourable, by fear.

This observation holds equally with respect to future events: if a future event be either much wished or dreaded, the mind never fails to augment the probability beyond truth.

That easiness of belief, with respect to wonders and prodigies, even the most absurd and ridiculous, is a strange phenomenon; because nothing can be more evident than the following proposition, That, the more singular any event is, the more evidence is required to produce belief: a familiar event daily occurring, being in itself extremely probable, finds ready credit, and therefore is vouched by the slightest evidence; but to overcome the improbability of a strange and rare event, contrary to the course of nature, the very strongest evidence is required. It is certain, however, that wonders and prodigies are swallowed by the vulgar, upon evidence that would not be sufficient to ascertain the most familiar occurrence. It has been reckoned difficult to explain that irregular bias of mind; but we are now made acquainted with the influence of passion upon opinion and belief; a story of ghosts or fairies, told with an air of gravity and truth, raiseth an emotion of wonder, and perhaps of dread; and these emotions, imposing on a weak mind, impress upon it a thorough conviction contrary to reason.

Opinion and belief are influenced by propensity as well as by passion. An innate propensity is all we have to convince us that the operations of nature are uniform: influenced by that propensity, we often rashly think, that good or bad weather will never have an end; and in natural philosophy, writers, influenced by the same propensity, stretch commonly their analogical reasonings beyond just bounds.

Opinion and belief are influenced by affection as well as by propensity. The noted story of a fine lady and a curate viewing the moon through a telescope is a pleasant illustration: "I perceive (says the lady) two shadows inclining to each other; they are certainly two happy lovers;" "Not at all (replies the curate), they are two steeples of a cathedral."

Among

Among the particulars that compose the social part of our nature, there is a propensity to communicate our opinions, our emotions, and every thing that affects us, which may be called the *Language of our Passions*. But fortune and injustice affect us greatly; and of these we are so prone to complain, that, if we have no friend nor acquaintance to take part in our sufferings, we sometimes utter our complaints aloud, even where there is none to listen.

But this propensity operates not in every state of mind. A man immoderately grieved seeks to afflict himself, rejecting all consolation: immoderate grief accordingly is mute; complaining is struggling for consolation:

> It is the wretch's comfort still to have
> Some small reserve of near and inward woe,
> Some unsuspected hoard of inward grief,
> Which they unseen may wail, and weep, and mourn,
> And glutton-like alone devour.
>
> MOURNING BRIDE, act 1. sc. 1.

When grief subsides, it then, and no sooner, finds a tongue: we complain, because complaining is an effort to disburden the mind of its distress. This observation is finely illustrated by a story which Herodotus records. Cambyses, when he conquered Egypt, made Psammeticus the king prisoner; and, for trying his constancy, ordered his daughter to be dressed in the habit of a slave, and to be employed in bringing water from the river; his son also was led to execution with a halter about his neck. The Egyptions vented their sorrow in tears and lamentations: Psammeticus only, with a downcast eye, remained silent. Afterward meeting one of his companions, a man advanced in years, who, being plundered of all, was begging alms, he wept bitterly, calling him by name. Cambyses, struck with wonder, demanded an answer to the following question: "Psammeticus, thy master Cambyses is desirous to know, why, after thou hadst seen thy daughter so ignominiously treated, and thy son led to execution, without exclaiming or weeping, thou shouldst be so highly concerned for a poor man, no way related to thee?" Psammeticus returned the following answer: "Son of Cyrus, the calamities of my family are too great to leave me the power of weeping; but the misfortunes of a companion, reduced in his old age to want of bread, is a fit subject for lamentation."

Surprise and terror are silent passions, for a different reason: they agitate the mind so violently, as for a time to suspend the exercise of its faculties, and among others the faculty of speech.

Love and revenge, when immoderate, are not more loquacious than immoderate grief. But, when these passions become moderate, they set the tongue free, and, like moderate grief, become loquacious. Moderate love, when unsuccessful, is vented in complaints; when successful, is full of joy expressed by words and gestures.

As no passion hath any long uninterrupted existence, nor beats always an equal pulse, the language suggested by passion is not only unequal, but frequently interrupted: and, even during an uninterrupted fit of passion, we only express in words the more capital sentiments. In familiar conversation, one who vents every single thought, is justly branded with the character of *loquacity*; because sensible people express no thoughts but what make some figure: in

the ſame manner, we are only diſpoſed to expreſs the ſtrongeſt impulſes of paſſion, eſpecially when it returns with impetuoſity after interruption.

It has been obſerved that the ſentiments ought to be tuned to the paſſion, and the language to both. Elevated ſentiments ought to be clothed in words that are ſoft and flowing: when the mind is depreſſed with any paſſion, the ſentiments muſt be expreſſed in words that are humble, not low. Words being intimately connected with the ideas they repreſent, the greateſt harmony is required between them: to expreſs an humble ſentiment in high-ſounding words, is diſagreeable by a diſcordant mixture of feelings; and the diſcord is not leſs when elevated ſentiments are dreſſed in low words. This, however, excludes not figurative expreſſion, which, within moderate bounds, communicates to the ſentiment an agreeable elevation. Figurative expreſſion, being the work of an enlivened imagination, cannot be the language of anguiſh or diſtreſs. Otway, ſenſible of this, has painted a ſcene of diſtreſs in colours finely adapted to the ſubject: there is ſcarcely a figure in it, except a ſhort and natural ſimile with which the ſpeech is introduced: Belvidera, talking to her father of her huſband:

Think you ſaw what paſt at our laſt parting;
Think you beheld him like a raging lion,
Pacing the earth, and tearing up his ſteps,
Fate in his eyes, and roaring with the pain
Of burning fury; think you ſaw his one hand
Fix'd on my throat, while the extended other
Graſp'd a keen threat'ning dagger: oh, 'twas thus
We laſt embrac'd, when, trembling with revenge,
He dragg'd me to the ground, and at my boſom
Preſented horrid death; cry'd out, My friends!
Where are my friends? ſwore, wept, rag'd, threaten'd, lov'd;
For he yet lov'd, and that dear love preſerv'd me
To this laſt trial of a father's pity.
I fear not death, but cannot bear a thought
That that dear hand ſhould do th' unfriendly office.
If I was ever then your care, now hear me;
Fly to the ſenate, ſave the promis'd lives
Of his dear friends, ere mine be made the ſacrifice.

VENICE PRESERV'D, act 5.

To preſerve the foreſaid reſemblance between words and their meaning, the ſentiments of active and hurrying paſſions ought to be dreſſed in words where ſyllables prevail that are pronounced ſhort or faſt; for theſe make an impreſſion of hurry and precipitation. Emotions, on the other hand, that reſt upon their objects, are beſt expreſſed by words where ſyllables prevail that are pronounced long or ſlow. A perſon affected with melancholy, has a languid and ſlow train of perceptions. The expreſſion beſt ſuited to that ſtate of mind, is where words, not only of long, but of many, ſyllables, abound in the compoſition; and for that reaſon, nothing can be finer than the following paſſage:

In thoſe deep ſolitudes, and awful cells,
Where heav'nly-penſive Contemplation dwells,
And ever-muſing Melancholy reigns.

POPE.

To

To preserve the same resemblance, another circumstance is requisite, that the language, like the emotion, be rough or smooth, broken or uniform. Calm and sweet emotions are best expressed by words that glide softly: surprise, fear, and other turbulent passions, require an expression both rough and broken.

It cannot have escaped any diligent inquirer into nature, that, in the hurry of passion, one generally expresses that thing first which is most at heart; which is beautifully done in the following passage:

Me, me; adsum qui feci: in me convertite ferrum,
O Rutuli, mea fraus omnis. ÆNEID, ix. 427.

Passion has often the effect of redoubling words, the better to make them express the strong conception of the mind. This is finely imitated in the following examples:

——————— Thou sun, said I, fair light!
And thou enlighten'd earth, so fresh and gay!
Ye hills and dales, ye rivers, woods, and plains!
And ye that live, and move, fair creatures! tell,
Tell, if ye saw, how came I thus, how here?—
PARADISE LOST, b. viii. 273.

——————— Both have sinn'd! but thou
Against God only; I, 'gainst God and thee:
And to the place of judgment will return;
There with my cries importune Heav'n, that all
The sentence, from thy head remov'd, may light
On me, sole cause to thee of all this woe;
Me! me! only just object of his ire.
PARADISE LOST, b. x. 930.

In general, the language of violent passion ought to be broken and interrupted. Soliloquies ought to be so in a peculiar manner: language is intended by nature for society; and a man when alone, though he always clothes his thoughts in words, seldom gives his words utterance, unless when prompted by some strong emotion; and even then by starts and intervals only. Shakespeare's soliloquies may be justly established as a model; for it is not easy to conceive any more perfect:

"FORD. Hum! ha! is this a vision? is this a dream? do I sleep? Mr. Ford, awake; awake, Mr. Ford; there's a hole made in your best coat, Mr. Ford! this 'tis to be married! this 'tis to have linen and buck-baskets. Well, I will proclaim myself what I am; I will now take the leacher; he is at my house; he cannot 'scape me; 'tis impossible he should; he cannot creep into a halfpenny purse, nor into a pepper-box. But, lest the devil that guides him should aid him, I will search impossible places; tho' what I am I cannot avoid, yet to be what I would not shall not make me tame."
MERRY WIVES OF WINDSOR, act 3. sc. last.

Soliloquies upon lively or interesting subjects, but without any turbulence of passion, may be carried on in a continued chain of thought. If, for example, the nature and sprightliness of the subject prompt a man to speak his thoughts in the form of a dialogue, the expression must be carried on without break or interruption, as in a dialogue between two persons; which justifies Falstaff's soliloquy upon honour:—"What need I be so forward with Death, that calls

calls not on me? Well, 'tis no matter, Honours pricks me on. But how if Honour prick me off, when I come on? how then? Can honour set a leg? No. Or an arm? No. Or take away the grief of a wound? No. Honour hath no skill in surgery then? No. What is Honour? A word.—What is that word *honour?* Air; a trim reckoning.—Who hath it? He that dy'd a Wednesday. Doth he feel it? No. Doth he hear it? No. It is insensible then? Yea, to the dead. But will it not live with the living? No. Why? Detraction will not suffer it. Therefore I'll none of it; honour is a mere scutcheon: and so ends my catechism."

FIRST PART, HERYY IV. act. 5. sc. 2.

LITERARY ANECDOTES.—By Dr. WARTON.

ESSAY ON CRITICISM.

THE first piece of Criticism in our language, worthy our attention, was Sir Philip Sydney's "Defence of Poesie." Spenser is said to have written a critical discourse, called "The Poet;" the loss of which, considering the exquisite taste and extensive learning of Spenser, is much to be regretted. Next came Daniel's Apology; then Ben Jonson's Discoveries, the Preface to Gondibert, Hobbes' Letter to D'Avenant, the Preface and Notes of Cowley (whose prose style, by the way, is admirable), Temple's Essays, Dryden's Essay on Dramatic Poetry, and his various Prefaces and Prologues, Rymer's Preface to Rapin, and Letter on Tragedy, Dennis' Reformation on Poetry, and the Essays of Roscommon and Buckingham. These (says Dr. Warton) were the critical pieces that preceded Pope's Essay on Criticism, which was published without his name, May 1711, and (as Lewis the bookseller told me) did not sell at first, till the author sent copies, as presents, to several eminent persons.

It is not improper to observe what great improvements the art of criticism has received since this Essay was written. Without recurring to pieces of earlier date, and nearer the time in which it was written, we have the Essays in the Spectator and Guardian, Shaftesbury's Advice to an Author, Spence on the Odyssey, Fenton on Waller, and Blackwell's Enquiry into the Life and Writings of Homer. Even of late years, we have had the Treatises of Harris, Hurd's Remarks on Horace, Observations on the Fairy Queen, Webb on Poetry and Music, Brown's Dissertation on the same, the Dissertations of Beattie, Lord Kaim's Elements of Criticism, Blair's Lectures; the Critical Papers in the Rambler, Adventurer, World, and Connoisseur; Johnson's Lives of the Poets; the Biographia Britannica; the Poetics of Aristotle, translated, and accompanied by judicious notes by Twining and Pye; the translations, with notes, of Horace's Art of Poetry, by Hurd and Colman; and the Epistles of Hayley.

ELEGY TO THE MEMORY OF AN UNFORTUNATE LADY.

The true cause of the excellence of this Elegy is, that the occasion of it was real; so true is the maxim, that nature is more powerful than fancy; that we can always feel more than we can imagine; and that the most artful fiction must give way to truth: for this lady was beloved by Pope. After many and wide enquiries, I have been informed that her name was Wainsbury; and that (which is a singular circumstance) she was ill-shaped and deformed as our author.

Her

Her death was not by a ſword, but, what would leſs bear to be told poetically, ſhe hanged herſelf. Johnſon has too ſevgrely cenſured this Elegy, when he ſays, "that it has drawn much attention by the illaudable ſingularity of treating ſuicide with reſpect; and, that "poetry has not been often worſe employed, than in dignifying the amorous fury of a raving girl." She ſeems to have been driven to this deſperate act by the violence and cruelty of her uncle and guardian, who forced her to a convent abroad; and to which circumſtance Pope alludes in one of his Letters.

PROLOGUES OF DRYDEN AND POPE.

Pope's Prologue to Addiſon's Cato is ſuperior to any Prologue of Dryden; who, notwithſtanding, is ſo juſtly celebrated for this ſpecies of writing. The prologues of Dryden are ſatirical and facetious: this of Pope is ſolemn and ſublime, as the ſubject required. Thoſe of Dryden contain general topics of criticiſm and wit, and may precede any play whatſoever, even tragedy or comedy. This of Pope is particular, and appropriated to the tragedy alone, which it was deſigned to introduce.

ROWE.

The genius of Rowe was rather delicate and ſoft, than ſtrong and pathetic. His compoſitions ſooth us with a tranquil and tender ſort of complacency, rather than cleave the heart with pangs of commiſeration. His diſtreſſes are entirely founded on the paſſion of love. His diction is extremely elegant and chaſte, and his verſification highly melodious. His plays are declamations rather than dialogues; and his characters are general, and undiſtinguiſhed from each other. Such a furious character as that of Bajazet is eaſily drawn, and, let me add, eaſily acted.—There is a want of unity in the fable of Tamerlane. The death's head, dead body, and ſtage hung in mourning, in the Fair Penitent, are artificial and mechanical methods of affecting an audience. In a word, his plays are muſical and pleaſing poems; but inactive and unmoving tragedies. That of Jane Shore is, I think, the moſt intereſting and affecting of any he has given us; but probability is ſadly violated in it by the neglect of the unity of time. For a perſon to be ſuppoſed to be ſtarved during the repreſentation of five acts is a ſtriking inſtance of the abſurdity of this violation. * * * * * Rowe has taken the fable of his Fair Penitent, from the Fatal Dowry of Maſſinger and Field. His very ſpirited tranſlation of Lucan, is perhaps his beſt work, and one of the beſt tranſlations in our language, of the only claſſic, ſaid Addiſon, not explained for the uſe of the dauphin.

FENTON.

Of Pope's Epitaph on Fenton, it is obſerved by Dr. Warton, that his integrity, learning, and genius, deſerved the character therein given, and that it was not in any reſpect overwrought. "His Poems," he adds are not ſufficiently read and admired. The Epiſtle to Southerne, the Ode to the Sun, the Fair Nun, and, above all, the Ode to Lord Gower, are excellent. Akenſide frequently ſaid to me, that he thought this Ode the beſt in our language, next to Alexander's Feaſt. "I envy Fenton," ſaid Pope to Mr. Walter Hart, "his Horation Epiſtle to Lambard." Parts of Mariamne are beautiful, and it ought to take its turn on the ſtage.

NEWTON.

Newton was born on the very day which Galileo died. When Ramsay was one day complimenting him on his discoveries in philosophy, he answered, as I read it in Spence's Anecdotes, "Alas! I am only like a child, picking up pebbles on the shore of the great ocean of truth."

It is related in Mr. Harris' MSS. that Newton, hearing Handel play upon the harpsichord, could find nothing worthy of remark but the elasticity of his fingers. At another time, having asserted that Terence's plays had no plot, and Bentley (in this knowledge his superior beyond all controversy) having copiously endeavoured to shew the contrary, he concluded as he began, that, Terence's plays had no plot. At another time, being asked his opinion of poetry, he quoted a *sentiment of Barrow, that it was ingenious nonsense.*

Thus must it necessarily happen, when men, even the greatest, are (according to the common saying) got out of their element. No genius, perhaps ever existing, was more acute than his in discovering true from false, in the subjects of colour, quantity, and motion. No one had an abler intellect to discern what existed from that which existed not. But, among the number of things existing, what were fair, beautiful, graceful, elegant, and what the contrary; of this, by these stories, one would imagine he had no conception.

SINGULARITIES OF GREAT MEN.

Dr. Warton produces many curious instances to illustrate the following line:

Unthought-of frailties cheat us in the wise.

Who could have thought, he observes, that Xenophon, during his famous retreat, performed many acts of the most vulgar superstition; that Augustus was alarmed and dispirited if he put on a slipper on his right leg which should have been on his left; that Newton once studied astrology; that Thuanus, Dryden, and the Chancellor Shaftesbury, calculated nativities; that Roger Ascham and Dr. Whitby were devoted lovers of cock-fighting, as was Bayle of mountebanks; that Bishop Hoadly was often rallied by Dr. Clarke for his dread of thunder; that Henry IV. of France, was terrified at the jolting of his coach; that Ben Johnson and Addison were hard drinkers, and Pope himself an epicure? The night before the battle of Blenheim, after a council of war had been held in the Duke of Marlborough's tent, at which Louis of Baden and Prince Eugene had assisted, the latter, after the council had broke up, kept back to the tent to communicate something he had forgot to the duke, whom he found giving orders to his aid-de-camp Colonel Selwyn (who related this fact) at the table, on which there was now only a single taper burning, all the others being extinguished the moment the council was over. "What a man is this," said Prince Eugene, "who at such a time can think of saving the ends of candles?" *Elizabeth was a coquette, and Bacon received a bribe.* Dr. Busby had a violent passion for the stage: it was excited in him by the applause he received in acting the Royal Slave before the king at Christchurch; and he declared, that, if the rebellion had not broke out, he had certainly engaged himself as an actor. Luther was so immoderately passionate, that he sometimes boxed Melanchton's ears; and Melanchton himself was a believer in judicial astrology,

astrology, and an interpreter of dreams. Mazarin and Richlieu were so superstitious as to employ and pension Morin, a pretender to astrology, who cast the nativities of these two able politicians. Nor was Tacitus himself, who generally appears superior to superstition, untainted by this folly, as may appear from the twenty-second chapter of the sixth book of his Annals. Men of great genius have been sometimes compared to the pillar of fire that conducted the Israelites, which frequently turned a cloudy side toward the spectator.

GRAVITY.

The reader may compare a sensible reflection of Rochefoucault's with one of the great Confucius on the same subject: "Gravity," says the former, "is a mysterious carriage of the body, to cover the defects of the mind."—"Gravity," says the latter, "is only the rind or bark of wisdom; but it preserves it."

DR. SAMUEL CLARKE.

Ev'n in an ornament its place remark,
Nor in an hermitage set Dr. Clarke.

Pope himself thus sarcastically explains this couplet: "Dr. Clarke's busto placed by the queen in the Hermitage, while the doctor daily frequented the court."—"But he should have added," says his more candid annotator Warburton, "that he frequented the court—*with the innocence and disinterestedness of a hermit.*"

"These lines," observes Dr. Warburton, "are as ill-placed and injudicious as the busto they were designed to censure. Pope imbibed an aversion to this excellent man. Bolingbroke hated Clarke, not only because he had written a book which this declamatory philosopher could not refute, but because he was a favourite of Queen Caroline."

ARBUTHNOT.

Arbuthnot was a man of consummate probity, integrity, and sweetness of temper; he had infinitely more learning than Pope or Swift, and as much wit and humour as either of them. He was an excellent mathematician and physician, of which his Letter on the Usefulness of Mathematical Learning, and his Treatise on Air and Aliment, are sufficient proofs. His tables of ancient coins, weights, and measures, are the work of a man intimately acquainted with ancient history and literature, and are enlivened with many curious and interesting particulars of the manners and ways of living of the ancients. The History of John Bull, the best part of the Memoirs of Scriblerus, the Art of Political Lying, the Freeholder's Catechism, It cannot Rain but it Pours, &c. abound in strokes of the most exquisite humour. It is known he gave numberless hints to Swift, and Pope, and Gay, of some of the most striking parts of their works. He was so neglectful of his writings, that his children tore his manuscripts, and made paper kites of them. Few letters in the English language are so interesting, and contain so much of Christian resignation and calmness of mind, as one that he wrote to Swift a little before his death. He frequently, and ably, and warmly, in many conversations, defended the cause of revelation against the attacks of Bolingbroke and Chesterfield.

DR. BENTLEY.

Swift imbibed from Sir William Temple, and Pope from Swift, an inveterate and unreasonable aversion and contempt for Bentley, whose admirable Boyle's Lectures, Remarks upon Collins's Emendations of Menander and Callimachus, and Tully's Tusculan Disputations; whose edition of Horace, and, above all, Dissertations on the Epistles of Phalaris (in which he gained the most complete victory over a whole army of wits), all of them exhibit the most striking marks of accurate and extensive erudition, and a vigorous and acute understanding. He degraded himself much by his strange and absurd hypothesis of the faults which Milton's amanuensis introduced into the Paradise Lost. But I have been informed there was still an additional cause for Pope's resentment:—That Atterbury, being in company with Bentley and Pope, insisted upon knowing the doctor's opinion of the English Homer; and that, being earnestly pressed to declare his sentiments freely, he said, "The verses are good verses, but the work is not Homer, it is Spondanus." It may, however, be observed, in favour of Pope, that Dr. Clarke, whose critical exactness is well-known, has not been able to point out above three or four mistakes in the sense throughout the whole Iliad. The faults of that translation are of another kind. They are such as remind us of Nero's gilding a brazen statue of Alexander the Great, cast by Lysippus.

GAY.

The sweetness and simplicity of Gay's temper and manners much endeared him to all his acquaintance, and made them always speak of him with particular fondness and attachment. He wrote with neatness and terseness; *æquali quadam mediocritate*, but certainly without any elevation; frequently without any spirit. Trivia appears to be the best of his poems, in which are many strokes of genuine humour and pictures of London life, which are now become curious, because our manners, as well as dresses, are so much altered and changed within a few years. His Fables, the most popular of all his works, have the fault of many modern fable-writers—the ascribing to the different animals and objects introduced, speeches and actions inconsistent with their several natures. An elephant can have nothing to do in a bookseller's shop. They are greatly inferior to the Fables of La Fontaine, which is, perhaps, the most unrivalled work in the whole French language. The Beggar's Opera has surely been extolled beyond its merits. I could never perceive that fine vein of concealed satire supposed to run through it: and, though I should not join with a bench of Westminster justices in forbidding it to be represented on the stage, yet I think pickpockets, strumpets, and highwaymen, may be hardened in their vices by this piece; and that Pope and Swift talked too highly of its moral good effects. One undesigned and accidental mischief attended its success: it was the parent of that most monstrous of all dramatic absurdities, the Comic Opera. The friendship of two such excellent personages as the Duke and Duchess of Queensberry, did, in truth, compensate poor Gay's want of pension and preferment. They behaved to him constantly with that delicacy and sense of seeming equality, as never to suffer him for a moment to feel his state of dependence. Let every man of letters, who wishes for patronage, read D'Alembert's Essay on living with the Great, before he enters the house of a patron; and let him always

always remember the fate of Racine, who having drawn up, at Madame Maintenon's secret request, a memorial that strongly painted the distresses of the French nation, the weight of their taxes, and the expences of the court, she could not resist the importunity of Louis XIV. but shewed him her friend's paper; against whom the king immediately conceived a violent indignation, because a poet should dare to busy himself with politics. Racine had the weakness to take this anger so much to heart, that it brought on a slow fever, which hastened his death. The Duchess of Queensberry would not so have betrayed her poetical friend Gay.

CELEBRATED DEFORMED MEN.

Hay, in his Essay on Deformity, has remarked that Pope was so hurt by the caricatura of his figure, as to rank it among the most atrocious injuries he received from his enemies. Hay, with much pleasantry, jesting on his own deformity, has added, "In person I resemble Æsop, the Prince of Orange, Marshal Luxemburg, Lord-treasurer Salisbury, Scarron, and Mr. Pope; not to mention Thersites, and Richard III. whom I do not claim as members of our society; the first being a child of the poet's fancy; the last, misrepresented by historians. Let me not be unthankful that I was not born in Sparta! where I had no sooner seen the light but I should have been deprived of it, and have been thrown, as a useless thing, in a cavern by Mount Taygetus."

BLACKMORE, LOCKE, AND GALILEO.

All the wits seem to have leagued against Sir Richard Blackmore. In vain was he extolled by Molyneux and Locke: but Locke, to his other superior talents, did not add good taste. He affected to despise poetry, and he depreciated the ancients: which circumstance, as I was informed by the late Mr. James Harris, his relation, was the source of perpetual discontent and dispute between him and his pupil Lord Shaftesbury; who, in many parts of his Characteristics, and Letters to a Clergyman, has ridiculed Locke's selfish philosophy, and represented him as a disciple of Hobbes; from which writer it must in truth be confessed that Locke borrowed frequently and largely. Locke had not the fine taste of a greater philosopher; I mean Galileo, who wrote a comment on Ariosto full of just criticism.

ERASMUS AND LUTHER.

The violence and haughtiness of Luther disgusted the mild and moderate Erasmus, and alienated him from pursuing the plan of reformation, which at first he seemed to encourage and engage in. Luther represented him as an Arian and a time-server. "I thought," said Erasmus, "that Luther's marriage would have softened him a little. It is hard for a man of my moderation, and of my years, to be obliged to write against a savage beast and a furious wild boar." But great revolutions and great reformations are not effected by calm and sober reason, nor without such violence and enthusiasm as Luther possessed. When Voltaire was lamenting that Locke and Newton had few disciples in comparison of the numerous followers of Luther and Calvin, it was replied to him, "that, without a Luther and Calvin, we should never have had a Locke or Newton."

ENGLISH PEERS.

It having been disputed between two eminent persons, whether Swift or Pope had in their writings said the severest things on English peers, it was judged to be Swift, in the following passage of Gulliver:

liver: "The King of Brobdignag asked me what methods were used to cultivate the minds and bodies of our young nobility; and in what kind of business they commonly spent the first and teachable part of their lives? what course was taken to supply that assembly when any noble family became extinct? what qualifications were necessary in those that were to be *created new lords*; whether the humour of the prince, a sum of money to a court lady or a prime minister, or a design of strengthening a party opposite to the public interest, ever happened to be motives to those advancements? what share of knowledge these lords had in the laws of their country, and how they came by it, so as to enable them to decide on the properties of the following subjects in the last resort? whether they were always so free from avarice, partialities, or want, that a bribe, or some other sinister view, could have no place among them?" This is very caustic and severe; but is exceeded by what has lately been said by the late Mr. Burke, of the Duke of Bedford, "being swaddled, rocked, and dandled into a legislator."

Augustus Cæsar.

A noted French writer calls Augustus, "Un fourbe, un assassin, nommé Octave, parvenu à l'empire par des crimes qui meritaient le dernier supplice.—One Octavius, an impostor, an assassin, who obtained the empire by crimes for which he ought to have been condemned to death."

General Oglethorpe.

One driv'n by strong benevolence of soul,
Shall fly, like Oglethorpe, from pole to pole.

Here are lines that will justly confer immortality on a man, who well deserved so magnificent an eulogium. He was at once a great hero and a great legislator. The vigour of his mind and body have been seldom equalled. The vivacity of his genius continued to a very old age. The variety of his adventures, and the different scenes in which he had been engaged, make one regret that his life has never been written. Dr. Johnson once offered to do it, if the general would have furnished the materials. Johnson had a great regard for him; for he was one of the first persons that highly, in all companies, praised his "London." His first campaign was made under Prince Eugene, against the Turks; and this great general always spoke of Oglethorpe in the highest terms. Neither he nor Eugene loved Marlborough. He once told me, (for I had the pleasure of knowing him very well,) that Eugene, speaking of Marlborough, said, "There is a great difference between making war *en maître* or *en avocat*." But his settlement of the colony of Georgia gives more lustre to his character than even his military exploits.

Arthur Onslow.

By an affected gravity, and a solemn and important air, this gentleman presided for many years over the house of commons; but not with the ability, knowledge, patience, prudence, and amiable manners, of the present speaker, Mr. Henry Addington. It is a curious fact in the history of English liberty, that the very first person who was raised by the commons to the dignity of their speaker was a member who had been imprisoned by King Edward III. for attacking his ministers and his mistress in parliament.

DESCRIPTION

DESCRIPTION OF DOVER CASTLE.

THIS fortress has been famous through many ages, and was formerly esteemed the lock and key of the whole kingdom; it is very extensive, upwards of thirty-five acres are supposed to be contained within the walls. As it is frequently asserted in our old chronicles, and from them transcribed into our local and more general histories, that Dover castle was built by Julius Cæsar, many who have visited it have been satisfied with this idle report; but the works still remaining bear evident marks of its having been raised in different and very distant periods of our history. The three leading characteristical parts of ground-plans and buildings are Roman, Saxon, and Norman; but when, or by whom, each part was raised, and for what particular purpose, remains to be determined by attending to the masonry and the different methods of fortification, and considering when they were probably introduced into our island. The Roman fortifications, or all the works we can now trace of that enterprising and warlike people, upon the hill, are bounded by the deep ditch which encloses that space in which the church and octagonal watch-tower are placed; and it will be a vain attempt to search after any Roman military work in the castle beyond it. The form of the camp, the ditch, and the octagonal building, all point out the hand of the Roman engineer and the Roman architect. It was no uncommon thing for them, where the ground would admit of it, to make their camp in the form of a parallelogram, with the angles rounded off, and to secure it with a deep ditch and a high parapet. This appears to be the original plan of the Roman camp on this hill, before it was altered either by the Saxons or the Normans. The historians, who have ascribed this work to Julius Cæsar, did not attend to the place of his landing, the time he was here, nor the difficulties he had to encounter to fill up his time, without employing himself in building castles and towers. The fortifications about the castle underwent several material alterations in the year 1796. Of the new works, the most useful part is a battery of thirty-two-pounders, on a level with the water's edge. From this battery, if necessary, the men can retreat into the castle, ascending by a perpendicular shaft which has been made through the solid rock.

The first expedition of the Romans to Britain, under Julius Cæsar, was in the year fifty-five before Christ; and it has been determined to have been about the latter end of August when he arrived with his fleet in the valley where the town of Dover is now built; the sea then flowing in between two high hills, situated in the entrance of the bay, forming naturally a fine harbour for his ships, well sheltered from the winds, and the valley afforded plenty of wood, and fine water. But the emperor was obliged to relinquish this desirable situation, as the Britons, from the high and bold shores, could so easily annoy his men with their missive weapons. As Julius Cæsar was too prudent and cautious to attempt the landing of his men under such great disadvantage and danger, he weighed anchor with the flood-tide, which was in his favour, about three o'clock in the afternoon, on the 23d of August, and he sailed about eight miles farther towards the north; and, if we allow for the setting of the current at the rate of five miles an hour, he was carried farther than he

he estimated, and landed in the bay and near the high ground where Richborough castle was afterwards built.

To determine whether he built a castle on the hill at Dover during this expedition, we have only to attend to the reception he met with from the natives on-shore; the damage he sustained in his fleet by a storm; the time he was confined in his camp, and the injury he sustained in his retreat; the conclusion must be, that he could not march so far from his ships in an enemy's country to build a tower.

As the same emperor made a second descent upon Britain the following year, and, according to several of our historians, very probably at the same place, it is next to be considered, whether he was not fully employed, during the months he continued here, without fortifying any other place than the ground he encamped upon.

If he waited only two days on the coast at his arrival for that part of his fleet he left behind him, and spent ten days more in refitting his ships, which had suffered severely by tempestuous weather, he could not have had above three weeks to fight his battles; to ravage the country; to form alliances and conclude treaties with different and very distant states; and, if he only did one quarter part of what some of our historians have mentioned, he never had any time to erect a single tower at Dover. As this was the last expedition of the Romans to Britain till the year of Christ forty-three, it will be in vain to look for any Roman building at this spot till the reign of Claudius Cæsar.

Whether this emperor was excited by an ambitious desire of a triumph, or any injury he had received from the Britons, he determined, in the third year of his reign, to attempt the conquest of our island; and sent over Aulus Plautius, a general of consular dignity, with an army, and was successful in his first attempt upon the natives. If we can depend upon the credit of a Roman historian, he reduced part of Britain into the form of a Roman province, and placed a colony of veterans to secure it.

As the attempt was prosperous, it encouraged Claudius Cæsar to send over Publius Ostorius Scapula, another general of rank, in the year of Christ forty-nine; and he, finding the natives inclining to insurrection, immediately determined to disarm such as he suspected, and to build forts or castles to awe the rest.

There are several reasons why they fixed on the hill at Dover for a camp on their first settling on our island. The garrison could not only defend the small works they cast up here against a superior force, but it could command the harbour for receiving a reinforcement from the continent, or securing a retreat to it, if necessary, by the assistance of their ships; we are therefore led to conclude that Aulus Plautius fixed his colony of veterans here before forts were built in the interior parts of the country; besides, it is the nearest part of Britain to the opposite shore. If we admit this conjecture, as we have but slight hints in history upon this subject, we may date the beginning of Dover castle, or so much of the ground-plan as appears to be Roman work, between the years of Christ forty-three and forty-nine.

As the Romans seemed now determined upon the conquest of Britain, and were obliged frequently to cross and recross the sea, it was necessary, that their passage to and from the continent might be safe for their ships, to erect a light-house upon the high lands on

each side the Channel. The advantages of having such a guide to a safe harbour, protected by their friends, were too great to be overlooked by the Romans, for without it they would have been exposed to frequent shipwrecks by coming upon the coast in the dark, and liable to the attacks of the natives whose haunts they were at first unacquainted with.

By these reasons we may conclude the octagonal building at the west end of the church was originally designed for a Roman lighthouse and watch-tower, and erected either by Aulus Plautius or Publius Ostorius Scapula. The foundation of this building is in a bed of clay, a method which was usually practised by the Roman masons, and this is said to be one of the criterions of a Roman work; but the materials and the masonry of this tower both declare it of very high antiquity. The tiles are of the usual thickness of Roman tiles, but of different dimensions, and some of them appear to have been cast in a mould peculiar to the makers of them at this place. The tiles in the course, which is now nearly level with the surface of the ground, on the eastern aspect of the building, are on one side full of winding grooves, with four hemispherical knobs nearly equidistant from each angle, intended probably to make the mortar adhere more firmly. But what is most singular in the form of the tiles is their having a projection at the narrower end on each side of about one inch and three quarters, and an inch and an half wide, with a space left of the same dimensions at each angle of the opposite end, that, by reversing the tiles when laid in the wall, the projecting part might drop into that space like a half dove-tail, which rendered it impossible for them to slip from each other. The ground has been raised several feet since the first building of this tower; the form of it is octagonal without but a square within, and the sides of the square and of the octagon are each about fourteen feet. The thickness of the walls to the marks of the first floor is about ten feet. In four of the sides of this building are openings in the walls about four feet wide, and three of them of nearly equal heights, or about thirteen feet six inches within side, with semi-circular arches turned with Roman tiles, and either a stalactical concretion or a composition made and used by the Romans instead of stone. The pieces of this natural or factitious production applied in turning the arches are wedge-shaped, about four times the thickness of the tiles, and placed alternately between them with a thin laying of mortar of a reddish colour.

Though it is difficult to say whether this tower was used as a place of defence by the Romans, there can be little doubt of its having been applied to that purpose by the Normans. The masonry on each side the openings within the building is very different from the original work; and the spaces left in the wall for what we now call the windows, are much wider at the bottom than the old arch on the top. If they were intended at first only to give light, they were afterwards converted to loop-holes which were left almost close under the arch, and there were steps from the bottom to ascend to them, as appears by the present slopings in the wall; and this alteration was probably made upon Gundulph's plan of defence, soon after the Normans undertook to fortify Dover castle. The arch over the original entrance on the east side is about six feet wide, and still perfect. The other arches, which are damaged, have suffered more from violence, and an idle curiosity in breaking off pieces of the

 materials

materials to try their hardness, than either by age or the effects of the weather. It is very singular that the walls of the tower were originally built with the same kind of natural or artificial production the masons used in turning the arches, and they cut or formed it into blocks about seven inches deep and a foot in length; but the pieces vary in their dimensions. The work was carried up with first seven courses of these blocks, and then two courses of tiles; and this method was continued to the top of the tower. Many of these blocks differ in their solidity, neither are they all composed of the same proportionable parts of other bodies; they very much resemble the sediment found at the bottom of petrifying streams, both in their appearance and their properties; and a gentleman very conversant in the fossile world does not hesitate to call them a stalactical concretion. Several of the outside courses, which are still remaining on the east side of the building, seem hardened by being exposed to the weather.

As stalactical concretions abound in limestone-countries, and are so light as well as durable, they were very proper materials for the Romans to transport in their small vessels to places where they could not find stone for erecting towers of strength. This appears a convincing proof of the antiquity of this building, and that it was raised by the Romans upon their settling in Britain; for, if they had waited till they had been better acquainted with the country, they would have found stone much nearer the place.

This tower has been cased over, and very probably in the reign of Henry V., Erpingham being then lord warden of the castle, whose arms (two bars and a canton) are placed on a stone on the north side of it. As the casing is now dropping off in many places, and the old work is again exposed to the weather, time, which has been for so many ages eating into this work, must by degrees crumble it to rubbish, since there is but little probability of seeing it repaired again by those who preside over such works. The last use made of this tower was to contain a ring of bells, which Sir George Rooke by his interest removed to Portsmouth; and the board of ordnance soon after, for the sake of a trifling sum, disposed of the lead which covered them, and left, perhaps, one of the most ancient pieces of masonry in this kingdom open to the corroding effects of the sea-air, and to be mouldering away by the violent attacks of every winter storm. The last and only remaining pieces of masonry, within the Roman fortification, are the body and tower of the church; which, though not so old as the adjoining building, still retain, in their present state, striking marks of ancient workmanship.

The learned antiquarians have been very much divided in their opinions concerned the antiquity of this church, and each has contended for his own conceit, without producing any substantial reasons to support it. Our monkish chronicles, and several of our old historians after them, have ascribed the building of this church (which is in the form of a cross), and St. Martin's near the city of Canterbury, to Lucius, whom they suppose to have been a provincial king in Britain by the courtesy of the Romans: he probably reigned in Kent between the years of Christ 131 and 177.

Whether this church was built by King Lucius, or by his order, it will not be worth while to determine on the credit of a monkish chronicle, which is erroneous in many instances; and by drawing hasty conclusions from the masonry we may be led wide of the truth. It is the general and prevailing opinion of those who have visited

these

these ruins, that the church was originally built out of the decayed works of the Romans, the Roman tiles being seen in almost every part of it, and placed, they say, without any regularity. But it is very perceptible that the masonry, in whatever age it was built, was carried on in a very regular plan (a few trifling instances excepted) through the whole building.

In all masonry, ancient and modern, whether Roman, Saxon, Norman, or English, one general method is pursued by the different artists, which is, their carrying up the angles of their buildings with squared materials, when they raised their walls with flints, or rubbles, or such rough stones as they found upon the spot. Now it is evident upon a very slight inspection, that the angles of this fabric were all originally formed with tiles, cast in the Roman manner; which proves the artists had no stones they could square for that purpose near their work: for, when they had, they were never at the trouble of casting tiles. It is very probable that this church was built by some of the first masons who arrived here from the continent, after the Saxon conversion, and in the place of one of plaister raised by Eadbald, because the monks could here retire in safety, and exercise the duties of their office without fear of interruption by any sudden invasion of the enemy. As it is much to be doubted whether there be any religious fabric in the county which can boast a higher antiquity than some part of this ruin, we may place the foundation of it between the first arrival of the artists from the continent (whither they had fled for protection soon after the beginning of the war of the Saxons with the natives) and the reign of Alfred, who also adopted the plan of building chapels in fortifications.

Three chaplains were formerly allowed to this castle, and they were permitted to wear the habits of prebends, on account of the dignity and antiquity of the place. The first chaplain said mass to the governor at the high altar; the second to the marshalman and his officers, at ten o'clock, at the altar of the Virgin Mary; and the third to the soldiers, at nine o'clock, at the north end of the chapel of relics.

After the reformation, when superstition was driven, by royal authority, from this church, the very appearance of religion soon retired from its altars; and it is much to be feared, that the ancient salary, which is still continued, has been frequently applied to answer political more than religious purposes; as the chaplain and the inhabitants of the castle are no farther acquinted with each other than by name.

In this church several persons of family and note have been interred. In the chapel which contained the grand altar, Weever says, "lieth a knight whose portraiture is inlaid with brass upon a marble stone, with this inscription: viz. Hic jacet Robertus Asheton, myles, quondam constabularis castro Dovorre, et custos Quinque Portum, qui obiit nono die Januar. A. D. millesimo CCC octogesimo quarto, cujus anime propitietur Deus. Amen." The stone which contained the effigies of Sir Robert Asheton, and the foregoing inscription, is broken into several pieces, and parts of it are still remaining in the church, but there is not any thing to be seen on it, except the grooves which contained the brass work. The above-mentioned Robert Asheton, knight, was admiral of the fleet, chief justice of Ireland, lord-treasurer, and one of the executors to the last will of Edward III.

He was descended from the Ashetons of Asheton-under-Line, in the county of Lancaster.

On the right hand side of the south chapel there was formerly a marble coffin, which contained the remains of Henry Howard earl of Northampton, and lord-warden of the five ports in the reign of James I. and it was placed upon a marble tomb, which contained the following inscription: viz. Henricus Howardus, Henrici comitis Surriæ filius, Thomas secundi Norfolciæ ducis nepos, et Thomas tertii frater; comes Northamtoniæ, baro Howard de Marnhill; priviti sigilli custos; castri Durovernensis constabularius: Jacobo Magnæ Britanniæ Regi ab intimis conciliis; ordinis periscelidis eques auratus, et academiæ Cantabrigiensis cancellarius; inter nobiles literatissimus, in spem resurgendi in Christo hic conditur. Obiit 15 die Junii, A. D. 1614. Inclytus hic comes tria hospitalia fundavit, et catifundiis dotavit: unam Grenewici in Cantio, in quo viginti Egeni et præfectus: alterum cluni in comitatu Solopiæ, in quo XII Egeni com præfecto: tertium ad Castrum Rising, in comitatu Norfolciæ, in quo XII pauperculæ cum gubernatrice in perpetuum alantur. Johanne Griffiths, huic comiti ab epistolis, curante, positum. Of this nobleman, it was said that he was the most learned among the noble, and the most noble among the learned.

A few years ago there was remaining, in the walls of the chapel, a thick stone, with the following inscription; but this has been wantonly broken, and the remains are buried in the rubbish. Memorandum.—"In this place was buried the body of Henry earl of Northampton, and constable of Dover castle, and lord-warden of the cinque ports, A. D. 1614. And in this place stood likewise a monument of the said earl, whose body and monument, by reason of the ruinous condition of this chapel, was moved, A. D. 1696, to the chapel of the hospital of East Greenwich, in the county of Kent, of the foundation of the said earl, at the charge of the worshipful company of mercers, London, governors of the said hospital; and with the consent of the Archbishop of Canterbury, and of his grace the Duke of Norfolk, and of Henry earl of Romney, lord-warden and constable of Dover castle."

The ground behind the church is the burying-place for the soldiers who die in the castle; and, though there are but few of them who have had even a stone placed at the head of their graves to perpetuate their memory, yet they are now nearly upon a level with those who have had monuments of sculptured marble, and plates of engraved brass, to inform the inquisitive traveller of their birth and rank: for, alas! time, which levels all distinctions, will read us in this church a melancholy lecture on our vanity; and reflection will teach us how small the difference between the commander and the commanded in the mansions of death; when we find there is hardly a trace left here of all the splendour of the rich and great.

But to return to the fortifications: the Saxons made many additions to the Roman works, and extended them towards the land, which after their manner was raised and levelled on the top, and encompassed by a deep broad ditch; and the first tower known to have been built in the exterior walls before the Norman conquest was built by order of Godwin earl of Kent and governor of Dover castle, and probably the Saxon keep was soon afterwards surrounded by walls and towers. The gateway faced the Roman camp, and of the

towers

towers we will speak in their order. Proceeding from this gate, formerly called palace-gate, (because it immediately led to the palace, now called the keep,) the first tower to the right hand was called the Duke of Suffolk's tower; the others are in the following order: the old arsenal; the king's kitchen, and other offices; King Arthur's hall, on the east side of the keep, where a mess-room and other buildings have been erected for the use of the military officers; and in the hall on this side the quadrangle are four other towers, exclusive of one on each angle; but their particular names have not reached the present time. Next follows the king's gate and bridge; this was formerly secured by two strong gates, and a portcullis. On each side the gateway there is an access in the wall, open in front, after the manner of some of the Saxon fortifications. These recesses were used for various purposes: they were designed for retreats for their women and children; repositories for their arms; and for places whither their officers and men might retire to rest in safety. This gate was strengthened with an out-work, constructed in such a manner as to command the vallum on each side the bridge; the walls of this work are about ten feet thick at the gateway by the foot of the bridge. These walls are faced with flint, and the space filled up with rubbish and mortar, which (we are told) is one of the criterions of Saxon masonry. The three next towers were called Magminot towers; and the last, which is next the palace-gate, was named Arthur's smaller hall, or Queen Guaonabour's bed-chamber. Henry VIII. made a magazine of Guaonabour's royal bed-chamber to deposit his stores in, when he went with Anne Boleyne to France; it is not improbable that they were a part of the stores which were afterwards shewn for the wine, salt, and beef, left here by Julius Cæsar. These towers are not to be perceived within the quadrangles, the present building having been erected so as to cover them on the inside.

It is impossible, in the compass of this work, to give a very particular description of all the various contrivances in the palace or keep, a building designed by the ingenious architect for strength and defence, for annoying the besiegers, and for the safety of those who were to defend the tower, in case of a close siege.

Our historians inform us, upon the authority of a nameless chronicle in Norman-French, that Henry II. about the year of Christ 1153, the year in which he came from Normandy for the relief of Wallingford castle, and immediately preceding his succession to the throne, built this keep or palace, and enclosed it with a new wall. There was certainly a wall round this part of the Saxon work previous to that king's reign, as the towers of Magminot were built in the curtain; but, as to the keep in the centre of the quadrangle, it will be difficult to determine, either from history or the masonry, when, and whether by William, or Henry I. or by whom, it was first founded, as it underwent so many repairs in different and distant periods of time, and the ancient masonry is hidden by the modern work. This noble tower is built upon Gundulph's plan, who was bishop of Rochester, and employed by William the Conqueror to draw designs for his castles. The present entrance is on the south side of it; and by a grand flight of steps you ascend round the eastern side to the third story, on which, in Gundulph's castles, were the royal, or governor's, apartments. The rooms are large and lofty,

but they have very little at this time, except strength and security, to recommend them to our refined tastes. This grand flight of stone steps was formerly secured by three strong gates. By the first vestibule, on the right hand going up, is a room which was probably designed for the person who guarded the first gate. Opposite to this is another, adorned on every side with beautiful arches richly embellished with zigzag and other work; this, it is likely, was the chapel. The artist has been more lavish of his skill in these arches than in those over the door and on the side of the wall in the vestibule. Though they are the true semi-circular arch, it is much to be doubted whether they are the work of a Saxon artist. Above this room is another, richly ornamented in a similar manner, which probably was a chamber. Beneath the chapel and the first vestibule, was the dungeon for prisoners; several persons of distinction have been confined here at different times, but it is now only made use of as a prison for soldiers when they are under close confinement. There are galleries built in the walls, with loop-holes, to annoy the besiegers; and they are so contrived, that it would have been next to impossible for them to hurt the besieged in any of the rooms by shooting at them. The second floor was intended for the use of the garrison, and that on the ground for stores. The window on the left hand, when we enter the keep at the door fronting the first flight of steps, will convince us what care our ancestors took to prevent an arrow shot in at a loop-hole from reaching to the room so as to do any execution in it. The wall being eighteen feet thick, it gave them an opportunity of turning a sloping arch from the top of the aperture in such a manner that the height of the opening in the wall, within the room, might not exceed that of the bottom of the window or loop-hole. This being considerably above the ground, their warriors ascended to it by a flight of stone steps in the wall; and, as the arch over their heads was turned to answer the ascent or descent of the steps, an arrow, shot in at the aperture with the least elevation, could never pass the thickness of the wall without striking some part of the arch. In the north angle of the keep, we are told, there is a well, which is now arched over; and it was this well which Harold, before his advancement to the throne, promised, upon his oath, to deliver up with the castle to William duke of Normandy. There is some difference between the mind of a prince when in possession of a crown and at a distance from it; he violated his oath, and the violation of it cost him his life.

Just without the Duke of Suffolk's gate are barracks for the soldiers, and likewise the wells which supply the garrison with water; they are each about three hundred and seventy feet deep.

William duke of Normandy, after his successful battle near Hastings, in which Harold king of England was slain and his army routed, judged it necessary, before he quitted the coast, to secure a retreat to, and keep open a communication with, Normandy, by the assistance of his fleet, in case he should meet with a repulse. Dover castle was the place fixed upon; and, as it was even then a noted fortification, he marched his army to besiege it, and it surrendered to him after a very feeble resistance. The conqueror knew the weak parts of the castle; and, thinking it of too much consequence to him to suffer it to be re-taken by any neglect or surprise, he appointed Odo bishop of Bayeux (his brother, whom he created earl of Kent) justiciary

justiciary of England, regent, and governor of Dover castle, with a strong garrison, to defend it for him against any attack that might be made upon it. This proud, avaricious, and imperious, prelate, falling into disgrace, John Fienes, a trusty Norman, and one the Conqueror could confide in, was appointed governor of the fortification, and he had the lands given him; which he held of the crown, to secure and defend their works. This worthy knight, being willing to prove himself deserving of the favours conferred upon him by his sovereign, proceeded to discharge the important trust with great skill and diligence. It was by his order, and under his inspection, that the two exterior walls were joined to the Saxon fortification, and continued down to the very edge of the high perpendicular cliff. As he did not think himself equal to the task, he selected eight tried and approved Norman warriors to assist him in superintending and expediting the work. The names of these commanders were William de Albranche, Fulbert de Dover, William Arsic, Jeffery Peverel, William Mainsmoth, Robert Porth, Robert or Hugh Crevequer, and Adam Fitzwilliam. These had among them one hundred and twelve knights' fees, and were not only obliged to find a number of soldiers in proportion to the knight's fees they held of the crown, but they were bound by the nature of their tenure to build a tower for the defence of the castle, and for their own particular residences, and to place their arms in the front of it.

The names of the towers in the exterior wall of the castle, beginning at the side of the cliff next the town, are—Cannons, or Monk's Gate, where at present is a battery; Albrancis, or Rokesley's Tower; Chilham, or Chaldescot's Tower; Hurst Tower; Arsic, or Say Tower; Gatton Tower; Peverel, Beauchamp, or Marshal's, Tower; Port, Gastling, or Mary's, Tower; Fienes, or New Gate, or the Constable's Tower; Clopton Tower; Godsfoe Tower; Crevequer, or Cranville, or Earl of Norfolk's, Tower; Fitzwilliam's, or St. John's Tower; Avaranche's, or Mansel's Tower; Veville, or Pincester Tower; Earl Godwin's Tower; and Ashetisfordian Tower.

Of these towers those most worthy notice at present are, first, Chilham, or Chaldescot's Tower, the third from the edge of the cliff. This was built by Fulbert de Lucy, whose family came over with William the Conqueror from Normandy; and, being selected by John Fienes to assist him in defending the castle, he changed his name for Dover. But the tower was named after the manor, and they who held Chilham were obliged to keep it in repair. Chaldescot succeeding to the command here, the tower was called by his name.

In the front of this building is a house for an officer under the lord-warden of the cinque ports, called the Bodar of Dover castle. Though the ancient title is still retained, the original duty of his office is but little known by the inhabitants of the five ports and their ancient towns. The word is derived from the Saxon, *Boda*, which signifies a messenger, or a person sent with letters, injunctions, or precepts, from the superior of any particular jurisdiction. Upon all writs directed to him from the office of the lord-warden, or the constable of Dover castle, he is called My Bodar, or, which is the same thing, My Messenger.

The bodar of Dover castle has also another title annexed to his office, which is sergeant at arms. By this post he has power from the lord-warden to take into his particular jurisdiction crown and other debtors under an arrest, and to shut them up, and keep them in

in safe custody, in a prison belonging to Fulbert de Dover's Tower. In this, as in many other gaols in peculiar districts, there are several alterations necessary, and some things which ought to be rectified without the authority of parliament. It is to be hoped, that, when the state of this prison is known, some person who has the power will have the inclination to endeavour to soften the hardships which many suffer in it. There are but two rooms in this building for the confinement of the gentleman, the creditable but unfortunate artificer, and the most abandoned of the human race; in these rooms are they obliged to eat and sleep, and (if report speaks truth) it has happened that the different sexes have been locked into the same apartment. The prisoners have not the least outlet, where they can go to breathe the fresh air, or for any other necessary purpose. To add to the horrors of this gaol, there is not the least allowance of provisions either for common or crown debtors; and, if the persons who are so unfortunate as to be locked up here are not of a trade at which they can work in their confinement, they must not eat, unless their friends can afford to keep them, or the few who occasionally visit such scenes of distress cast in their mite to lighten but prolong their wretchedness.—The next tower of note is Fiennes, or Newgate, or the Constable's Tower, still used as the governor's apartments. This noble building, which is raised upon the scite of a more ancient one, is after the design of Gundulph, who first introduced the high portal, and secured the passage with drawbridges, portcullisses, and massy gates.

It would have been much easier to have forced a passage through the walls of the castle than through this archway, which was defended by two portcullisses and two gates; and, when the bridge was drawn up, it might be considered as another gate, there being projections in the arch to support it. In the interior ditch you may descend, by a flight of stone steps, to a subterraneous vault, cut through the solid rock into the outer ditch.

The residence of the constable or governor of the castle was in the apartments in these towers after the Norman conquest; and it was here they heard and settled all disputes and controversies relative to the pay and the regulations of the garrison.—The porter generally stands at the door of a room under the arch on the left hand going into the castle, to invite travellers to see the ancient keys of the castle, and a few antique pictures which are kept there. They have an old horn, which tradition, to inhance its worth, tells us was used by the Romans, at the building of the castle, to give notice to the workmen, by the sounding of it, when to begin or to leave their work. We know it was an ancient custom, with the feudal lords, for the centinel to sound a horn for a signal at the gates of the castles upon their estates; and no doubt this was one of the horns used by the centinels here to sound an alarm, to give notice of the approach of strangers, or to convey from post to post, during the night, any alarm, or other notice.

We will next speak of Crevequer, or Cranville, or Earl of Norfolk's, Tower. This was built by one of the associated captains, and is situated opposite the north entrance into the quadrangle of the keep; but near it are several other towers, which have neither names nor lands assigned them. If these towers had been designed for appendages to Crevequer's Tower, they ought to have been included

cluded in his grant of lands, as all castle-guard tenures were obliged to be definite. It was not sufficient for them to be in general words, "To defend the castle;" but it was required to be particularly expressed, "To defend a tower, a gate, a bridge, or some certain part of the castle." As this was the case, it is reasonable to conclude that these towers were built after Henry VIII. passed an act to suppress all castle-guard tenures; but, from a subterraneous passage, which connected these towers with each other, it is probable that they are of higher antiquity.—Near this tower you descend by a flight of stone steps into the main sally-port, which is wide and lofty, and part of it is cut through the solid rock. Near the entrance of this passage is a turning to the right hand, by which you proceed to a stone door-case, near the foundation of the wall of the castle, where there is another flight of steps, by which you again descend several feet, till you arrive at a passage, to the right and left, in the bank without the wall. The passage to the right is nearly filled up with rubbish, and it is not possible to crawl to the end of it; yet there is reason to believe that it never went farther than the tower in the angle to the right. On the left of the flight of steps you proceed in a subterraneous vault which forms several angles, and the direction was guided by the foundations of the towers. As the arch is stopped up, it is not easy to trace it to the place where it originally opened; but, if it did not lead into the main sally-port, it led into a tower near it.—The tower in the ditch and the adjoining subterraneous works, are supposed by some to have been built by Hubert de Burgh, while the castle was besieged by the dauphin, in the reign of King John; but this was probably impracticable, as it cannot be supposed that the besiegers would have suffered the besieged to have carried on such a work, when they could so easily have prevented them. If this tower and the barbican were raised by Hubert de Burgh, it must have been in the interval of the dauphin's quitting the siege and returning to it again. That he might then erect them will indeed appear highly probable, when we consider how indefatigable Hubert de Burgh was in fortifying and defending this castle for his sovereign.—Lord St. John had a grant of Burleigh and Piling in Kent, and Popeshall in Hertfordshire, to repair and defend it.

From St. John's Tower the sally-port was continued across the ditch, and entered the bank on the opposite side in a strait direction, when it divided into three branches. The branch on the right hand going out of the castle had a tower at, or near, the opening, the remains of which are still to be seen in the side of the works; this was probably intended to cover the men in case they should have been pursued by the enemy, upon their return to the castle after a sally. How far the other two branches of this subterraneous work were continued, or whether they had any towers to guard their entrance next the country, like the other, cannot be determined by the present remaining works. It is certain they were continued farther than they now are; and the middle passage descends, though the other two ascend, from the place where the three passages branch off.

There were several gates in different parts of this barbican, secured by strong bolts and bars, to prevent or retard an enemy from proceeding into the castle, if they happened to force an entrance; which indeed was hardly practicable, the whole being so well defended by towers.

Crevequer's Tower was named Norfolk Tower, after Bigod earl of Norfolk, who had the command of it in the reign of Henry III. and a grant of the manors of Gravesend, Whitchling, and Sandling, in Kent, to repair it. The king, after his defeat at Lewes, was obliged by Leicester (who had almost all the royal family in his power) to sign an order to the governors of his castles, to deliver them up to the barons; and this castle, among the rest, was taken possession of by the confederate troops. This being considered as a place of safety, Leicester used to send such persons to be prisoners here as he chose to keep in safe custody. Prince Edward, after the defeat at Lewes, May the 14th, 1264, was sent and detained a prisoner here till the 28th of January in the following year; and then he was by an order of parliament delivered to the king, or, in other words, to Leicester, (as he had the king under his command,) till the artifice succeeded by which he made his escape. Prince Edward, soon after his enlargement, raised an army, and, on the 4th of August in the same year, defeated Leicester at the battle of Evesham, whose body was found among the slain.

After the death of the earl, his eldest son Simon Montfort, fearing the resentment of his sovereign, endeavoured to make Richard king of the Romans his friend, by releasing him without a ransom from Kenelworth castle where he had kept him a prisoner. The victory of Prince Edward was favourable to several prisoners taken at Lewes; but those at Dover castle did not find immediate relief from it.

The barons of the cinque-ports, hearing the affairs of the king were growing more prosperous, judged it necessary to take charge of the castle themselves, and to secure the prisoners. This news being brought to the king, Prince Edward prepared with all expedition to relieve his friends in Dover castle, in custody of the barons. It being hazardous to abide too long with a weak party, the prudent barons of the ports, finding themselves incapable of resisting for any length of time the forces coming against them, wisely judged it would be more to their interest to open a treaty before matters were pushed to an extremity, as they might then lose all; and, by holding out, there was but little prospect of getting any thing. In their articles of capitulation, they procured the honourable terms of keeping their horses, armour, and all their military accoutrements, when they delivered up the castle to the prince.

Passing from the guard-house towards the hospital, the first tower in the wall is Fitzwilliam's, or St. John's, tower. Adam Fitzwilliam, the first commander of this tower, attended William duke of Normandy into England, as marshal of his army; and, for his valour in the memorable battle of Hastings, (where Harold king of England was slain,) the Conqueror gave him his scarf from his own arm. There was formerly a noble and spacious sally-port from this tower: the entrance to it in the castle was in the Saxon ditch, on the right hand; and this, like the subterraneous work at Crevequer's tower, was originally intended not for foot only, but for cavalry. In this passage, under ground, there was a gate and portcullis; and the stone grooves in which the latter moved are still remaining. It was probably drawn up by the side of the tower within the castle walls. The sally-port was continued from the back of the tower across the ditch between two walls, which, for the greater security, were

were probably arched over. An arch was turned in the mason's work in the ditch, which, whilst it supported the side-walls, left a passage through from one side to the other; and above, between the two walls, the pass seems to have been made good by a draw-bridge between the tower and the bank, on the opposite side of the ditch. This bridge was necessary to stop the progress of an enemy in case they had forced the work beyond it. In the part of the sally-port which is in the high ground beyond the ditch, there was a large gate which moved upon two pivots fixed in sockets in the wall, and was hoisted up by a pulley fixed in the top of the arch; by slackening the gate suddenly, the weight of it would have driven every thing before it, if there had been any resistance made by the enemy in a close pursuit. It has been generally supposed that there was formerly a subterraneous passage from Crevequier's tower to this, and from this to Avaranche's tower, in the next angle, where, as authors have informed us, it turned, and passed on to Pincester's tower, and thence to the Roman camp. If there be any such tracks remaining, they are not now to be traced without some trouble and expence.

We will now proceed to describe the next tower, which is Avaranche's, or Maunsel's, tower, situated in the angle near the hospital. This is one of the noblest remains of the Norman towers in the castle. It was called Avaranche's from the first commander. The Maunsel who succeeded him, and got the tower called after his own name, was probably John Maunsel, a descendant of Philip Maunsel, who came over with William the Conqueror, as he was a person of some eminence, and lord-warden of the castle in the reign of Henry III. Maunsel had a grant from the king of Malton and Alkham to defend and repair it.

This tower, by the present appearance of it, was built entirely for defence; as there was no conveniency in it even for the temporary residence of a commander, unless there was originally another story more than there is left in the remaining ruin. The first floor of this tower was a kind of vault arched with stone but open in front; and in the wall, which is very thick, round part of this vault was a passage where you might ascend by stone steps, in which passage the archers might stand, one above another, and command the ditch on each side of the building through the loop-holes, as well as the approaches to it, from each side of the curtain. By this gallery or passage they ascended to the top of the first vault, and came out upon a platform over it, which was also partly surrounded by a wall, but not near so thick as that below. From this platform there is a circular staircase of stone leading to the top the tower. Exactly over the passage in the wall below was another passage covered with an arch supported with piers; opposite the interval between each pier were loop-holes in the walls of the tower which commanded the ditch; and near the end of the passage there was a machecolation in the wall for pouring out scalding water, burning sand, melted lead, or whatever the besieged pleased, upon the heads of the assailants.

The next tower in the other angle is Veville, or Pincester's tower. From this we will proceed to the following one, which is Earl Godwin's tower. This tower was built by Earl Godwin about the time of Canute the Great or Edward the Confessor. He held by grant Goodnestone, near Sandwich, where he had his seat for this particular purpose. At the back of this tower was a postern, through which

was a way under ground that came into the castle upon the vallum which joined the Roman and Saxon work. It was through this sally-port Stephen Pincester led his reinforcement to enable Hubert de Burgh to withstand the dauphin.

In the beginning of the barons' wars, it is said, the governor of Dover castle was a zealous partizan of the discontented nobles; but John prevailed upon him, by flattery, promises, and presents, to deliver up the government of the castle to him. As the fortress was so advantageously situated to prevent the descent of his foreign enemies, he took care to select a person attached to his interest, and one he could confide in, for this important trust. Hubert de Burgh had distinguished himself in the service of his brother Richard; and the king, knowing him to be active, loyal, prudent, brave, and learned in the laws of his country, appointed him governor of Dover castle. He also raised him to the dignity of earl of Kent and chief justiciary, by virtue of which office he could hold courts and assizes for the trial and punishment of malefactors; and this power continued with the lord-warden of the cinque ports after him. Hubert de Burgh, like every truly great and good man, was more intent upon discharging the duties of his office than enriching himself and his dependants at the expence of his sovereign's welfare and the public safety; he therefore began with rectifying such abuses as he found had crept into the garrison under former governors; and his aim was not only to correct but to abolish several old and adopt new regulations. As the king had the fullest confidence in the integrity and abilities of his new governor, Hubert de Burgh could easily obtain the royal assent to give energy to his plans. As there were many who held land, and were bound by the nature of their tenure to give their personal attendance for the defence of the castle, he changed the nature of their service, and they were obliged to pay 10s. each month to maintain a regular garrison. By adopting this plan, he procured a number of men and officers, whom he trained to their duty; and they were no longer, as they had hitherto been, ignorant of the service required of them. That they might not be taken by surprise, he ordered a watch to be kept during the night, either under the inspection of the marshal, or some proper officer of the guard. He ordered them to sound a horn or a trumpet every hour, to keep their sentinels awake at their respective posts: the sentinel at the great gate or entrance of the castle gave notice by the sound of the trumpet of what passed there to the rest of the garrison. But, while Hubert de Burgh was correcting old abuses, and introducing new regulations, he was obliged to prepare for the defence of the castle; as the dauphin, in conjunction with the disaffected barons, made several attempts to wrest it from him. It is said the dauphin cast up a work from the foot of the hill to the gate going into the castle, to cover his men; which work may still be traced on the side of the hill next the town. This siege was several times raised and renewed between the fifteenth of John and the first of Henry III. When Stephen Pincester had led his reinforcement into the castle, with proper arms and engines for annoying the besiegers, it gave such spirits to the garrison, and disheartened the dauphin so much, that he gave up all hopes of subduing the castle by force: he next endeavoured to obtain it by praises and promises. William Longsword and Hubert de Burgh's youngest brother, with upwards of forty

forty barons more, were deputed to confer with him concerning the state of affairs, and to prevail with him, if possible, to capitulate; as they said he had sufficiently shewn his loyalty to his king: but the governor of the castle did not estimate his loyalty by past dangers; nor the reward of his valour from the promises of grants of large possessions from the enemies of his sovereign; he refused, with the spirit of an Englishman, all the advantageous terms offered him; and the dauphin, tired out with fruitless attempts, was obliged to quit the siege, and leave his adversary in quiet possession of this important post. Hubert was liberally rewarded by the king for this singular attachment and service; but he was not long permitted to enjoy the laurels he had earned, nor to eat the fruits of his toils in peace. After the accession of Henry III. to the throne, he was accused by his enemies of crimes and misdemeanors; and, by their intrigues, he was seized, cast into prison, and dispossessed of his honours and estates. His friends so far prevailed by their intercessions, as to procure his enlargement; and that was all they could obtain for him; and, when he had neither title nor property, envy did not discover any ground for murmurs and complaints, and his enemies were then at peace with him. After struggling with a variety of misfortunes, he died at Banfted in Surry, in 1243.

Dover castle, in most of our civil commotions, generally attracted the attention of the leaders of each party; and, while one endeavoured to keep, the other strove as much to get, possession of it. So lately as Charles II. it was attempted and taken by surprize by a few men in the night. One Drake, a merchant, who was in opposition to the king, and a zealous partizan for the cause in which he was embarked, formed a plan to seize the garrison; and the first of August, 1642, about midnight, was the time fixed upon to put it in execution: every thing being prepared for the attempt, he, with ten or twelve men, by the assistance of ropes and scaling ladders, reached the top of the high cliff, with their muskets, undiscovered. Drake was probably well acquainted with this part of the castle, and knew that it was left unguarded, as it was thought inaccessible from the side next the sea: having reached the summit unmolested, they proceeded immediately to the post where the sentinel was placed, and, after securing or killing him, they threw open the gates; and the garrison, being few in number, and in the confusion of the night concluding he had a strong party with him, the officer on command surrendered up the castle to them. Drake immediately dispatched a messenger to Canterbury with the news of his success; and, the Earl of Warwick being there, he sent him fifty men, and the city seventy, to guard and defend the castle.

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 39.

OF MOULDS, CASES, MIXTURE, INSTRUMENTS, &c.

Rocket Moulds.

AS the performance of rockets depends much on their moulds, it is requisite to give a definition of them and their proportions:—They are made and proportioned by the diameter of their orifice, which are divided into parts.

The

The rammers should have a collar of brass at the bottom, to keep the wood from spreading or splitting, and the same proportion must be given to all moulds from 1 oz. to 6 lb. The handles of the rammers should be equal to the bore of the mould, and 2 diameters long; but the shorter you can use them, the better; for the longer the drift, the less will be the pressure on the composition by the blow given with the mallet.

Dimensions for Rocket Moulds, if the Rockets are rammed solid.

Weight of Rockets.		Length of Moulds without their Feet.	Interior Diameter of the Moulds.	Height of the Nipples.
lb.	oz.	Inches.	Inches.	Inches.
6	0	34,7	3,5	1,5
4	0	38,6	2,9	1,4
2	0	13,35	2,1	1,0
1	0	12,25	1,7	0,85
0	8	10,125	1,333, &c.	0,6
0	4	7,75	1,125	0,5
0	2	6,2	0,9	0,45
0	1	4,9	0,7	0,35
0	½	3,9	0,55	0,25
6 drams		3,5	0,5	0,225
4 drams		2,2	0,3	0,2

The diameter of the nipple must always be equal to that of the former. Those who make rockets for private amusement, should not ram them solid; for it requires a very skilful hand, and an expensive apparatus for boring them. Driving of rockets solid is the most expeditious method, but not so certain as ramming them over a piercer.

To roll Rocket and other Cases.—Sky-rocket cases are to be made 6½ of their exterior diameter long; and all other cases that are to be filled in moulds must be as long as the moulds, within half its interior diameter. Rocket-cases, from the smallest to 4 or 6 lb. are generally made of the strongest sort of cartridge paper, and rolled dry; but the large sort are made of pasted pasteboard. As it is very difficult to roll the ends of the cases quite even, the best way will be to keep a pattern of the paper for the different sorts of cases; which pattern should be somewhat longer than the case it is designed for, and on it marked the number of sheets required, which will prevent any paper being cut to waste. Having cut your papers of a proper size, and the last sheet for each case with a slope at one end, so that when the cases are rolled it may form a spiral line round the outside, and that this slope may always be the same, let the pattern be so cut for a guide. Before you begin to roll, fold down one end of the first sheet, so far that the fold will go two or three times round the former: then, on the double edge, lay the former with its handle off the table; and when you have rolled on the paper within two or three turns, lay the next sheet on that part which is loose, and roll it all on.

Having thus done, you must have a smooth board, about twenty inches long, and equal in breadth to the length of the case. In the middle of this board must be a handle placed lengthwise. Under this board lay your case, and let one end of the board lie on the table; then press hard on it, and push it forwards, which will roll

roll the paper very tight: do this three or four times before you roll on any more paper. This must be repeated every other sheet of paper, till the case is thick enough; but, if the rolling board be drawn backwards, it will loosen the paper: you are to observe, when you roll on the last sheet, that the point of the slope be placed at the small end of the roller. Having rolled your case to fit the mould, push in the small end of the former about 1 diameter from the end of the case, and put in the end-piece within a little distance of the former; then give the pinching cord one turn round the case, between the former and the end-piece; at first pull easy, and keep moving the case, which will make the neck smooth, and without large wrinkles. When the cases are hard to choak, let each sheet of paper (except the first and last, in that part where the neck is formed) be a little moistened with water: immediately after you have struck the concave stroke, bind the neck of the case round with small twine, which must not be tied in a knot, but fastened with two or three hitches.

Having thus pinched and tied the case so as not to give way, put it into the mould without its foot, and with a mallet drive the former hard on the end-piece, which will force the neck close and smooth. This done, cut the case to its proper length, allowing, from the neck to the edge of the mouth half a diameter, which is equal to the height of the nipple; then take out the former, and drive the case over the piercer with the long rammer, and the vent will be of a proper size. Wheel-cases must be drove on a nipple with a point to close the neck, and make the vent of the size required; which, in most cases, is generally ¼ of their interior diameter. As it is very often difficult, when the cases are rolled, to draw the roller out, you may make a hole through the handle, and put in it a small iron pin, by which you may easily turn the former round and pull it out.

Cases are commonly rolled wet, for wheels and fixed pieces; and when they are required to contain a great length of charge, the method of making those cases is thus: Your paper must be cut as usual, only the last sheet must not be cut with a slope: having your paper ready, paste each sheet on one side; then fold down the first sheet as before directed: but be careful that the paste do not touch the upper part of the fold; for, if the roller be wetted, it will tear the paper in drawing it out. In pasting the last sheet, observe not to wet the last turn or two in that part where it is to be pinched; for, if that part be damp, the pinching cord will stick to it, and tear the paper; therefore, when you choak those cases, roll a bit of dry paper once round the case, before you put on the pinching cord; but this bit of paper must be taken off after the case is choaked. The rolling board, and all other methods, according to the former directions for the rolling and pinching of cases, must be used to these as well as all other cases.

To make Tourbillon Cases.—Those sort of cases are generally made about 8 diameters long; but if very large 7 will be sufficient: tourbillons will answer very well from 4 oz. to 2 lb. but when larger there is no certainty. The cases are best rolled wet with paste, and the last sheet must have a straight edge, so that the case may be all of a thickness: when you have rolled your cases after the manner of wheel-cases, pinch them at one end quite close; then with the rammer drive the ends down flat, and afterwards ram in about ⅓ of a diameter of dried clay. The diameter of the former for these cases must be the

ſame as for ſky-rockets. Tourbillons are to be rammed in moulds without a nipple, or in a mould without its foot.

Balloon Caſes, or Paper Shells.—Firſt, you muſt have an oval former turned of ſmooth wood; then paſte a quantity of brown or cartridge paper, and let it lie till the paſte has quite ſoaked through; this done, rub the former with ſoap or greaſe, to prevent the paper from ſticking to it; then lay the paper on in ſmall ſlips, till you have made it $\frac{1}{4}$ of the thickneſs of the ſhell intended. Having thus done, ſet it to dry; and, when dry, cut it round the middle, and the two halves will eaſily come off: but obſerve, when you cut, to leave about 1 inch not cut, which will make the halves join much better than if quite ſeparated. When you have ſome ready to join, place the halves even together, paſte a ſlip of paper round the opening to hold them together, and let that dry; then lay on paper all over as before, everywhere equal, excepting that end which goes downwards in the mortar, which may be a little thicker than the reſt; for that part which receives the blow from the powder in the chamber of the mortar conſequently requires the greateſt ſtrength. When the ſhell is thoroughly dry, burn a round vent at top, with ſquare iron, large enough for the fuze: this method will do for balloons from $4\frac{2}{5}$ inches to 8 inches diameter; but if they are larger, or required to be thrown a great height, let the firſt ſhell be turned of elm, inſtead of being made of paper.

For a balloon of $4\frac{2}{5}$ inches, let the former be 3 inches $\frac{1}{8}$ diameter, and $5\frac{1}{2}$ inches long. For a balloon of $5\frac{1}{2}$ inches, the diameter of the former muſt be 4 inches, and 8 inches long. For a balloon of 8 inches, let the diameter of the former be 5 inches and $\frac{15}{16}$, and $11\frac{7}{8}$ long. For a 10-inch balloon, let the former be $7\frac{3}{16}$ diameter, and $14\frac{1}{2}$ inches long. The thickneſs of a ſhell for a balloon of $4\frac{2}{5}$ inches muſt be $\frac{1}{2}$ inch. For a balloon of $5\frac{1}{2}$ inches, let the thickneſs of the paper be $\frac{5}{8}$ of an inch. For an 8-inch balloon, $\frac{7}{8}$ of an inch. And for a 10-inch balloon, let the ſhell be $1\frac{1}{8}$ inch thick.

Shells that are deſigned for ſtars only, may be made quite round, and the thinner they are at the opening, the better; for if they are too ſtrong, the ſtars are apt to break at the burſting of the ſhell: when you are making the ſhell, make uſe of a pair of calibres, or a round gage, ſo that you may not lay the paper thicker in one place than another; and alſo to know when the ſhell is of a proper thickneſs. Balloons muſt always be made to go eaſy into the mortars.

Caſes for illumination Port-fires.—Theſe muſt be made very thin of paper, and rolled on formers, from $\frac{1}{4}$ to $\frac{5}{8}$ of an inch diameter, and from 2 to 6 inches long: they are pinched cloſe at one end, and left open at the other. When you fill them, put in but a little compoſition at a time, and ram it in lightly, ſo as not to break the caſe: 3 or 4 rounds of paper, with the laſt round paſted, will be ſtrong enough for theſe caſes.

Caſes and Moulds for common Port-fires.—Common port-fires are intended purpoſely to fire the works, their fire being very ſlow, and the heat of the flame ſo intenſe, that, if applied to rockets, leaders, &c. it will fire them immediately. Port-fires may be made of any length, but are ſeldom made more than 21 inches long: the interior diameter of port-fire moulds ſhould be $\frac{10}{16}$ of an inch, and the diameter of the former $\frac{1}{2}$ an inch. The caſes muſt be rolled wet with paſte, and one end pinched, or folded down. The moulds ſhould be made

made of brass, and to take in two pieces lengthwise; when the case is in the two sides, they are held together by brass rings, or hoops, which are made to fit over the outside. The bore of the mould must not be made quite through, so that there will be no occasion for a foot. Those port-fires, when used, are held in copper sockets, fixed on the end of a long stick: these sockets are made like port-crayons, only with a screw instead of a ring.

Of mixing the Compositions.—The performance of the principal part of fire-works depends much on the compositions being well mixed; therefore great care must be taken in this part of the work, particularly for the composition for sky-rockets. When you have four or five pounds of ingredients to mix, which is a sufficient quantity at a time (for a larger proportion will not do so well), first put the different ingredients together; then work them about with your hands, till you think they are pretty well incorporated: after which put them into a lawn sieve with a receiver and top to it; and if, after it is sifted, any remains that will not pass through the sieve, grind it again till fine enough; and, if it be twice sifted, it will not be amiss; but the compositions for wheels and common works are not so material, nor need be so fine. But in all fixed works, from which the fire is to play regular, the ingredients must be very fine, and great care taken in mixing them well together; and observe, that in all compositions wherein are steel or iron filings, the hands must not touch; nor will any works which have iron or steel in their charge keep long in damp weather, unless properly prepared, according to the following directions.

To perserve Steel or Iron Filings.—It sometimes may happen, that fire-works may be required to be kept a long time, or sent abroad; neither of which could be done with brilliant fires, if made with filings unprepared; for this reason, that the saltpetre being of a damp nature, it causes the iron to rust; the consequence of which is, that, when the works are fired, there will appear but very few brilliant sparks, but instead of them a number of red and drossy sparks; and besides, the charge will be so much weakened, that if this was to happen to wheels, the fire will hardly be strong enough to force them round. But, to prevent such accidents, prepare your filings thus:—Melt in a glazed earthen pan some brimstone over a slow fire, and when melted throw in some filings; which keep stirring about till they are covered with brimstone: this you must do while it is on the fire; then take it off, and stir it very quick till cold, when you must roll it on a board with a wooden roller, till you have broke it as fine as corn powder; after which sift from it as much of the brimstone as you can. There is another method of preparing filings, so as to keep two or three months in winter; this may be done by rubbing them between the strongest sort of brown paper, which before has been moistened with linseed oil. If the brimstone should take fire, you may put it out, by covering the pan close at top: it is not of much signification what quantity of brimstone you use, so that there is enough to give each grain of iron a coat; but as much as will cover the bottom of a pan of about 1 foot diameter, will do for 5 or 6 pound of filings, or cast-iron for gerbes.

To drive or ram Sky-rockets, &c.—Rockets drove over a piercer must not have so much composition put in them at a time as when drove solid; for the piercer, taking up a great part of the bore of the case,

 would

would cause the rammer to rise too high; so that the pressure of it would not be so great on the composition, nor would it be drove every where equal. To prevent this, observe the following rule:—That for those rockets which are rammed over a piercer, let the ladle hold as much composition as, when drove, will raise the drift $\frac{1}{3}$ the interior diameter of the case, and for those drove solid to contain as much as will raise it $\frac{1}{2}$ the exterior diameter of the case: ladles are generally made to go easy in the case, and the length of the scoop about $1\frac{1}{2}$ of its own diameter.

The charge of rockets must always be drove 1 diameter above the piercer, and on it must be rammed $\frac{1}{3}$ of a diameter of clay: through the middle of which bore a small hole to the composition, that, when the charge is burnt to the top, it may communicate its fire, through the hole, to the stars in the head. Great care must be taken to strike with the mallet, and with an equal force, the same number of strokes, to each ladlefull of charge; otherwise the rockets will not rise with an uniform motion, nor will the composition burn equal and regular: for which reason they cannot carry a proper tail; for it will break before the rocket has got half way up, instead of reaching from the ground to the top, where the rocket breaks and disperses the stars, rains, or whatever is contained in the head. When you are ramming, keep the drift constantly turning or moving; and, when you use the hollow rammers, knock out of them the composition now and then, or the piercer will split them. To a rocket of 4 oz. give to each ladle-full of charge 16 strokes; to a rocket of 1 lb. 28; to a 2-pounder, 36; to a 4-pounder, 42; and to a 6-pounder, 56: but rockets of a larger sort cannot be drove well by hand, but must be rammed with a machine made in the same manner as those for driving piles.

The method of ramming of wheel-cases, or any other sort, in which the charge is drove solid, is much the same as sky-rockets; for the same proportion may be observed in the ladle, and the same number of strokes given, according to their diameters, all cases being distinguished by their diameters. In this manner, a case, whose bore is equal to a rocket of 4 oz. is called a 4-oz. case, and that which is equal to an 8-oz. rocket an 8-oz. case, and so on, according to the different rockets.

Having taught the method of ramming cases in moulds, we shall here say something concerning those filled without moulds; which method, for strong pasted cases, will do extremely well, and save the expence of making so many moulds. The reader must here observe, when he fills any sort of cases, to place the mould on a perpendicular block of wood, and not on any place that is hollow; for we have found by experience, that when cases were rammed on driving benches, which were formerly used, the works frequently miscarried, on account of the hollow resistance of the benches, which oft jarred and loosened the charge in the cases; but this accident never happens when the driving blocks are used.

When cases are to be filled without moulds, proceed thus. Have some nipples made of brass or iron, of several sorts and sizes, in proportion to the cases, and to screw or fix in the top of the driving block; when you have fixed in a nipple, make, at about $1\frac{1}{2}$ inch from it, a square hole in the block, six inches deep and one inch diameter; then have a piece of wood, 6 inches longer than the case intended

intended to be filled, and 2 inches square; on one side of it cut a groove almost the length of the case, whose breadth and depth must be sufficient to cover near ½ the case; then cut the other end to fit the hole in the block, but take care to cut it so that the groove may be of a proper distance from the nipple; this half-mould being made and fixed tight in the block, cut, in another piece of wood nearly of the same length as the case, a groove of the same dimensions as that in the fixed piece; then put the case on the nipple, and with a cord tie it and the 2 half-moulds together, and your case will be ready for filling.

The dimensions of the above-described half-moulds are proportionable for cases of 8 ounces; but notice must be taken, that they differ in size in proportion to the cases. The clay, mentioned in this article, must be prepared after this manner:—Get some clay, in which there is no stones nor sand, and bake it in an oven till quite dry; then take it out and beat it to a powder, and afterwards sift it through a common hair-sieve, and it will be fit for use.

Proportion of Mallets.—The best wood for mallets is dry beech. If a person uses a mallet of a moderate size, in proportion to the rocket, according to his judgment, and if the rocket succeeds, he may depend on the rest; by using the same mallet; yet it will be necessary that cases of different sorts be drove with mallets of different sizes.

The following proportion of the mallets for rockets of any size, from 1 oz. to 6 lb. may be observed; but as rockets are seldom made less than 1 oz. or larger than 6 lb. we shall leave the management of them to the curious; but all cases under 1 oz. may be rammed with an oz. rocket-mallet. Your mallets will strike more solid, by having their handles turned out of the same piece as the head, and made in a cylindrical form. Let their dimensions be worked by the diameters of the rockets: for example; let the thickness of the head be 3 diameters, and its length 4, and the length of the handle 5 diameters, whose thickness must be in proportion to the hand.

Manner of heading Rockets.—When the collar is to be glued on the rocket, you must cut two or three rounds of paper off the case, which will make a shoulder for it to rest upon. Two or three rounds of paper well pasted will be enough for the head, which, when rolled, put the collar on, which must fit the inside of it; then, with the pinching cord pinch the bottom of the head into the groove, and tie it with small twine. To make the caps, cut your paper in round pieces, equal in diameter to twice the length of the cone you intend to make; which pieces being cut into halves, will make two caps each, without wasting any paper; having formed the caps, paste over each of them a thin white paper, which must be a little longer than the cone, so as to project about ¼ an inch below the bottom: this projection of paper, being notched and pasted, serves to fasten the cap to the head.

When you load the heads of your rockets, with stars, rains, serpents, crackers, scrolls, or any thing else, according to your fancy, remember always to put 1 ladlefull of meal-powder into each head, which will be enough to burst the head, and disperse the stars, or whatever it contains: when the heads are loaded with any sort of cases, let their mouths be placed downwards; and after the heads are filled, paste on the top of them a piece of paper, before you put on the caps. As the size of the stars often differ, it would be need-

less to give an exact number for each rocket; but this rule may be observed, that the heads may be nearly filled with whatever they are loaded.

Decorations for Sky-rockets.—Sky-rockets bearing the pre-eminence of all fire-works, it will not be improper to treat of their various kinds of decorations, which are directed according to fancy. Some are headed with stars of different sorts, such as tailed, brilliant, white, blue, and yellow, stars, &c. some with gold and silver rain; others with serpents, crackers, firescrolls, marrons; and some with small rockets, and many other devices, as the maker pleases.

Dimensions and Poise of Rocket-sticks.

Weight of the Rocket		Length of the Stick.		Thickness at Top.	Breadth at Top.	Square at Bottom.	Poise from the Point of the Cone.	
lb.	oz.	F.	in.	Inches.	Inches.	Inches.	F.	in.
6	0	14	0	1,5	1,85	0,75	4	1,5
4	0	12	10	1,25	1,40	0,625	3	9,
2	0	9	4	1,125	1,	0,525	2	9,
1	0	8	2	0,725	0,80	0,375	2	1,
	8	6	6	0,5	0,70	0,25	1	10,4
	4	5	3	0,3750	0,55	0,35	1	8,5
	2	4	1	0,3	0,45	0,15	1	3,
	1	3	6	0,25	0,35	0,10	10	0,
	½	2	4	0,125	0,20	0,16	8	0,
	¼	1	10½	0,1	0,15	0,5	5	0,5

The last column on the right, in the above table, expresses the distance from the top of the cone, where the stick, when tied on, should balance the rocket, so as to stand in an equilibrium on one's finger or the edge of a knife. The best wood for the sticks is dry deal, made thus. When you have cut and planed the sticks according to the dimensions given in the table, cut, on one of the flat sides at the top, a groove the length of the rocket, and as broad as the stick will allow; then, on the opposite flat side, cut two notches for the cord, which ties on the rocket, to lie in; one of those notches must be near the top of the stick, and the other facing the neck of the rockets; the distance between these notches may easily be known, for the top of the stick should always touch the head of the rocket. When your rockets and sticks are ready, lay the rockets in the grooves in the sticks, and tie them on. Those who, merely for curiosity, may choose to make rockets of different sizes from those expressed in the table of dimensions, may find the length of their sticks, by making them, for rockets from ½ oz. to 1 lb. 60 diameters of the rocket long; and for rockets above 1 lb. 50 or 52 diameters will be a good length; their thickness at top may be about ½ a diameter, and their breadth a very little more; their square at buttom is generally equal to ½ the thickness at the top. But, although the dimensions of the sticks be very nicely observed, you must depend only on their balance; for, without a proper counterpoise, your rockets, instead of mounting perpendicularly, will take an oblique direction, and fall to the ground before they are burnt out.

(To be continued.)

DESCRIPTION

DESCRIPTION OF THE ROCKING STONES.

THE Logan ſtone is of a prodigious ſize, ſo exactly poiſed, that it would rock or ſhake with the ſmalleſt force. Of theſe ſtones the ancients give us ſome account. Pliny ſays, that at Harpaſa, a town of Aſia, there was a rock of ſuch a wonderful nature, that if touched with the finger it would ſhake, but could not be moved from its place with the whole force of the body. Ptolemy Hepheſtion mentions a gygonion ſtone near the ocean, which was agitated when ſtruck by the ſtalk of an aſphodel, but could not be removed by a great exertion of force. The word *gygonian* ſeems to be Celtic; for *gwingog* ſignifies *motitans*, the rocking-ſtone.

Many rocking ſtones are to be found in different parts of this iſland; ſome natural, others artificial, or placed in their poſition by human art. In the pariſh of St. Leven, Cornwall, there is a promontary called *Caſtle Treryn*. On the weſtern ſide of the middle group, near the top, lies a very large ſtone, ſo evenly poiſed that any hand may move it from one ſide to another; yet it is ſo fixed on its baſe, that no lever, nor any mechanical force, can remove it from its preſent ſituation. It is called the *Logan-ſtone*, and is at ſuch a height from the ground that no perſon can believe that it was raiſed to its preſent poſition by art. But there are other rocking ſtones, which are ſo ſhaped, and ſo ſituated, that there can be no doubt but they were erected by human ſtrength. Of this kind Borlaſe thinks the great *Quoit* or *Karn-lehau*, in the pariſh of Tywidnck, to be. It is thirty-nine feet in circumference, and four feet thick at a medium, and ſtands on a ſingle pedeſtal. There is alſo a remarkable ſtone of the ſame kind in the iſland of St. Agnes in Scilly. The under rock is ten feet ſix inches high, forty-ſeven feet round the middle, and touches the ground with no more than half its baſe. The upper rock reſts on one point only, and is ſo nicely balanced, that two or three men with a pole can move it. It is eight feet ſix inches high, and forty-ſeven in circumference. On the top there is a baſon hollowed out, three feet eleven inches in diameter at a medium, but wider at the brim, and three feet deep. From the globular ſhape of this upper ſtone, it is highly probable that it was rounded by human art, and perhaps even placed on its pedeſtal by human ſtrength. In Sithney pariſh, near Helſton, in Cornwall, ſtood the famous logan, or rocking-ſtone, commonly called *Men Amber*, q. d. *Men an Bar*, or the *top-ſtone*. It was eleven feet by ſix, and four high, and ſo nicely poiſed on another ſtone that a little child could move it, and all travellers who came this way deſired to ſee it. But Shrubſall, Cromwell's governor of Pendennis, with much ado cauſed it to be undermined, to the great grief of the country. There are ſome marks of the tool on it, and, by its quadrangular ſhape, it was probably dedicated to Mercury.

That the rocking ſtones are monuments erected by the Druids cannot be doubted; but tradition has not informed us for what purpoſe they were intended. Mr. Toland thinks that the Druids made the people believe that they alone could move them, and that by a miracle; and that by this pretended miracle they condemned or acquitted the accuſed, and brought criminals to confeſs what could not otherwiſe be extorted from them. How far this conjecture is right we

shall leave to those who are deeply versed in the knowledge of antiquities to determine.

There are likewise sonorous stones, remarkable for emitting an agreeable sound when struck, and much used in China for making musical instruments which they call *king*.—The various kinds of sonorous stones known in China differ considerably from one another in beauty, and in the strength and duration of their tone; and what is very surprising, is, that this difference cannot be discovered either by the different degrees of their hardness, weight, or fineness of grain, or by any other qualities which might be supposed to determine it. Some stones are found remarkably hard, which are very sonorous; and others exceedingly soft, which have an excellent tone; some extremely heavy emit a very sweet sound; and there are others as light as pumice-stone which have also an agreeable sound.

The chemists and naturalists of Europe have never yet attempted to discover, whether some of our stones may not have the same properties as the sonorous stones of the extremities of Asia. It however appears, that the Romans were formerly acquainted with a sonorous stone of the class of *hiang-che*. Pliny (says the Abbé du Bos, in his Reflections on Poetry and Painting, when speaking of curious stones) observes that the stone called *chalcophonas*, or *brazen sound*, is black; and that, according to the etymology of its name, it sends forth a sound much resembling that of brass when it is struck. The passage of Pliny is as follows:—*Chalcophonas nigra est; sed elisa æris tinnitum reddit.*

Some sonorous stones have been sent into France, and the late Duke de Chaulnes examined them with particular attention. The following are some of his observations: "The Academy of Sciences, Mr. Rouné de Lisle, and several other learned mineralogists, when asked if they were acquainted with the black stone of which the Chinese king was made, for answer cited the passage of Pliny mentioned by Boethius de Bott, Linnæus, and in the Dictionary of Bomare, and added what Mr. Anderson says in his Natural History of Iceland respecting a bluish kind of stone which is very sonorous. As the black stone of the Chinese becomes of a bluish colour when filed, it is probably of the same species. None of the rest who were consulted had ever seen it. The Chinese stone has a great resemblance at first sight to black marble, and like it is calcareous; but marble generally is not sonorous. It also externally resembles touch-stone, which is a kind of basaltes, and the basaltes found near volcanos; but these two stones are vitrifications."

The duke next endeavoured to procure some information from the stone-cutters. They all replied, that blue-coloured marble was very sonorous, and that they had seen large blocks of it which emitted a very strong sound; but, the duke having ordered a king to be constructed of this kind of stone, it was found that it did not possess that property. By trying the black marble of Flanders, a piece was at length found which emitted an agreeable sound: it was cut into a king, which is almost as sonorous as those of China. All these observations give us reason to believe that the stones of which the king are formed are nothing else but a black kind of marble, the constituent parts of which are the same as those of the marble of Europe, but that some difference in their organization renders them more or less sonorous."

Or

ON THE ORIGIN OF SPRINGS.

VARIOUS have been the conjectures of philosophers concerning the origin of fountains, and great pains have been taken, both by the members of the Royal Society and those of the Academy of Sciences at Paris, in order to ascertain the true cause of it. It was Aristotle's opinion, and held by most of the ancient philosophers after him, that the air contained in the caverns of the earth, being condensed by cold near its surface, was thereby changed into water; and that it made its way through where it could find a passage. But we have no experience of any such transmutation of air into water.

Those who imagine that fountains owe their origin to waters brought from the sea by subterraneous ducts, give a tolerable account how they lose their saltness by percolation as they pass through the earth: but they find great difficulty in explaining by what power the water rises above the level of the sea to near the tops of mountains, where springs generally abound; it being contrary to the laws of hydrostatics, that a fluid should rise in a tube above the level of its source. However, they have found two ways whereby they endeavour to extricate themselves from this difficulty. The one is that of Des Cartes, who imagines, that, after the water is become fresh by percolation, it is raised out of the caverns of the earth in vapour towards its surface; where, meeting with rocks near the tops of mountains in the form of arches or vaults, it sticks to them, and runs down their sides, (like water in an alembic,) till it meets with proper receptacles, from which it supplies the fountains. Now this is a mere hypothesis, without foundation or probability; for, in the first place, we know of no internal heat of the earth to cause such evaporation; or, if that were allowed, yet it is quite incredible that there should be any caverns so smooth and void of protuberances as to answer the ends of an alembic, in collecting and condensing the vapours together in every place where fountains arise. There are others (as Varenius, &c.) who suppose that the water may rise through the pores of the earth, as through capillary tubes by attraction. But hereby they shew, that they are quite unacquainted with what relates to the motion of a fluid through such tubes; for when a capillary tube opens into a cavity at its upper end, or grows larger and larger, so as to cease to be capillary at that end, the water will not ascend through that tube into the cavity, or beyond where the tube is capillary; because that part of the periphery of the cavity, which is partly above the surface of the water and partly below it, is not of the capillary kind. Nay, if the cavity is continually supplied with water, it will be attracted into the capillary tube, and run down it as through a funnel, if the lower end is immerged in the same fluid, as in this case it is supposed to be.

It has been a generally-received opinion, and much espoused by Mariotte (a diligent observer of nature), that the rise of springs is owing to the rains and melted snow. According to him, the rain-water which falls upon the hills and mountains, penetrating the surface, meets with clay or rocks contiguous to each other; along which it runs, without being able to penetrate them, till, being got to the bottom of the mountain, or to a considerable distance from the top, it breaks out of the ground, and forms springs.

In

In order to examine this opinion, Mr. Perrault, De la Hire, and D. Sideleau, endeavoured to make an estimate of the quantity of rain and snow that falls in the space of a year, to see whether it would be sufficient to afford a quantity of water equal to that which is annually discharged into the sea by the rivers. The result of their inquiries was, that the quantity of rain and snow which fell in a year into a cylindrical vessel would fill it (if secured from evaporating) to the height of about nineteen inches. Which quantity D. Sideleau shewed, was not sufficient to supply the rivers; for that those of England, Ireland, and Spain, discharge a greater quantity of water annually, than the rain, according to that experiment, is able to supply. Besides which, another observation was made by them at the same time, viz. that the quantity of water raised in vapour, one year with another, amounted to about thirty-two inches, which is thirteen more than falls in rain: a plain indication that the water of fountains is not supplied by rain and melted snow.

Thus the true cause of the origin of fountains remained undiscovered, till Dr. Halley, in making his celestial observations upon the tops of the mountains at St. Helena, about eight hundred yards above the level of the sea, found, that the quantity of vapour which fell there (even when the sky was clear) was so great, that it very much impeded his observations, by covering his glasses with water every half quarter of an hour; and upon that he attempted to determine by experiment the quantity of vapour exhaled from the surface of the sea, as far as it rises from heat, in order to try whether that might be a sufficient supply for the water continually discharged by fountains. The process of his experiment was as follows:—He took a vessel of water salted to the same degree with that of sea-water, in which he placed a thermometer; and by means of a pan of coals brought the water to the same degree of heat which is observed to be that of the air in our hottest summer; this done, he fixed the vessel of water with the thermometer in it to one end of a pair of scales, and exactly counterpoised it with weights on the other: then, at the end of two hours, he found, by the alteration made in the weight of the vessel, that about a sixtieth part of an inch of the depth of the water was gone off in vapour; and therefore, in twelve hours, one-tenth of an inch would have gone off. Now this very accurate observer allows the Mediterranean Sea to be forty degrees long and four broad, (the broader parts compensating for the narrower, so that its whole surface is 160 square degrees;) which, according to the experiment, must yield at least 5,280,000,000 tons of water:—in which account no regard is had to the wind and the agitation of the surface of the sea, both which undoubtedly promote the evaporation.

It remained now to compare this quantity of water with that which is daily conveyed into the same sea by the rivers. The only way to do which was to compare them with some known river; and accordingly he takes his computation from the river Thames; and, to avoid all objections, makes allowances, probably greater than what were absolutely necessary.

The Mediterranean receives the following considerable rivers, viz. the Iberus, the Rhone, the Tyber, the Po, the Danube, the Niester, the Borysthenes, the Tanais, and the Nile. Each of these he supposes to bring down ten times as much water as the Thames, whereby he

he allows for ſmaller rivers which fall into the ſame ſea. The Thames, then, he finds by menſuration to diſcharge about 20,300,000 tons of water a-day. If therefore the above-ſaid nine rivers yield ten times as much water as the Thames doth, it will follow that all of them together yield but 1827 millions of tons in a day, which is but little more than one-third of what is proved to be raiſed in vapour out of the Mediterranean in the ſame time. We have therefore from hence a ſource abundantly ſufficient for the ſupply of fountains.

Now, having found that the vapour exhaled from the ſea is a ſufficient ſupply for the fountains, he proceeds in the next place to conſider the manner in which they are raiſed; and how they are condenſed into water again, and conveyed to the ſources of ſprings.

In order to this he conſiders, that, if an atom of water were expanded into a ſhell or bubble ſo as to be ten times as big in diameter as when it was water, that atom would become ſpecifically lighter than air; and therefore would riſe ſo long as the warmth which firſt ſeparated it from the ſurface of the water ſhould continue to diſtend it to the ſame degree; and conſequently, that vapours may be raiſed from the ſurface of the ſea in that manner, till they arrive at a certain height in the atmoſphere, at which they find air of equal ſpecific gravity with themſelves. Here they will float till, being condenſed by cold, they become ſpecifically heavier than the air, and fall down in dew; or being driven by the winds againſt the ſides of mountains (many of which far ſurpaſs the uſual height to which the vapours would of themſelves aſcend), are compelled by the ſtream of the air to mount up with it to the tops of them; where being condenſed into water, they preſently precipitate, and gleeting down by the crannies of the ſtones, part of them enters into the caverns of the hills; which being once filled, all the overplus of water that comes thither runs over by the loweſt place, and breaking out by the ſides of the hills forms ſingle ſprings. Many of theſe running down by the valleys between the ridges of the hills, and coming to unite, form little rivulets or brooks: many of theſe again meeting in one common valley, and gaining the plain ground, being grown leſs rapid, become a river; and many of theſe being united in one common channel, make ſuch ſtreams as the Rhine and the Danube; which latter, he obſerves, one would hardly think to be a collection of water condenſed out of vapour, unleſs we conſider how vaſt a tract of ground that river drains, and that it is the ſum of all thoſe ſprings which break out on the ſouth ſide of the Carpathian mountains, and on the north ſide of the immenſe ridge of the Alps, which is one continued chain of mountains from Switzerland to the Black Sea.

Thus one part of the vapours which are blown on the land is returned by the rivers into the ſea from whence it came. Another part falls into the ſea before it reaches the land; and this is the reaſon why the rivers do not return ſo much water into the Mediterranean as is raiſed in vapour. A third part falls on the low lands, where it affords nouriſhment to plants; yet it does not reſt there, but is again exhaled in vapour by the action of the ſun, and is either carried by the winds to the ſea to fall in rain or dew there, or elſe to the mountains to become the ſources of ſprings.

However, it is not to be ſuppoſed that all fountains are owing to one and the ſame cauſe; but that ſome proceed from rain and melted

ſnow, which, ſubſiding through the ſurface of the earth, makes its way into certain cavities, and thence iſſues out in the form of ſprings; becauſe the waters of ſeveral are found to increaſe and diminiſh in proportion to the rain which falls: that others again, eſpecially ſuch as are ſalt, and ſpring near the ſea-ſhore, owe their origin to ſea-water percolated through the earth; and ſome to both theſe cauſes: though without doubt moſt of them, and eſpecially ſuch as ſpring near the tops of high mountains, receive their waters from vapours, as before explained.

This reaſoning of Dr. Halley's is confirmed by more recent obſervations and diſcoveries. It is now found, that, though water is a tolerable conductor of the electric fluid, dry earth is an electric *per ſe*, conſequently the dry land muſt always be in an electrified ſtate compared with the ocean. It is alſo well known, that ſuch bodies as are in an electrified ſtate, whether *plus* or *minus*, will attract vapour, or other light ſubſtances that come near them. Hence the vapours that are raiſed from the ocean muſt neceſſarily have a tendency to approach the land in great quantity, even without the aſſiſtance of the wind, though this laſt muſt undoubtedly contribute greatly towards the ſame purpoſe, as Dr. Halley juſtly obſerves. In like manner, the higher grounds are always in a more electrified ſtate than the lower ones: and hence the vapours, having once left the ocean and approached the ſhore, are attracted by the high mountains; of which Mr. Pennant gives an inſtance in Snowdon. Hence we may ſee the reaſon why ſprings are ſo common in the neighbourhood of mountains, they being ſo advantageouſly formed in every reſpect for collecting and condenſing the vapours into water.

The heat of ſprings is generally the ſame with the mean temperature of the atmoſphere. The mean temperature of the ſouth of England is 48°; in Scotland, near Edinburgh, it is 45°; in the north of Ireland it is 48°, and on the ſouth coaſt about 51°. At Upſal, in Sweden, it is 43°, and in Paris 53°. According to accurate experiments made by eminent philoſophers, the heat of the ſprings in theſe different countries correſponds with the medium temperature. We have not heard that ſimilar experiments have been made in other countries, or we ſhould have been careful to collect them. We do not, however, doubt but they have been made in moſt countries of Europe; yet we ſuſpect little attention has been paid to this ſubject within the tropical regions.

Though this coincidence of the heat of ſprings with the mean temperature of the climate where they flow, ſeems to be a general fact, yet it admits of many exceptions. In many parts of the world there are ſprings which not only exceed the mean temperature, but even the ſtrongeſt meridian heat ever known in the torrid regions. The following table will give a diſtinct notion of the degrees of heat which different ſprings have been found to poſſeſs, according to the experiments of philoſophers. It is neceſſary to remark, that experiments made upon the ſame ſprings, made by different perſons, vary a little from one another, which may be owing to many accidents eaſily accounted for. Where this is the caſe, we ſhall mention both the loweſt and higheſt degree of heat which has been aſcribed to the ſame ſpring, according to Fahrenheit's thermometer.

Briſtol,

Springs.	Highest Deg. of Heat.	Lowest.
Briſtol, (St. Vincent's, or the Hot-well,)	84	76
Buxton, (Gentleman's bath,)	82	
Matlock,	69	
Bath, (King's bath,)	119	113
Aix-la-Chapelle,	146	136
Barege,	122	
Piſa,	104	
Caroline Baths in Bohemia, (prudel, or furious,)	165	
Iceland, (Geyzer,)	212	

In cold countries, where congelation takes place, the heat of the earth is conſiderably above the freezing point, and continues ſo through the whole year. From experiments that have been made in mines and deep pits, it appears that this heat is uniform and ſtationary at a certain depth. But as the heat of theſe ſprings far exceeds the common heat of the internal parts of the earth, it muſt be occaſioned by cauſes peculiar to certain places; but what theſe cauſes are it is no eaſy matter to determine. We are certain, indeed, that hot ſprings receive their heat from ſome ſubterranean cauſe; but it is a matter of difficulty to inveſtigate how this heat is produced and preſerved. Theories, however, have been formed on this ſubject. The ſubterranean heat has been aſcribed to the electrical fluid, and to a great body of fire in the centre of the earth: but we ſuſpect that the nature of the electrical fluid and its effects are not ſufficiently underſtood. As to the ſuppoſition that the heat of ſprings is owing to a central fire, it is too hypothetical to require any refutation. From what then does this heat originate, and whence is the fuel which has produced it for ſo many ages? To enable us to anſwer theſe queſtions with preciſion, more information is neceſſary than we have hitherto obtained reſpecting the ſtructure of the internal parts of the earth. It is peculiarly requiſite that we ſhould be made acquainted with the foſſils which are moſt common in thoſe places where hot ſprings abound. We ſhould then perhaps diſcover that hot ſprings always paſs thro' bodies of a combuſtible nature. It is well known to chemiſts, that, when water is mixed with the vitriolic acid, a degree of heat is produced ſuperior to that of boiling water. It is alſo an eſtabliſhed fact, that when water meets with pyrites, that is, a mixture of ſulphur and iron, a violent inflammation takes place. If, therefore, we could prove that theſe materials exiſt in the ſtrata from which hot ſprings are derived, we ſhould be enabled to give a ſatisfactory account of this curious phenomenon. As ſome apology for this ſuppoſition, we may add, that moſt of the hot ſprings mentioned above have been found by analyſis to be impregnated with ſulphur, and ſome of them with iron. It muſt, however, be acknowledged, that the hot ſprings of Iceland, which are 112°, the heat of boiling water, according to an accurate analyſis of their contents by the ingenious Dr. Black, were neither found to contain iron nor ſulphur. It will therefore, perhaps, be neceſſary that we ſhould wait with patience, till the ſciences of chemiſtry and mineralogy ſhall be ſo far advanced as to enable us to form a permanent theory on this ſubject.

Springs are of different kinds. Some are perennial, or continue to flow during the whole year; others flow only during the rainy ſeaſon; ſome ebb and flow. At Torbay there is one of this kind,

which ebbs and flows five or six inches every hour. There is another near Corifo in Italy, which ebbed and flowed three times a-day in the time of Pliny, and continues to do still. A spring near Henley sometimes flows for two years together, and then dries up for an equal period.

The following account of the wonderful faculty of the Houzuanas, a tribe of Hottentots, in discovering subterraneous springs, is extracted from the third volume of Le Vaillant's Travels into the interior of Africa, by the Cape of Good Hope:—

"When on a journey, a scarcity of water gives them (the Houzuanas) no uneasiness, even in the middle of a desert. By a particular art they can discover water that is concealed in the bowels of the earth; and their instinct, in this point, is even superior to that of the other Africans. Animals, in like cases, also find water; but it is only by the smell. There must be a current of air to convey to them the exhalation which rises from it; and consequently they must be to windward. Whilst I resided in the desert, during my first journey, the savages had shewn more than once the same faculty; and I myself acquired it also from their instruction, as I have mentioned in my narrative.

"The Houzuana, more expert, employs only his sight. He throws himself flat on the ground, takes a distant view, and, if the space which he traverses with his eye conceals any subterraneous spring, he rises and points with his finger to the spot where it is to be found. The only thing by which he discovers it is, that ethereal and subtile exhalation which evaporates from every current of water, when not sunk to too great a depth.

"With regard to pools and other collections, formed by the rain, as their evaporation is more sensible, they are discoverable, even when hid by an eminence or a hill; and the vapour of streams, being still more abundant, is so distinctly marked by it, that their course, and even all their sinuosities, may be traced.

"I endeavoured to learn this art of the Houzuanas, during the time I resided amongst them. I followed their example, and practised their lessons; and was at length able to make similar discoveries, and with as much certainty. My talent, however, was far from being so extensive as theirs; for, owing either to the natural weakness of my sight, or the want of experience, I could distinguish water at no greater distance than three hundred paces, when they could perceive it at a distance much more considerable."

MEMOIRS OF THE LATE Mr. JOSEPH WRIGHT, OF DERBY.

JOSEPH WRIGHT was born at Derby, on the 3d Sept. 1734, and was the son of a very respectable attorney there; he received his education at the free grammar school under the care of the Rev. Mr. Almond. During his youth he shewed a great fondness for all kinds of mechanical employments, spending most of his leisure hours in watching the operations of expert workmen, whose performances he frequently imitated. These occupations soon gave place to his affection for drawing, which soon shewed itself; and, having discovered considerable adroitness in taking likenesses very often of persons whom he had only once seen, his father was induced to comply with his earnest wishes, by looking out for a situation in London where he

he might have better opportunities of making improvement.—Hudſon was the moſt eminent portrait-painter of that day, and, in 1751, young Wright was placed with him for the term of two years, after which time he returned to Derby, and painted ſeveral portraits in that neighbourhood with tolerable ſucceſs: not being ſatisfied with his own productions, he returned to London in 1756, and remained fifteen months longer with his old maſter Hudſon for want of a more able preceptor, as he often lamented that it was not in his power to obtain better inſtructions than Hudſon could furniſh. It muſt not, however, be forgotten, that Sir Joſhua Reynolds and Mortimer were likewiſe pupils of the ſame maſter, which affords a ſtriking proof of the great abilities of this triumvirate, who could arrive at ſuch eminence in their profeſſion, in ſpite of the obſtacles which at that period they had to combat with. After Mr. Wright's return from his ſecond abode with Hudſon, he painted many portraits in a very ſuperior ſtyle; and, ſoon after the year 1760, he produced a ſet of hiſtorical pictures, which may deſervedly rank amongſt the earlieſt valuable productions of the modern ſchool.—Of theſe the Blackſmith's Forge, Air Pump, Gladiator, and ſeveral others, are very well known by Pether's metzotintos. In 1773 he was married, and indulged his wiſh of viſiting Italy, where he remained fully two years ſtudying the works of the firſt maſters, and more eſpecially the inimitable productions of Michael Angelo, in the Capella Feſtina of the Vatican; of many parts of which he made faithful drawings, upon a larger ſcale than has generally been attempted, as he conſidered thoſe ſubjects but ill adapted for pocket-book ſketches. Theſe treaſures of art have hitherto remained, in a great degree, loſt to the world, having ſcarcely been ſeen except by Mr. Wright's particular friends, to whom he ſhewed them, when his imagination was warmed with a deſcription of the divine originals. In 1775, he returned to England, and reſided two years at Bath, after which time his reſidence was entirely at Derby. Being frequently urged by his friends to fix in London, he had it often in contemplation to remove thither, but had never reſolution to leave the place where his family had ſo long reſided, and to which he was ſo much attached, that it daily became more difficult for him to reſolve upon a removal, particularly as he dedicated the whole of his time to the ſtudy of his profeſſion, ſo that, for many years paſt, (with the exception of a few particular friends,) he ſcarcely wiſhed for any ſociety beyond that of his own family. In 1793, he viſited the lakes of Weſtmoreland and Cumberland, where he was ſo much pleaſed with the extraordinary effects he witneſſed, that, notwithſtanding his health was then much impaired, he made ſtudies from which he has produced a few pictures ſtill finer than any he had before painted; not contenting himſelf with giving mere portraits of the ſcenery, but imitating, with great ſucceſs, thoſe brilliant effects of light and ſhade which characterize our variable atmoſphere. His health continued to decline, until at length, on the 29th of Auguſt, 1797, he paid the great debt of nature, which was to him a happy releaſe from a tedious and painful illneſs.—In his perſon he was rather above the middle ſize, and, when young, was eſteemed a very handſome man; his company was then much courted on account of his pleaſing vivacity and convivial habits; his eyes were prominent and very expreſſive; in his manners he was mild, unaſſuming, modeſt to an extreme, generous and full of

ſenſibility,

sensibility, with the perfect carriage of a gentleman; honourable and punctual in all his transactions, he entertained the most utter contempt for every thing like meanness or illiberality; and his good heart felt but too poignantly for the misconduct of others.—It may truly be observed of him, that he stedfastly acted on the principle of always continuing to learn; from conversation, from examining pictures, and, above all, from the study of nature, he was constantly endeavouring to advance in the knowledge of his art; and to this habit, as wise as it was modest, of considering himself through life as a learner, no small share of his excellence may be ascribed. This disposition was naturally attended with a candid readiness to adopt, from the practice of other artists, new modes of proceeding, when they appeared to him rational, and to make trial in studies on a small scale, of such as seemed in a tolerable degree promising. To the judgment of his friends, who had directed any share of attention to landscape or other branches of his art, he was always ready to give, at the very least, the weight which it deserved, and was solicitous to draw forth their objections and doubts, in order to profit by them. He well knew how defective and poor the highest efforts of art are, when compared with the grandeur and beauty of nature, and shewed at once his modesty and judgment, by expressing this sentiment in the strongest language. Landscape painters sometimes learn, from admiring pictures as imitations of nature, to admire nature merely as the imitation of a picture, and proportion their approbation of any particular scene to the resemblance which they fancy they discover between it and the works of some favourite master; but from this professional prejudice Mr. Wright was entirely free, considering nature as the best of models. Simplicity and truth were the objects of his researches, and it is much to be lamented that he could not be prevailed upon to commit his observations to writing, to which he was frequently urged by his friends, who knew the rock upon which his theory of the art was established, where nothing occurs to alarm sober judgment, nor to require voluminous explanations, which serve only to bewilder the understanding. He daily followed that excellent advice of du Fresnoy, which we lament is in general but too much disregarded. We shall conclude our account of Mr. Wright in his private capacity as a man, with observing that he repeatedly evinced much liberality, by giving valuable pictures to individuals among his private friends, or to persons to whom he thought himself obliged. In various instances these gifts were *manifestly* disinterested; and they were always conferred in a very pleasing manner which declined rather than sought the expression of gratitude.

Amongst the principal of his early historical pictures may be reckoned the Air Pump, Orrery, Academy, Hermit, Chemist, Blacksmith's Forge, and others, which were painted prior to his visiting Italy; and, as the subjects were interesting, they attracted, in a considerable degree, the public attention, and served to establish his reputation as an artist many years before the foundation of the Royal Academy. Immediately upon his return from Italy, he exhibited some pictures of Mount Vesuvius, under different effects attending a memorable eruption which happened during his residence at Naples; and, having likewise seen a magnificent display of fireworks from the castle of St. Angelo on the election of the present pope, he produced a surprising picture of that extraordinary spectacle—

these

these works, being far beyond what had hitherto been produced, procured him the highest reputation in fire-light subjects, in the painting of which he contrived an apparatus purposely for illuminating the objects with artificial lights, whereby he was enabled to imitate the real tints of nature more accurately, than, perhaps any other painter in that line had hitherto done. In moonlight likewise his pictures are allowed to hold the highest rank, and it cannot be deemed an exaggeration to assert, that they remain unrivalled; neither is it likely they will be exceeded, until some superior artist, possessing a more refined taste and correct judgment, will, like him, pass his evenings in studying the curious and delicate hues of objects under the various circumstances attendant upon scenes of this nature, which have by many painters been considered as composed merely of black and white, without attention to the numberless beautiful tints unnoticed by superficial observers, but which constitute a principal excellence in Mr. Wright's works. His judicious combination of fire and moon-light has particularly attracted the admiration of connoisseurs; but this excellence was the result of that accuracy of discrimination, which was Mr. Wright's great characteristic, and which led him to treat every circumstance with precision, contending that no part of a picture ought to be left imperfect, neither should a tint be introduced that was incongruous with the general harmony.

If the portraits, which he painted, fall short of the grandeur and brilliance of Sir Joshua's best works, they may justly lay claim to the merit of truth and correctness, and of giving what he always aimed to arrest, the true character of nature. Had he resided in London, there can be little doubt he would have shone in a very conspicuous point of view in this more profitable occupation; but, happily for the admirers of the higher branches of the art, he devoted his attention to other objects, and his portraits are mostly confined to the immediate neighbourhood of Derby; this remark may likewise, in a great degree, extend to the generality of his works, as but few of his late pictures have been publicly exhibited, owing to their being frequently disposed of even before finished, and to a repugnance which he felt at sending his works to an exhibition, where he had too much cause to complain of their being very improperly placed, and sometimes even upon the ground, that, if possible, they might escape the public eye. This narrow jealousy, added to the circumstance of his being rejected as an R. A. at the time Mr. Garvey was a successful candidate, did not tend to increase his opinion of the liberality of his brethren in the profession. The academy, however, being afterwards aware of the impropriety of thus insulting a man of his abilities, deputed their secretary, Newton, to Derby, to solicit his acceptance of a diploma, which he indignantly rejected, knowing how little the institution could serve him, and feeling, perhaps, a satisfaction that his friend Mortimer and himself were both deemed equally unqualified to enjoy the honours attached to that royal establishment. He was at an early period appointed a member of the society of artists, to whose exhibitions he contributed for many years.

The historical pictures which he painted since his return from Italy, have proved how equal he was to compositions of that nature, and that, as a colourist, he may rank with the greatest masters. The carnations in that admirable picture of the Dead Soldier, have scarcely been exceeded in the Venetian school; and the anatomical correctness

correctness in the drawing of the figures, evinces how successfully he had studied that fundamental branch of the profession. Two pictures of Hero and Leander, one being a calm and the other a stormy night;—the student in Virgil's Tomb;—Indian Widow and Lady in Comus;—rank amongst his greater works; and, in several studies of children, some playing with bladders, and others with lighted charcoal, he had opportunities of indulging his powers of producing extraordinary effects. A fine cavern by moon-light, in which he has introduced a large figure of Julia lamenting her banishment, in the possession of D. Daulby, Esq. has, by many connoisseurs, been considered as one of his best performances, and particularly by those who admire the gusto of Michael Angelo, which is eminently displayed in that figure.

His style of landscape painting is more varied, and consists of a greater diversity of subjects than that of any other artist whose works we are acquainted with. Sometimes he excites the sublimest ideas by his wonderful representations of stupendous caverns, under the various effects of day, fire, or moon-light; at other times we are soothed with the calm and still scenery of Italy, in which he introduces the clear and brilliant skies peculiar to that climate; he again, in his last pictures, exhibits the most playful execution, and charming effects, which constitute the principal beauty of our own mountain scenery in Westmoreland and Cumberland. Upon these subjects his pencil was last employed, and, as a proof that his unremitting application was productive of farther advances towards perfection, his last work (not entirely finished) being a view of the Head of Ullswater Lake, from Lyulph's Tower, may justly be considered as the finest of all his landscapes, and a work which alone would place his reputation along with that of the most eminent masters.

His principal fire lights are a large Vesuvius, sold to the Empress of Russia for three hundred guineas; a girandolo, its companion, in the same collection; the destruction of the floating batteries off Gibraltar, in the possession of J. Milnes, Esq. of Wakefield, and other subjects, for many of which he received considerable prices.

In addition to the character which he merits for the executive part of his art, it is pleasing to record, that in his works the attention is ever directed to the cause of virtue; that his early historical pictures consist of subjects either of rational or moral improvement, and he has succeeded admirably in arresting the gentler feelings of humanity; for what eye or heart ever remained unmoved at the sight of Maria, Sterne's Captive, or the Dead Soldier. In his works "not one immoral, one corrupted thought," occurs to wound the eye of delicacy, or induce a wish that so exquisite a pencil had not found employment on more worthy subjects.

His pictures may be considered as the reflection of his own delicate mind, and will be ranked by posterity as treasures worthy the imitation of succeeding generations.

HISTORY OF LEARNING, AND TASTE, IN GREAT BRITAIN, DURING THE USURPATION OF CROMWELL.

IT has frequently been remarked, that, in periods of public commotion and of civil anarchy, the noblest energies of the human mind are often called forth to action; and, if we have to witness much

much calamity, vice, and horror, the prospect is somewhat cheered by examples of virtue uncontaminated by interest, and of genius unfettered by timidity. Yet the short space of time which elapsed from the deposition of the first Charles to the accession of his son, presents us with not many names of eminence in literature which were unnoticed in the preceding period. There was certainly a large mass of learning deposited at this time in various hands; but that learning was obscured by pedantry; and the science as well as the morals of the age was perverted by fanaticism. It was an age of projects, but those projects partook of all the wildness of anarchy; and history and politics were debased, as they too commonly are, by a devotion to party.

The rapid transition of the human mind from torpid ignorance to restless speculation, from stupidity to error, was, perhaps, never more strongly instanced than in those ages which immediately succeeded the Reformation.

A blind devotion to the papal decrees, an aversion to inquiry, an indifference to knowledge and to taste, characterized successive ages and generations, of which scarcely a monument remains, except upon the tables of chronology. An accidental discovery, the invention of printing, seems to have awakened the European world from its mental lethargy; and no sooner was religious liberty restored, and the scriptures refused from the strong and sterile grasp of the papal hierarchy, than a scene of confusion ensued—every man heard them in his own tongue; or, more properly, he forced them to speak a language congenial to the caprices of his own imagination.

The ardour for theological speculation was somewhat repressed, as we have already seen, by the arbitrary interference of government during the reigns of Elizabeth and her immediate successor. But these impediments were no sooner removed by the downfall of Charles, and the severe, though not wholly unmerited, punishment of Laud, than the utmost latitude was given to the excursions of the imagination; and there was scarcely a doctrine or text of scripture which could be perverted, that did not serve as the foundation on which some class of enthusiasts erected a new form of religion. The disciples of Calvin were divided into various parties; many of them embraced with avidity the tenets of the anabaptists, and a still larger party of the old puritans discovered that even the presbyterian church was not sufficiently democratical; that the church of Corinth had a complete independent jurisdiction within itself; and they determined, in consequence, that every particular and distinct congregation of Christians must have a full power to regulate all its own concerns without the aid of either bishops or synods, and independent of all connexion with other churches. This party, from their particular tenets, were termed Independents; and with this party it was, that the artful and ambitious Cromwell thought proper to connect himself. Where there exists no regular principle of association, no connected government or subordination in any society, that society, whether civil or religious, will more readily be reduced under the yoke of slavery. The presbyterian party under Cromwell, therefore, lost all its weight and importance in the state; some of its members were subjected to the severity of persecution; the independents, of all the greater sects, were alone admitted to the favour of the pro-

tector, while some of the weaker and least numerous of the other sects enjoyed perfect toleration, if not protection, from the court.

It is difficult to stop the progress of innovation, and it is most difficult in religious speculation. The independents themselves divided, after some time, into a number of subordinate sects; and some of them, by interpreting the obscure parts of scripture in a literal sense, embraced and propagated the wildest doctrines, and the most absurd delusions. The Ranters received their name from the violence of their extemporaneous harangues, and from their ridiculous and unnatural gesticulation. The Antinomians, not content with rejecting entirely the Jewish dispensation, and cancelling even the moral precepts of the law, extended the doctrine of justification by the death of Christ to an unwarrantable extreme; and asserted that justification precedes the birth of the individual, and that it is impossible that by any part of his conduct he can become obnoxious to future punishment. The fifth-monarchy-men, exulting in the overthrow of temporal sovereignty, applied the prophecies which relate to the advent of Christ in their literal sense; they asserted that this was the season indicated by the prophets, in which Christ was to reign with his elect upon earth; some of them even assumed the prophetic character, proclaimed themselves the precursors of the Lord, and pronounced positively the speedy downfall of all other principalities and powers.

Among the numerous pretenders to the gift of prophecy, few were more successful than the celebrated Lodewick Muggleton, who, from the humble station of a journeyman taylor, was suddenly exalted into the founder of a sect. His associate was a person of the name of Reeves, who was perfectly on a level with him both as to station and erudition. They exhibited themselves as the two last witnesses of God; they assumed an absolute power of dispensing damnation or salvation to mankind; and preached that the end of the world was at hand. From the nature of their tenets, however, their popularity was but of short duration. The disappointment of a prediction is generally fatal to the reputation of the prophet:—their credit, therefore, survived them but a few years; and we believe the sect is now nearly, if not utterly, extinct.

Most of these visionaries had their advocates. But few of the productions which contain their literary history have descended to posterity; and these are only deposited in the libraries of ecclesiastican antiquarians. They indeed trusted more in general for the propagation of their doctrines to the force of their extempore eloquence, than to the excellence of their compositions. Enthusiasm is an active principle, and but seldom submits to the patient drudgery of literary labour.

While a strict regard to truth obliges us to ascribe the origin of the Quaker profession to a spirit of enthusiasm in its first preachers, yet we must acknowledge that religious enthusiasm has never appeared in a more amiable form, nor was ever blended with purer and more refined principles of morality. George Fox, the famous founder of this respectable sect, was born at Drayton, in Leicestershire, and exercised the humble occupation of a shoemaker for a considerable time in the town of Nottingham. He is represented to have been of a pensive and retired temper; and, as sober manners in that class of life are commonly connected with a devotional spirit, his leisure

leisure hours were spent in the assiduous study of the scriptures. He at length publicly proclaimed himself to be an inspired preacher; and the simplicity of his manners, the purity of his life, the general utility and excellence of his precepts, and his adroitness in defending his tenets upon the principles of scripture, soon attracted a number of disciples.

He declaimed with vehemence and with energy against the vices of the age.—He condemned war, and proved it incontestably to be altogether inconsistent with the Christian profession. Oaths, upon every occasion, he regarded as a species of blasphemy.—He strenuously recommended simplicity in dress, and frugality in all domestic arrangements. The persecutions which this good man, this truly apostolical preacher, endured in his endeavours to reform a corrupt yet bigoted age, are a stigma on the times in which he lived, and a disgrace to professing Christians. The usurper Cromwell himself felt the force of his rebukes; and his military despotism tottered before the preacher of peace. His soldiers themselves were unable to resist that reasoning which proved from the gospel the unlawfulness of their profession; and the satellites of tyranny became the apostles of peace, and the martyrs of religion. Not only many of the converts of Fox, therefore, were severely punished, but he himself was subjected to a rigorous imprisonment by the orders of government; and the rest of the Quaker preachers were enjoined silence under severe penalties:—but what human authority can silence or counteract the force of truth?

Among the military converts of Fox, one of the most extraordinary was James Naylor, who had been bred a farmer, but who, during the civil wars, had enlisted as a soldier in the parliamentary army. Naylor soon became a preacher among the new sect; and his zeal was not unaccompanied by talents. But the modesty and simplicity which characterized the Quakers in general, were, in the violence of enthusiasm, or in the career of vanity, forgotten by Naylor. Not content with assuming the prophetic character, it is said he arrogated to himself titles which approached to blasphemy, and disgraced religion by the extravagancies which he committed. His followers participated in his zeal and his insanity; and (if we may credit contemporary writers) as he passed through Bristol in his way to London from the west, the multitude who accompanied him, proclaimed him as the promised Messiah, and, in imitation of our Saviour's entry into Jerusalem, sung, as they marched before him, the sacred hymn—"Holy, holy, holy, Lord God of Sabaoth—Hosannah in the highest," &c. So gross a mockery of religion was not to be endured by fanaticism itself. The pretended prophet was apprehended by the magistrates, and sent to London to be examined by the parliament. The parliament, in this instance, departed from their functions as legislators, and assumed the complex character of judges, jury, and accusers. The sentence was as severe as it was probably unjust; and the irregularity of the proceedings leads us to suspect the truth of the evidence on which he was said to be convicted. Either his sufferings restored him to his right senses, or (what we are disposed to believe) his errors had been grossly exaggerated and misrepresented. In his confinement he composed several tracts in a strain of piety, bordering indeed on enthusiasm, but in a spirit of humility inconsistent with the charges of blasphemy alleged

against him. The writings of the Quakers in general were, however, at this period but little noticed without the narrow boundaries of their own sect. In the succeeding reign the tenets of the society were acutely defended by the learning and talents of a Barclay; and their constitution was organized and digested by the judgment of a Penn.

The Socinian doctrines, which had been published in Poland in the latter end of the preceding century, had at this period made but little progress in Great Britain; yet the doctrine of the Trinity was vigorously impugned by John Biddle, a student of Magdalen-hall, Oxford, and master of the free-school of Crypt, in the city of Gloucester, who suffered a long and rigorous imprisonment from the Calvinistic party in the long parliament, and was at length tried for his life on the infamous ordinance of blasphemy, which was passed by that body, and was rescued from the fatal effects of this prosecution only by the interference of Cromwell. It does not appear that Biddle was conversant with the writings of the Polish brethren; and his objections to the received doctrine of the Trinity were chiefly confined to the divinity of the Holy Ghost. He was committed to prison along with other dissenters after the restoration, where he soon contracted a disease, of which he died.

The more powerful and numerous sects, those which at different periods of this fluctuating government enjoyed the favour and protection of the legislature and the court, it may well be imagined, included among their partizans several men of great and eminent talents. Among presbyterians there are none whose names have descended to posterity with a reputation equal to that of Matthew Poole and Edmund Calamy. Mr. Poole was, however, only known, at the period of which we are now treating, as the author of some useful tracts, and as a man of considerable erudition. His great work, the Synopsis Criticorum Bibliorum, was not undertaken till the succeeding reign, after his ejection from the church of St. Michael-le-Quern, of which he was rector upwards of twelve years. Edmund Calamy was, as well as Matthew Poole, educated at Cambridge; and, in the year 1739, was chosen by the parishioners minister of St. Mary, Aldermanbury. Very early in life he evinced strongly his antipathy to the Arminian party; and this circumstance, it is alleged, prevented his obtaining a fellowship in the university, though his literary acquirements and his standing both entitled him to it, and though his character was unblemished. Mr. Calamy commenced his ecclesiastical career as a conformist to the church of England, and is said rather to have objected to the forms under which episcopacy was established in this country, than to episcopacy itself. Though he occasionally preached before the house of commons during the interregnum, yet he took no part in the violent proceedings of the republican party, and opposed the beheading of the king with constancy and courage. During the usurpation of Cromwell, he was passive; yet when called upon to declare his sentiments, he was far from approving that proceeding. There is indeed a remarkable story of this person related by Harry Neville, one of the council of state, which is deserving the notice of all posterity, since it conveys to the reflecting reader the real secret of every tyrannical government, and the means by which the liberties of mankind are wrested from them. When Cromwell first aspired to the supreme dignity, desirous of the support of the presbyterian clergy, he sent for some of the most eminent of

of the city divines, informing them that, as a matter of conſcience, he would ſubmit his arguments and his ſcruples to their determination. Among thoſe who attended, was Mr. Calamy; and he oppoſed the project of Cromwell's ſingle government with equal boldneſs and force, and endeavoured to prove it not only unlawful but impracticable, aſſerting that it was evidently againſt the ſenſe of the nation, and that nine out of ten would openly oppoſe it. "Well," replied Cromwell, "if that is all, ſuppoſe I ſhould diſarm the nine, and put the ſword into the tenth man's hand, will not that, think you, effect the buſineſs?"

Mr. Calamy was one of the non-conformiſt divines who were principally concerned in writing the famous book known by the name Smectymnuus, which, in the year 1641, gave, as he himſelf expreſſes it, "the firſt mortal blow to epiſcopacy." It is entitled, An Anſwer to a Book entitled, An humble Remonſtrance; in which the Original of Liturgy and Epiſcopacy is diſcuſſed, &c. written by Smectymnuus, a word compoſed of the initial letters of its authors' names, viz. Stephen Marſhal, Edmund Calamy, Thomas Young, Matthew Newcomen, and William Spurſtow, all of them men of note and reputation among the non-conformiſts. Dr. Joſeph Hall, biſhop of Exeter, was the author of the Humble Remonſtrance; and a controverſy of ſome length was carried on between him and the Smectymneans. But the worthy and pious prelate was ſcarcely equal to a contest with ſuch acute and able antagoniſts, whatever advantage he might have in point of evidence and fact. Though Mr. Calamy was at firſt rewarded for his loyalty by being appointed chaplain in ordinary to Charles II. he ſoon experienced the ingratitude which was ſo peculiarly the characteriſtic of that prince, and was ejected from his living, and even committed to priſon, on ſome trifling accuſation. The learned and pious Baxter was alſo at this period in ſome repute among the preſbyterians; but, as his literary labours were chiefly confined to the ſucceeding period, we muſt reſerve his character for another opportunity.

ACCOUNT OF THE NATIVE GOLD LATELY DISCOVERED IN IRELAND.

[In a Letter from ABRAHAM MILLS, Eſq. to Sir JOSEPH BANKS, Bart.]

THE extraordinary circumſtance of native gold being found in this vicinity, early excited my attention, and led me to ſeize the firſt opportunity that preſented itſelf, after my late arrival here, to inſpect the place where the diſcovery was made. I went thither with Mr. Lloyd, of Havodynos, and Mr. Weaver. The former having given you ſome account of the circumſtances which attended the original diſcovery, and, ſince he left me, a favourable day having enabled me to take a ſecond view of the adjacent country, I ſhall now attempt to deſcribe the general appearance, and add ſuch farther information as has come to my knowledge.

The workings which the peaſantry recently undertook are on the north-eaſt ſide of the mountain Croughan Kinſhelly, within the barony of Arklow, and county of Wicklow, on the lands of the Earl of Carysfort, wherein the Earl of Ormond claims a right to the minerals,

nerals, in consequence (as I have been informed) of a grant in the reign of King Henry II. by Prince John, during his command of his father's forces in Ireland; which grant was renewed and confirmed by Queen Elizabeth, and again by King Charles II. The summit of the mountain is the boundary between the counties of Wicklow and Wexford; seven English miles west from Arklow, ten to the south-westward of Rathdrum, and six south-westerly from Cronebane mines; by estimation about six hundred yards above the level of the sea. It extends W. by N. and E. by S. and stretches away to the north-eastward, to Ballycoage, where shafts have formerly been sunk, and some copper and magnetic iron ore has been found; and thence to the N. E. there extends a tract of mineral country, eight miles in length, running through the lands of Ballymurtage, Ballygahan, Tigrony, Cronebane, Connery, and Kilmacoe, in all which veins of copper ore are found, and terminating at the slate quarry at Balnabarny.

On the highest part of the mountain are bare rocks, being a variety of argillite, whose joints range N. N. E. and S. S. W. hade to the S. S. W. and in one part include a rib of quartz, three inches wide, which follows the direction of the strata. Around the rocks, for some distance, is sound ground, covered with heath; descending to the eastward, there is springy ground, abounding with coarse grass; and below that a very extensive bog, in which the turf is from four to nine feet thick, and beneath it, in the substratum of clay, are many angular fragments of quartz, containing chlorite, and ferruginous earth. Below the turbary the ground falls with a quick descent, and three ravines are observed. The central one, which is the most considerable, has been worn by torrents, which derive their source from the bog; the others are formed lower down the mountain by springs, which uniting with the former, below their junction the gold has been found. The smaller have not water sufficient to wash away the incumbent cay, so as to lay bare the substratum; and their beds only contain gravel, consisting of quartz with chlorite, and other substances of which the mountain consists. The great ravine presents a more interesting aspect; the water in its descent has, in a very short distance from the bog, entirely carried off the clay, and considerably worn down the substrata of rock, which it has laid open to inspection.

Descending along the bed of the great ravine, whose general course is to the eastward, a yellow argillaceous shistus is first seen; the laminæ are much shattered, are very thin, have a light hade to the S. S. W. and range E. S. E. and W. N. W. Included within the shist, is a vein of compact barren quartz, about three feet wide, ranging N. E. and S. W. below this is another vein, about nine inches wide, having the same range as the former, and hading to the northward, consisting of quartz, including ferruginous earth. Lower down, is a vein of a compact aggregate substance, apparently compounded of quartz, ochraceous earth, chert, minute particles of mica, and some little argillite, of unknown breadth, ranging E. and W. hading fast to the southward, and including strings of quartz, from one to two inches thick, the quartz containing ferruginous earth. The yellow argillaceous shistus is again seen with its former hade and range: and then, adjacent to a quartz vein, is laminated blue argillaceous shistus, ranging N. E. and S. W. and hading S. E.

which

which is afterwards seen varying its range and hade, running E. N. E. and W. S. W. and hading N. N. W. lower down, the blue shist is observed more compact, though still laminated. The ground, less steep, becomes springy, is inclosed, and the ravine, shallower, has deposited a considerable quantity of clay, sand, and gravel. Following the course of the ravine, or, as it may now more properly be called, the brook, arrive at the road which leads to Arklow; here is a ford, and the brook has the Irish name of *Aughatinavought*, (the river that drowned the old man;) hence it descends to the Aughrim river just above its confluence with that from Rathdrum, which, after their junction, take the general name of the Ovo, that, discharging itself into the sea near the town of Arklow, forms an harbour for vessels of small burthen.

The lands of Ballinvally are to the southward, and the lands of Ballinagore to the northward, of the ford, where the blue shistus rock, whose joints are nearly vertical, is seen ranging E. N. E. and W. S. W. including small strings of quartz, which contain ferruginous earth. The same kind of earth is also seen in the quartz, contained in a vein from ten to twelve inches wide, ranging E. N. E. and W. S. W. and hading to the southward, which has been laid open in forming the Arklow road.

Here the valley is from twenty to thirty yards in width, and is covered with substances washed down from the mountain, which on the sides have accumulated to the depth of about twelve feet. A thin stratum of vegetable soil lies uppermost; then clay, mingled with fine sand, composed of small particles of quartz, mica, and shist; beneath which the same substances are larger, and constitute a bed of gravel, that also contains nodules of fine grained iron stone, which produces fifty per cent. of crude iron: incumbent on the rock, are large tumblers of quartz, a variety of argillite and shistus; many pieces of the quartz are perfectly pure, others are attached to the shistus, contain chlorite, pyrites, mica, and ferruginous earth; and the arsenical cubical pyrites frequently occurs, imbedded in the blue shistus. In this mass of matter, before the workings began, the brook had formed its channel down to the surface of the rock, and between six and seven feet wide, but in times of floods extended itself entirely over the valley.

Researches have been made for the gold, amidst the sand and gravel along the run of the brook for near half a mile in length; but it is only about one hundred and fifty yards above, and about two hundred yards below, the ford, that the trials have been attended with much success: within that space, the valley is tolerably level, and the banks of the brook have not more than five feet of sand and gravel above the rock; added to this, it takes a small turn to the southward, and consequently, the rude surfaces of the shistus rock in some degree cross its course, and form natural impediments to the particles of gold being carried farther down the stream, which still lower has a more rapid descent; besides, the rude manner in which the country people worked, seldom enabled them to penetrate to the rock, in those places where the sand and gravel were of any material depth. Their method was, to turn the course of the water wherever they deemed necessary, and then, with any instruments they could procure, to dig holes down to the rock, and by washing, in bowls and sieves, the sand and gravel they threw out,

out, to separate the particles of gold which it contained; and, from the slovenly and hasty way in which their operations were performed, much gold most probably escaped their search; and that indeed actually appears to have been the case; for since the late rains washed the clay and gravel which had been thrown up, gold has been found lying on the surface. The situation of the place, and the constant command of water, do, however, very clearly point out the great facility with which the gold might be separated from the trash, by adopting the mode of working practised at the best managed tin stream works in the county of Cornwall; that is, entirely to remove (by machinery) the whole cove off the rock, and then wash it in proper bundles and sieves. And by thus continuing the operations, constantly advancing in the ravine towards the mountain, as long as gold should be found, the vein that forms its matrix might probably be laid bare.

The discovery was made public, and the workings began, early in the month of September, and continued the 15th of October, when a party of the Kildare militia arrived, and took possession by order of government; and the great concourse of people, who were busily engaged in endeavouring to procure a share of the treasure, immediately desisted from their labour, and peaceably retired.

Calculations have been made, that during the foregoing period, gold to the amount of three thousand pounds Irish sterling was sold to various persons; the average price was three pounds fifteen shillings per ounce; hence eight hundred ounces appear to have been collected within the short space of six weeks.

The gold is of a bright yellow colour, perfectly malleable; the specific gravity of an apparently clean piece 19,000. A specimen, assayed here by Mr. Weaver, in the moist way, produced from 24 grains, $22\frac{58}{101}$ grains of pure gold, and $1\frac{43}{101}$ of silver. Some of the gold is intimately blended with, and adherent to, quartz; some (it is said) was found united to the fine grained iron stone, but the major part was entirely free from the matrix; every piece more or less rounded on the edges, of various weights, forms, and sizes, from the most minute particle up to 2 oz. 17 dwts. only two pieces are known to have been found of superior weight, and one of those is five, and the other twenty-two, ounces.

I much regret not having been present when the work was going on, that I might have seen the gold as found, before prepared for sale by breaking off any extraneous matter that adhered; for in that state, a proper attention to the substances with which it was united, and a subsequent diligent inspection of the several veins that range through the mountain, might assist towards the discovery of that from whence it was detached.

I shall shortly return to England; and on my arrival, will send specimens of the gold, and of the different substances of the mountain, to be deposited (if you think proper) in the collection of the Royal Society. And am, with great respect, &c.

ABRAHAM MILLS.

The bearings are all taken by the compass, without allowing for the variation. Besides these accounts of the gold found in Ireland, the following information has been received on that subject:—William Molesworth, Esq. of Dublin, in a letter to Richard Molesworth, Esq. F. R. S. writes, that he weighed the largest piece of

gold in his balance, both in air and water; that its weight was 20 oz. 2 dwts. 21 gr. and its specific gravity, to that of sterling gold, as 12 to 18. Also that Richard Kirwan, Esq. F. R. S. found the specific gravity of another specimen to be as 13 to 18. Hence, as the gold was worth 4l. an ounce, Mr. William Molesworth concludes, that the specimens are full of pores and cavities, which increase their bulk, and that there are some extraneous substances, such as dirt or clay, contained in those cavities. This opinion was discovered to be well founded, by cutting through some of the small lumps. Stanesby Alchorne, Esq. his majesty's assay-master at the Tower of London, assayed two specimens of this native gold. The first appeared to contain, in 24 carats, 21$\frac{6}{8}$ of fine gold; 1$\frac{7}{8}$ of fine silver; $\frac{3}{8}$ of alloy, which seemed to be copper tinged with a little iron. The second specimen differed only in holding 21$\frac{5}{8}$ instead of 21$\frac{6}{8}$ of fine gold."

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 92.

To LOAD AIR-BALLOONS; with the Number of STARS, SERPENTS, SNAKES, RAIN-FALLS, &c. in Shells of each Nature.

Mortars to throw Aigrettes, &c.

WHEN you fill your shells, you must first put in the serpents, rains, flars, &c. or whatever they are composed of; then the blowing powder; but the shells must not be quite filled. All those things must be put in at the fuze hole; but marrons, being too large to go in at the fuze hole, must be put in before the inside shell be joined. When the shells are loaded, glue and drive in the fuzes very tight. For a cohorn balloon, let the diameter of the fuze hole be $\frac{5}{8}$ of an inch; for a royal balloon, which is near 5$\frac{1}{2}$ inches diameter, make the fuze hole 1$\frac{1}{8}$ inch diameter; for an 8 inch balloon, 1$\frac{3}{8}$ inch; and for a 10-inch balloon, 1$\frac{5}{8}$ inch.

Air-balloons are divided into 4 sorts; viz. first, illuminated balloons; second, balloons of serpents; third, balloons of reports, marrons, and crackers; and fourth, compound balloons. The number and quantities of each article for the different shells are as follow.

Cohorn Balloons illuminated.—Meal powder one ounce and a half; corn powder half an ounce; powder for the mortar, two ounces. Length of the fuze composition, $\frac{3}{4}$ of an inch; one ounce drove or rolled flars, as many as will nearly fill the shell.

Cohorn Balloon of Serpents.—Meal powder one ounce and a quarter; corn powder one ounce; powder for the mortar two ounces and a quarter. Length of the fuze composition $\frac{11}{16}$ of an inch: half-ounce cases drove 3 diameters and bounced 3 diameters, and half-ounce cases drove 2 diameters and bounced 4, of each an equal quantity, and as many of them as will fit in easily placed head to tail.

Cohorn Balloons of Crackers and Reports.—Meal powder one ounce and a quarter; corn powder, three quarters of an ounce; powder for the mortar two ounces. Length of the fuze composition $\frac{3}{4}$ of an inch. Reports 4, and crackers of 6 bounces as many as will fill the shell.

Compound Cohorn Balloons.—Meal powder one ounce and four drams; corn powder twelve drams; powder for the mortar two ounces and four drams. Length of the fuze composition $\frac{13}{16}$ of an inch: $\frac{1}{2}$ ounce cases drove $3\frac{1}{2}$ diameters and bounced 2, 16; $\frac{1}{2}$ ounce cases drove four diameters and not bounced 10; blue strung stars, 10; rolled stars, as many as will complete the balloon.

Royal Balloons illuminated.—Meal powder one ounce and eight drams; corn powder twelve drams; powder for the mortar three ounces. Length of the fuze composition $\frac{15}{16}$ of an inch; 2 ounce strung stars, 34; rolled stars, as many as the shell will contain, allowing room for the fuze.

Royal Balloons of Serpents.—Meal powder one ounce; corn powder one ounce and eight drams; powder for the mortar three ounces and eight drams. Length of the fuze composition 1 inch: 1 ounce-cases drove $3\frac{1}{2}$ and 4 diameters, and bounced 2, of each an equal quantity, sufficient to load the shell.

Royal Balloons with Crackers and Marrons.—Meal powder one ounce and eight drams; corn powder one ounce and four drams; powder for firing the mortar three ounces. Length of the fuze composition $\frac{14}{16}$ of an inch; reports 12, and completed with crackers of 8 bounces.

Compound Royal Balloons.—Meal powder one ounce and five drams; corn powder one ounce and six drams; powder for the mortar three ounces and twelve drams. Length of the fuze composition 1 inch: $\frac{1}{2}$ ounce cases drove and bounced 2 diameters, 8; 2 ounce cases filled $\frac{3}{8}$ of an inch with star composition, and bounced 2 diameters, 8; silver rain-falls, 10; 2-ounce tailed stars, 16; rolled brilliant stars, 30. If this should not be sufficient to load the shell, you may complete it with gold rain-falls.

Eight-inch Balloons illuminated.—Meal powder two ounces and eight drams; corn powder one ounce and four drams; powder for the mortar nine ounces. Length of the fuze composition 1 inch $\frac{1}{8}$: 2 ounce drove stars, 48; 2 ounce cases drove with star composition $\frac{3}{8}$ of an inch, and bounced 3 diameters, 12; and the balloon completed with 2 ounce drove brilliant stars.

Eight-inch Balloons of Serpents.—Meal powder two ounces; corn powder two ounces; powder for the mortar nine ounces and eight drams. Length of the fuze composition 1 inch $\frac{3}{16}$: 2 ounce cases drove $1\frac{1}{2}$ diameter and bounced 2, and 1 ounce cases drove 2 diameters and bounced $2\frac{1}{2}$, of each an equal quantity sufficient for the shell. The star-composition driven in bounced cases must be managed thus: First, the cases must be pinched close at one end, then the corn-powder put in for a report, and the case pinched again close to the powder, only leaving a small vent for the star composition, which is drove at top, to communicate to the powder at the bounce end.

Compound Eight-inch Balloons.—Meal powder two ounces and eight drams; corn powder one ounce and twelve drams; powder for the mortar nine ounces and four drams. Length of the fuze composition $\frac{1}{8}$: 4 ounce cases drove with star composition $\frac{3}{8}$ of an inch, and bounced 3 diameters, 16; 2 ounce tailed stars, 16; 2 ounce drove brilliant stars, 12; silver rain-falls, 20; 1 ounce drove blue stars, 20; and 1 ounce cases drove and bounced 2 diameters, as many as will fill the shell.

Another of eight Inches.—Meal powder two ounces and eight drams; corn powder one ounce and twelve drams; powder for the mortar nine

nine ounces and four drams. Length of the fuze composition 1 inch ½: crackers of 6 reports, 10; gold rains, 14; 2 ounce cases drove with star composition ⅜ of an inch, and bounced 2 diameters, 16; ¾ ounce tailed stars, 16; 2 ounce drove brilliant stars, 12; silver rains, 10; 1 ounce drove blue stars, 20; and 1 ounce cases drove with a brilliant charge 2 diameters and bounced 3, as many as the shell will hold.

A compound Ten-inch Balloon.—Meal powder three ounces and four drams; corn powder two ounces and eight drams; powder for the mortar twelve ounces and eight drams. Length of the fuze composition $\frac{15}{16}$ of an inch: 1 ounce cases drove and bounced 3 diameters, 16. Crackers of 8 reports, 12; 4 ounce cases drove ½ inch with star-composition, and bounced 2 diameters, 14; 2 ounce cases drove with brilliant fire 1¼ diameter, and bounced 2 diameters, 16: 2 ounce drove brilliant stars, 30: 2 ounce drove blue stars, 3; gold rains, 20; silver rains, 20. After all these are put in, fill the remainder of the case with tailed and rolled stars.

Ten-inch Balloons of three Charges.—Meal powder three ounces; corn powder three ounces and two drams; powder for the mortar thirteen ounces. Length of the fuze composition 1 inch. The shell must be loaded with 2 ounce cases, drove with star composition ¼ of an inch, and on that 1 diameter of gold fire, then bounced 3 diameters; or with 2 ounce cases first filled 1 diameter with gold fire, then ¼ of an inch with star composition, and on that 1¼ diameter of brilliant fire. These cases must be well secured at top of the charge, lest they should take fire at both ends: but their necks must be larger than the common proportion.

To make Balloon Fuzes.—Fuzes for air-balloons are sometimes turned out of dry beech, with a cup at top to hold the quick-match, but, if made with pasted paper, they will do as well: the diameter of the former for fuzes for cohorn balloons must be ¼ an inch; for a royal fuze, ⅜ of an inch; for an 8-inch fuze, ½ of an inch; and for a 10-inch fuze, ⅝ of an inch. Having rolled your cases, pinch and tie them almost close at one end; then drive them down, and let them dry. Before you begin to fill them, mark on the outside of the case the length of the charge required, allowing for the thickness of the bottom; and, when you have rammed in the composition, take two pieces of quick-match about 6 inches long, and lay one end of each on the charge, and then a little meal-powder, which ram down hard; the loose ends of the match double up into the top of the fuze, and cover it with a paper cap to keep it dry. When you put the shells in the mortars, uncap the fuzes, and pull out the loose ends of the match, and let them hang on the sides of the balloons. The use of the match is, to receive the fire from the powder in the chamber of the mortar, in order to light the fuze: the shell being put in the mortar with the fuze uppermost, and exactly in the centre, sprinkle over it a little meal-powder, and it will be ready to be fired. Fuzes made of wood must be longer than those of paper, and not bored quite through, but left solid about ¼ an inch at bottom; and, when you use them, saw them off to a proper length, measuring the charge from the cup at top.

Tourbillons.—Having filled some cases within about 1½ diameter, drive in a ladleful of clay; then pinch their ends close, and drive them down with a mallet. When done, find the centre of gravity

of each case; where you nail and tie a stick, which should be ½ an inch broad at the middle, and run a little narrower to the ends: these sticks must have their ends turned upwards, so that the cases may turn horizontally on their centres: at the opposite sides of the cases, at each end, bore a hole close to the clay with a gimblet, the size of the neck of a common case of the same nature; from these holes draw a line round the case, and at the under part of the case bore a hole with the same gimblet, within ½ diameter of each line towards the centre; then from one hole to the other draw a right line, and bore two holes; then from these holes to the other two lead a quick-match, over which paste a thin paper. When you fire tourbillons, lay them on a smooth table, with their sticks downwards, and burn the leader through the middle with a port-fire. They should spin three or four seconds on the table before they rise, which is about the time the composition will be burning from the side-holes to those at bottom. To tourbillons may be fixed reports in this manner:—In the centre of the case at top make a small hole, and in the middle of the report make another; then place them together, and tie on the report, and with a single paper secure it from fire: this done, your tourbillon is completed. By this method you may fix on tourbillons small cones of stars, rains, &c. but be careful not to load them too much. One-eighth of an inch will be enough for the thickness of the sticks, and their length equal to that of the cases.

To make Mortars to throw Aigrettes, and to load and fire them.—Mortars to throw aigrettes are generally made of pasteboard, of the same thickness as balloon mortars, and 2½ diameters long in the inside from the top of the foot: the foot must be made of elm without a chamber, but flat at top, and in the same proportion as those for balloon mortars; these mortars must also be bound round with a cord as before-mentioned: sometimes eight or nine of these mortars, of about three or four inches diameter, are bound all together, so as to appear but one: but, when they are made for this purpose, the bottom of the foot must be of the same diameter as the mortars, and only ½ diameter high. Your mortars being bound well together, fix them on a heavy solid block of wood. To load these mortars, first put on the inside bottom of each a piece of paper, and on it spread 1½ oz. of meal and corn powder mixed; then tie your serpents up in parcels with quick-match, and put them in the mortar with their mouths downwards; but take care the parcels do not fit too tight in the mortars, and that all the serpents have been well primed with powder wetted with spirit of wine. On the top of the serpents in each mortar lay some paper or tow; then carry a leader from one mortar to the other all round, and then from all the outside mortars into that in the middle: these leaders must be put between the cases and the sides of the mortar, down to the powder at bottom: in the centre of the middle mortar fix a fire-pump, or brilliant fountain, which must be open at bottom, and long enough to project out of the mouth of the mortar; then paste paper on the tops of all the mortars.

Mortars thus prepared are called a *nest of serpents*. When you would fire these mortars, light the fire-pump, which when consumed will communicate to all the mortars at once by means of the leaders. For mortars of 6, 8, or 10, inches diameter, the serpents should be made

made in 1 and 2 ounce cases, 6 or 7 inches long, and fired by a leader brought out of the mouth of the mortar, and turned down the outside, and the end of it covered with paper, to prevent the sparks of the other works from setting it on fire. For a six-inch mortar, let the quantity of powder for firing be 2 oz. for an 8-inch $2\frac{3}{4}$ oz. and for a 10-inch $3\frac{3}{4}$ oz. Care must be taken in these, as well as small mortars, not to put the serpents in too tight, for fear of bursting the mortars. These mortars may be loaded with stars, crackers, &c.

If the mortars, when loaded, are sent to any distance, or liable to be much moved, the firing powder should be secured from getting amongst the serpents, which would endanger the mortars, as well as hurt their performance. To prevent which, load your mortars thus:—First put in the firing powder, and spread it equally about; then cut a round piece of blue touch-paper, equal to the exterior diameter of the mortar, and draw on it a circle equal to the interior diameter of the mortar, and notch it all round as far as that circle; then paste that part which is notched, and put it down the mortar close to the powder, and stick the pasted edge to the mortar: this will keep the powder always smooth at bottom, so that it may be moved or carried anywhere without receiving damage. The large single mortars are called *pots des aigrettes.*

Making, loading, and firing, of Pots des Brins.—These are formed of pasteboard, and must be rolled pretty thick. They are usually made three or four inches diameter, and four diameters long; and pinched with a neck at one end, like common cases. A number of these are placed on a plank thus:—Having fixed on a plank two rows of wooden pegs; cut in the bottom of the plank a groove the whole length under each row of pegs; then, through the centre of each peg, bore a hole down to the groove at bottom, and on every peg fix and glue a pot, whose mouth must fit tight on the peg: through all the holes run a quick-match, one end of which must go into the pot, and the other into the groove, which must have a match laid in it from end to end, and covered with paper, so that when lighted at one end it may discharge the whole almost instantaneously: in all the pots put about 1 oz. of meal and corn powder; then in some put stars, and others rains, snakes, serpents, crackers, &c. when they are all loaded, paste paper over their mouths. Two or three hundred of these pots being fired together make a very pretty show, by affording so great a variety of fires.

Pots des Saucissons are generally fired out of large mortars without chambers, the same as those for aigrettes, only somewhat stronger. Saucissons are made of 1 and 2 ounce cases, 5 or 6 inches long, and choaked in the same manner as serpents. Half the number which the mortar contains must be drove $1\frac{1}{2}$ diameter with composition, and the other half two diameters, so that when fired they may give two volleys of reports. But if the mortars are very strong, and will bear a sufficient charge to throw the saucissons very high, you may make three volleys of reports, by dividing the number of cases into three parts, and making a difference in the height of the charge. After they are filled, pinch and tie them at top of the charge almost close; only leaving a small vent to communicate the fire to the upper part of the case, which must be filled with corn-powder very near the top; then pinch the end quite close, and tie it: after this is done, bind the case very tight with waxed packthread, from the

choak at top of the composition to the end of the case; this will make the case very strong in that part, and cause the report to be very loud. Saucissons should be rolled a little thicker of paper than the common proportion. When they are to be put in the mortar, they must be primed in their mouths, and fired by a case of brilliant fire fixed in their centre. The charge for these mortars should be ⅕th or ⅓th more than for *pots des aigrettes* of the same diameter.

SKETCHES OF TURKISH JURISPRUDENCE AND MANNERS.

THE administration of justice in Constantinople is notoriously corrupt. It is placed solely in the hands of the oulemah, or ecclesiastical body, who are confirmed in their rapacity by being secured from the interposition of the body politic, as they receive no salary from the state. In these two causes originates a system of enormous peculation and bribery, so that for the poor there is no redress. Turkish jurisprudence professes the implicit direction of the korân, but more attention is paid to the multèkah, or sonhèt, containing the traditional injunctions; after all, the interest or caprice of the judge biasses the decision.

The rank of Turkish lawyers is the mufti, or deputy to the sultan; as kalife, or oracle of the law, the kadilescars of Roumily and Anadoly; supreme in their distinct districts, mollahs, muselims, and kadies. These hold their mekemehs, or halls of justice, where they try criminals and hear causes, in which oral testimony always prevails against written evidence. Three MSS. of the Koran, the Evangelists, and the Pentateuch, are kept by the kadies, who administer oaths upon them, according to the religion of the person to be sworn. False witnesses are easily procured; they frequent certain coffee-houses, where these infamous transactions are arranged. If one of these wretches be too often detected, or has forfeited the interested connivance of the judge, he is given over to the punishment of the law. Mounted on an ass, with his arms and legs tied, and his face towards the tail, he is led through the streets and bazârs, where he is insulted with every grossness, and, if a Turk, fares very ill.

It is truly remarkable, in so great a population, that criminal causes do not occur more frequently. Murders are seldom heard of, and happen amongst the soldiers oftener than other descriptions of people: they are certainly prevented by the prohibition of wearing arms in the capital. If the murderer escape justice for twenty-four hours, he is not amenable to the law: at least, has a good chance of evading its vengeance.—Robberies are not frequent, excepting in the great roads through distant provinces, where they are always punished with impalement. There is no place of public execution; and, when a criminal is condemned, he is led down the nearest street by the executioner, who is provided with a large nail and cord, which he places over the door of any shop where he is not paid for forbearance. The body is raised a few inches only above the ground, and must be left untouched for three days. In instances of decapitation, the more honourable punishment, it is exposed as long in the street, with the head under the arm, if a mussulman, but, if a rayah, between the legs. So horrid a spectacle excites no emotion in the mind of a Turk; for it is certain that by no nation, be it as savage as it

it may, is the life of a man so lightly regarded as by them. This is a disgusting but true sketch of their laws and executive justice.

Personal combat, unknown to the ancients, but so universal in modern Europe since the days of Chibalry, is not practised amongst the Turks, nor is assassination, the disgrace of many nations, in any degree frequent. Connections with women, the great cause of inveterate quarrels, are so arranged as to render interference with each other almost impossible.—Before marriage they are not seen by their lovers, and after only by their husbands and near relatives. There is likewise an inviolable point of honour between men respecting their harèms, and an avowed libertine would be banished from society.—Poison, secretly given, is the punishment he would probably incur.

To another occasion of personal provocation, they are equally strangers. Gaming is prohibited by the Mohammedan law; and, as chess is their favourite amusement, their singular proficiency is a proof that the love of gain may not be the only inducement to excel. Wagers, or anticipating the chances of any trial of skill or common event, they can consider as unlawful. To the absence of these powerful incitements to anger, and to their national suavity of manners as confined to themselves, may be attributed much social harmony, though with fewer examples of disinterested friendship than amongst us. The Turk shews insolence or morosenes to those only whom his prejudices exclude from intercourse.

The Rammezan, or Turkish Lent, lasts for one complete moon, and takes every month in the year in rotation. No institution can be more strictly or more generally observed; it enjoins perfect abstinence from sun-rise to sun-set, from every kind of aliment, even from water. Mohammed did not foresee that coffee and tobacco would become the chief luxury of his followers, and various were the opinions respecting the legality of taking them in Rammezan; which were finally determined in the negative. These are indeed days of penance to the labourer and mechanic, but to the opulent only a pleasant variety, for they sleep all day, and in the evening feast and make merry, as if they exulted in cheating the prophet. The only show of mortification is a prohibition from entering the harem during the twelve hours of fasting. Every night of this season is some appointed feast amongst the officers of the court.

Nor are the inferior orders deprived of their share of relaxation; for the shops of cooks and confectioners, and the coffee-houses, are unusually decorated and frequented. There are exhibitions of low humour, and the kara-guze, or puppet-show, represented by Chinese shades. For the graver sort, most coffee-houses retain a raccontatore, or professed story-teller, who entertains a very attentive audience for many hours. They relate eastern tales, or sarcastic anecdotes of the times, and are sometimes engaged by government to treat on politics, and to reconcile the people to any recent measure of the sultan or vizier. Their manner is very animated, and their recitation accompanied by much gesticulation. They have the finesse, when they perceive the audience numerous, and deeply engaged, to defer the sequel of their story. The nightly illuminations of every minareh in the city, especially those of the imperial mosques, produce a very singular and splendid effect. Within each of these, the vast concaves of the domes are lighted up by some hundred

hundred lamps of coloured glass; and external cords are thrown across from one minaret to another, and the lamps fantastically disposed in letters and figures. I was not more agreeably surprised by any thing I saw in Constantinople, than the whole appearance of the first night in Rammezan.

As an indulgence from the severities of Lent, the Turks have their Beyram, and the Christians their Easter. At this season, those of every nation appear in new clothes, and exhibit all possible gaiety. Places of public resort are then particularly frequented, and the pastimes and groupes, excepting in their dress, exactly resemble an English wake.—The Turks are much delighted by a circular swing, made by fixing a wheel on a high post, from which hang many poles, with seats attached to them. I have seen several of these bearded children taking this amusement with great glee, and contrasted with the gravity of their habits, nothing could be more ridiculous. The Greeks have an universal licence, dance through the streets to very rude music, and are in the zenith of their vivacity; but the festivity of the Armenians, a saturnine race, seems to consist chiefly in being intoxicated, and jumping with the preposterous activity of an elephant. In the Campo de Morti, near Pera, so called from being the cemetery of the Franks and Armenians, many of these droll scenes may be then contemplated by an investigator of the precise traits of character which discriminate the mass of all nations.

The Turks have sumptuary laws, and habits peculiar to professions. By the turban differing in size and shape every man is known; and so numerous are these distinctions, that a dragoman, long conversant with Constantinople, told me he knew not half of them. The emirs, real or pretended descendants from the prophet, are distinguished by the green muslin; the others wear white round a cap of cloth, and the head is universally very closely shaven. In the turbans of the oulemah there is a greater profusion of muslin, from ten to twenty yards, which are proportionally larger, as the wigs of professional men were formerly. The military, as the janissaries, bostandjis, and topdjis, wear caps of the most uncouth shape and fashion, such as defy description. The rayahs are known by a head-dress called a kalpac, made of lamb-skin, and inimitably ugly, differing entirely from a turban; and sometimes a samour, or black fur cap, which is principally worn by dragomen and physicians. In other respects they are dressed as the Turks. Yellow slippers, or boots, are indulged only to those under ambassadorial protection, and are an envied distinction. When the present sultan came to the throne, he issued an edict, that no unlicensed rayah should appear publicly in yellow slippers.—At that time he took great pleasure in walking the streets in disguise; when meeting an ill-starred Jew dressed contrary to law, he ordered his head to be instantly struck off.—This was his first act of severity, which created most unfavourable conjectures, not altogether confirmed by his subsequent reign.

The Turks of better rank, and the regular citizens, wear what is called the long dress, with outer robes of fine cloth, shalloon, or pellices, which are in general use for the greater part of the year, and commonly of the most costly furs. They are seldom seen without a tespi in their hands; it is a string of ninety-nine beads, corresponding with the names of the Deity, which they carry as much for amusement

amusement as devotion. Hamid Ali, a late vizier, wore one of pearl, so perfect as to be valued at 3000l. sterling.

The common people, especially those belonging to any military corps, have a jacket richly ornamented with gold or silver twist, trowsers of cloth, which close to the middle of the leg, the other part of which is bare, and red slippers. Their great pride is to stick into their girdle a pair of large horse pistols, a yataghân or long knife, a hanjiar or dagger, all profusely inlaid with silver in a grotesque taste, which, with pouches for ammunition and tobacco, are extremely incommodious, and several pounds weight. With these weapons they frequently do mischief, often from childishness, sometimes from intention. Such are seen in every town in the empire, except the capital, who glory in their privilege, as no rayah is permitted to carry arms.

By the laws of Islamism the Turks are forbidden vessels and utensils of gold or silver, and are directed to great simplicity in every habit of life. This injunction does not extend to women, whose pride consists in the number and costliness of their trinkets. The chief luxury of the men is displayed in the number of their attendants, and their horses with superb caparisons, often of embroidered velvet, and plates of silver embossed and gilt. No rich man appears in public but on horse back, with a train of footmen, in any part of Constantinople, the number of whom is unnecessarily great, and much of his income is expended in their daily maintenance, and new clothes at the feast of Bayràm. Their wages are inconsiderable. No domestic performs more than one office; this serves the coffee, and that hands the napkin, but no emergency can command any other service.

The horses of the Arab, or Turcoman breed, are eminently beautiful, and are taught to prance under the perfect manège of the rider, however infirm. Great expence likewise is lavished on the boats, which are elegant in a high degree, carved, gilded, and lined with rich cushions. They cost from a hundred to a thousand piastres each. The rank of the owner is ascertained by the number of oars; and in dexterity or civility no watermen exceed the Turks.

Coaches are not in use, excepting that the clumsy non-descript vehicles, which convey the ladies of great harems, can be so called. In his pipe an opulent man is extremely sumptuous; the head must be of pale amber, the stick of jasmine-wood, with the bark preserved, and the bowl of a delicate red clay, manufactured at Burgas in Romelia, and highly ornamented. According to the dignity of the smoker is the length of his pipe, often six or seven feet, when it is carried by two of his servants from place to place with much ceremony; and the bowl is supported by wheels, as an aid to supreme indolence. In the summer, for greater coolness, the stem of the pipe is covered with cotton or muslin, and moistened with water. This sovereign recreation is not confined to the men; the ladies, especially those advanced in life, partake of it largely; and, as a delicacy, they mix the tobacco with frankincense, musk, or aloes wood. The sultan alone abstains from etiquette; as kalife, or representative of the prophet, he declines deciding, by his own practice, upon the propriety of any custom, about which the law is not specific and declaratory.

Notwithstanding their grave exterior, which might prepossess foreigners with an idea of concealing as much stupidity as sense, and apparently so ungenial with mirth or vivacity, the Turks, in superior life, of both sexes, indulge a vein of sarcastic humour, and are not behind more polished nations in the delicacy or severity of their repartees. Most gentlemen of the seraglio, or capital, have been educated in their seminaries of learning, and are conversant with oriental literature. Many of them quote the Persian poets as happily, and refer to the Arabic philosopers with as complete erudition, as we can do to the Greek or Roman. The "Leilat u alf leilah," or Arabian Nights, first introduced into Europe by Monsieur Petit de la Croix, are familiarly known by them, as well as the fables and allegories of Pilpay and Lokman, from which sources they store their minds as well with sentiments as expression.—To excel in colloquial facility and elegance, is the first ambition of every cheliby, or man of breeding.

I repeat a specimen of Turkish wit, related to me as having been occasioned by a recent circumstance:—A man of rank, remarkably unpleasing in his countenance and figure, was married, according to custom, without having first seen her unveiled, to a lady, whose pretensions to personal attractions did not exceed his own. On the morning after their marriage she demanded of him to whom of his friends she might shew her face with freedom. "Shew it," said he, "to all the world, but hide it from me." "Patience," rejoined the lady. "I have none," returned the bridegroom. "Ah!" said she, "I think you must have had a good share, for you have carried that abominable great nose about with you all your life-time."

PARTICULARS OF THE EXPENCE OF THE ROYAL HOUSEHOLD IN THE REIGNS OF HENRY VII, HENRY VIII. QUEEN ELIZABETH, &c.

IF we compare the expences of the royal household in former times with those of later dates, and observe the alteration of the value of money, and the progressive rise in the cost of provisions, the result will probably be, that the expence of his present majesty's household is not more than it was in the time of Queen Elizabeth, and is much less than it was in the time of her successor.

The articles contained in the very curious wardrobe-account of Edward II. published by the Society, seem rather to relate to his extraordinary expences and preparations for war in Scotland, than to what we should properly call the expences of the household. The amount of the latter is, however, to be collected from the conclusion of the account, which, after stating the whole expences of

the articles in that book to be - - -	£.53,178	15	1
adds, Summa totalis exituum et expensarum garderobe per istum librum de anno 28, *una cum expensis hospicii regis ejusdem anni* - -	64,105	0	5
Deduct then the above sum - -	53,178	15	1
And the household expences will be - -	10,926	5	4

What

What might be the expence of Richard II. I do not know; but, according to Holinshed, it must have been enormous, as he says there were three hundred servitors in the kitchen, and every other office furnished at the like rate, and that ten thousand persons had meat and drink allowed them.

From the pipe rolls it appears that the greatest expence of Henry VII. was about 15,000l. per ann. but this was afterwards lessened, and towards the end of his reign was reduced to about 13,000l.

Henry VIII. a prince fond of expence, began with about 16,000l. per ann. and went on increasing till in his 30th year the expence was 22,000l. in the 33d year it got up to 34,000l. and the 37th to 40,000l.

In the beginning of Queen Elizabeth's reign, she reduced her expence a little below what her father ended with, but, at the conclusion of her long reign, it was increased to 55,000l.

A little before her death she was very uneasy at finding her household expences run so high, and the following account of a conversation which she had on the subject with Mr. Brown, one of the officers of her green-cloth, is truly characteristic of her. She died shortly after, and before any thing had been done to correct the abuses complained of.

The original of this paper is amongst some that were collected by Sir Julius Cæsar. It is indorsed,

"The late Q. Majestes speeches often tymes to R. Bro: for household causes."

"Richard Brown's s'vice to the late queene, and her mts. speeches and comts. at sundrie times to him for houshold causes knowen to some of the lo: in council and white-staves.

"The houshold charges abridged from 50,000l. to 44,000l. per ann: for in two offices onlie 2,000l. per ann. abated.—Larder—poultrie—her majestie has notwithstanding told Browne, that in the beginning of her raigne lesse than 40,000l. defrayed the charge. Browne answered, that all provic'ons then weare cheaper. The queene said, that may bee soe, and I save by the late compoc'on (as I am informed) 10,000l. per ann. and therefore I charge you examyne the difference of some yeare in the beginninge of my raigne with one yeares expences now, and lett me understand ytt.

"An examinac'on and conference was made betweene the third yeare and the 43d yeare, yt was found that in bread, beare, wyne, wood, coles, wax-lights, torches, tallow-lights, and some meete, and other allowances of incidents, necessaries, carriages, wages, &c. to the some of 12,000l. per ann. at the least, more was spent in a°. 43tio. than in a°. 3tio. Regiæ, and no sufficient warrant for the increase; whereby ytt did playnlie appeare, and the booke signed by her majestie for the honourable allowance to all persons was not exceeded.

"The queenes majestie being informed of this difference, and being therewith moved greatlie, said, And shall I suffer this? did not I tell you, Browne, what you should fynd, I was never in all my government, soe royallie, with nombers of noblemen and ladys attended upon, as in the beginninge of my raigne, all offices in my court being supplied, which now are not, and all those then satisfied with my allowance, agreed uppon by my councell and signed by me, with that care as by all former princes hath bene used? And shall these now that attend, and have the like allowances, not rest con-

tented? I will not suffer this dishonourable spoile, and increase that noe prince ever before me did, to the offence of God, and great greavance of my lovinge subjects, who, I understand, daylie complayne, and not without cause, that there is increase daylie of carryadges and of p'vic'on taken from them, at low prices, and wastfulle spent within my court to some of their undoings, and now myself understanding of yt, they may justlie accuse me, to suffer yt, with many other discontented speeches, delivered with great vehemencie, complayninge of the weakneſſe of the whiteſtaves to suffer yt, and accusinge herself for making soe slender choice; with many more speeches, &c. But my speedy order for reformac'on, shall satisfy my lovinge subjects greeved, for I will end as I beganne with my subjects love."

[In another hand is written, "Yt ys no marvell thoughe those grevances were compl. in parliament."]

"Those that are nearest to me, and have dailie great benefit by suits, have these wastfull increases daylie; but my whiteſtaves and those of my greencloth, by whom all good orders and honourable allowances should be maynteyned, are principal falters herein, for noe increase can be without their privitie and unlawful warraunt, whereby I fynd the difference of officers now, and in the beginninge of our raigne.

"Whereupon her majesty gave straight charge and commandment to Browne forthwith to repayre to the lo: treasurer, lo: admiral, and the whiteſtaves of the howshould, (which Browne did,) that order might be taken to abridge all messes of meate, and other expences, more than the booke signed doth allowe, and further said, Myself will speke unto them, and geve them charge, and then let me see or learn, what he in my house that dareth breake and disobey my orders and comanadements signed, with verie bitter speeches, that shee would cleanse her court, and not suffer such a nomber of persons and famylies more than are to bee allowed to bee kept within the court; whereuppon her majesty sent certain noates to the whiteſtaves, to be put in p'sent execu'on, in the meane tyme, before the effectinge whereof yt pleased God to take her majesty to his mercie."

Economy was not one of the virtues possessed by James the First (if indeed he possessed any;) and, when he came to the land of plenty, he had no idea of limiting his expences. The estimate for the first year was 76,954l. 2s. 5¼d. besides 16,000l. for the prince, making together 92,954l. 2s. 5¼d. In his fourth year his household expence was 97,421l. 2s. 3d. From Michaelmas in his seventh year to Michaelmas in the eighth year, it was 129,863l. 9s. 0½d. and yet the king had corn and cattle served by the several counties at underprices, that the farmers might get rid of purveyors, the benefit of which was estimated to the king at 38,000l.

Prince Henry's expences kept pace with his father's. At the first establishment of his household, 20th July, 1 James I. anno 1603, he had servants - - - 70

A few weeks after a second book was signed, when they were increased to - - - - - 104

In the next year they amounted to - - 141

besides servants of these servants, who had intruded themselves into the court - - - - 130

The

The 141 soon multiplied into - - - 215
besides workmen of various sorts and 13 extraordinary.

In 1608 they were - - - - 233
and with the masters, the number of servants also increased.

The book signed by his royal highness in 1610 gives the names of 297 with wages, 129 without, - - 426
besides various workmen, among whom is Inigo Jones, as surveyor of the works.

The following letter, the original of which is amongst Sir Julius Cæsar's papers, mentioned above, will shew the consequence of this want of management.

"*To the right honourabl my very good Lord the Erl of Dorset, Lord high Treasurer of England.*

"According to my duty I have beene always carefull to save al needless expense in the prince's house. But the continual increase of new servants dayly sent hether by warrante procured without my knowlege, has brought the charge so farr out of frame, that it is hard to conceive a course how to lessen it, seeing the necessary increase of many moor will follow the prince's advancement in years and dignitie. Notwithstanding least I should seeme to bee careless, or over curious to search into other mens actions, if it shall please your lordp to commande mee by a letter, to call the officers of this household to advise of some redress unto further inconveniencies, I hoope both to give your lordp good accounte of the present estate of our expense, and to make some overture how to reforme, or at least to prevent futur accidents. The note that I sent your lordp conteining a breefe of such orders as I desir to be ratified for avoyding confusion and diforder in the table, I beseech your lordship to consider of, and to propounde them not simply as a suite of myne, but as a matter generally requisite for the better government of his highnes house. And as my duty always binds mee I rest,

Your lordship's assuredly to commande,

St. James, Jan. 27. THO. CHALONER."

Sir Thomas Chaloner, in a letter to Sir Julius Cæsar, dated 7th of Nov. 1607, mentions some of the above circumstances; says he would (at the first) have undertaken to maintain the (prince's) house to the king's honour for 8000l. yearly, provided they might have good payment of the money; that in the first year he dismissed of unnecessary dependants on the house at least three score, whereof many had passports to return to their own country, and he utterly refused all suitors who addressed themselves to him to obtain some place about the prince; and then he complains of the great increase, without warrant, as well as with, and of the number of suitors waiting for places. He says, that for the want of ready money the purveyors are forced to take up meate on trust, and then serve it out so small and ill, at a price so high, that the king had better borrow money at twenty per cent.

It seems that King James's servants took much pains in endeavouring to lessen his enormous expence, and formed various projects for that purpose. They obtained an account of the French king's household expence, which was not so great as King James's. The heads of it were as follow:

The

The table and kitchen	£35,718	3	6
The ſtables	7,620	0	0
Domeſtic officers	9,000	0	0
The office of plate	8,180	0	0
The treaſurer of the chamber	12,893	5	0
The gardes du corps	5,400	2	0
The provoſt of the houſehold	3,000	0	0
The hounds and falcons	3,642	14	0
Total	85,454	4	6

In 1622 King James's expence was reduced to 78,995 7 8
but he ſoon after made additions to it.

	£.	s.	d.
The houſehold expence of King Charles II. from 1ſt Oct. 1663, to the laſt of Sept. 1664, was	57,275	1	0¼
To which is to be added for the Duke of York	10,000	0	0
The houſehold of King James II. in 1687. Houſehold coffers 76,118 6 6¼; Stables 14,336 19 1¼	90,455	5	8
King William and Queen Mary, 1ſt Oct. 1692, to the laſt of Sept. 1693	114,685	7	3⅛
King William alone from 1698 to 1699	90,735	1	2¼
Queen Anne, 2 years Oct. 1703—1705	167,421	4	2
The average	83,710	12	0
1 year, Oct. 1712—1713	89,044	6	10
King George I. Oct. 1715—1716	75,629	7	7¼
1723—1724	86,097	19	2¼
King George II. 1730—1731	118,487	2	1¼
1731—1732	124,806	17	6¼
1ſt Jan. to the laſt of Dec. 1759	108,290	10	2½

At the acceſſion of his preſent majeſty a conſiderable reduction was made in the houſehold expences. An increaſe attended the increaſe of his family; but they were again reduced in 1782.

ANECDOTES OF MRS. CLARKE, DAUGHTER OF COLLEY CIBBER, ESQ.

CIBBER the elder had a daughter named Charlotte, who alſo took to the ſtage; her ſubſequent life was one continued ſeries of misfortune, afflictions, and diſtreſs, which ſhe ſometimes contrived a little to alleviate by the productions of her pen. About the year 1755, ſhe had worked up a novel for the preſs, which the writer accompanied his friend the bookſeller to hear read; ſhe was at this time a widow, having been married to one Clarke a muſician, long ſince dead. Her habitation was a wretched thatched hovel, ſituated on the way to Iſlington in the purlieus of Clarkenwell bridewell, not very diſtant from the new river head, where at that time it was uſual for the ſcavengers to leave the cleanſings of the ſtreets, and the prieſts of Cloacina to depoſit the offerings from the temples of that all-worſhipped power. The night preceding a heavy rain had fallen, which rendered this extraordinary ſeat of the muſes almoſt inacceſſible, ſo that in our approach we got our white ſtockings inveloped with mud up to the very calves, which furniſhed an appearance

pearance much in the present fashionable style of half boots. We knocked at the door (not attempting to pull the latch-string), which was opened by a tall, meagre, ragged figure, with a blue apron, indicating, what else we might have doubted, the feminine gender. A perfect model for the Copper Captain's tattered landlady; that deplorable exhibition of the fair sex, in the comedy of Rule-a-Wife. She with a torpid voice and hungry smile desired us to walk in. The first object that presented itself was a dresser, clean, it must be confessed, and furnished with three or four coarse delf plates, two brown platters, and underneath an earthen pipkin and a black pitcher with a snip out of it. To the right we perceived and bowed to the mistress of the mansion on a maimed chair under the mantle-piece, by a fire merely sufficient to put us in mind of starving. On one hob sat a monkey, which by way of welcome chattered at our going in; on the other a tabby-cat, of melancholy aspect! and at our author's feet on the flounce of her dingy petticoat reclined a dog, almost a skeleton! he raised his shagged head, and, eagerly staring with his bleared eyes, saluted us with a snarl. "Have done, Fidele! these are friends." The tone of her voice was not harsh; it had something in it humbled and disconsolate; a mingled effort of authority and pleasure—Poor soul! few were her visitors of that description—no wonder the creature barked!—A magpie perched on the top rung of her chair, not an uncomely ornament! and on her lap was placed a mutilated pair of bellows; the pipe was gone, an advantage in their present office, they served as a succedaneum for a writing-desk, on which lay displayed her hopes and treasure, the manuscript of her novel. Her ink-stand was a broken tea-cup, the pen worn to a stump; she had but one! A rough deal board with three hobbling supporters was brought for our convenience, on which without farther ceremony we contrived to sit down, and entered upon business—The work was read, remarks made, alterations agreed to, and thirty guineas demanded for the copy. The squalid handmaiden, who had been an attentive listener, stretched forward her tawny length of neck with an eye of anxious expectation!—The bookseller offered five!—Our authoress did not appear hurt; disappointments had rendered her mind callous; however some altercation ensued. This was the writer's first initiation into the mysteries of bibliopolism and the state of author-craft. He, seeing both sides pertinacious, at length interposed, and at his instance the wary haberdasher of literature doubled his first proposal, with this saving proviso, that his friend present would pay a moiety and run one half the risk; which was agreed to. Thus matters were accommodated, seemingly to the satisfaction of all parties; lady's original stipulation of fifty copies for herself being previously acceded to. Such is the story of the once-admired daughter of Colley Cibber, poet-laureate and patentee of Drury-lane, who was born in affluence and educated with care and tenderness, her servants in livery, and a splendid equipage at her command, with swarms of time-serving sycophants officiously buzzing in her train; yet, unmindful of her advantages and improvident in her pursuits, she finished the career of her miserable existence on a dunghill.

The account given of this unfortunate woman is literally correct in every particular, of which, except the circumstance of her death, the writer himself was an eye-witness.

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 118.

DIFFERENT KINDS of ROCKETS, with their APPENDAGES and COMBINATIONS.

To fix one Rocket on the top of another.

WHEN sky-rockets are thus managed, they are called towering rockets, on account of their mounting so very high. Towering rockets are made after this manner: Fix on a pound-rocket a head without a collar; then take a four-ounce rocket, which may be headed or bounced, and rub the mouth of it with meal powder wetted with spirit of wine: when done, put it in the head of the large rocket with its mouth downwards; but before you put it in stick a bit of quick-match in the hole of the clay of the pound-rocket, which match should be long enough to go a little way up the bore of the small rocket, to fire it when the large is burnt out; the 4-ounce rocket being too small to fill the head of the other, roll round it as much tow as will make it stand upright in the centre of the head: the rocket being thus fixed, paste a single paper round the opening of the top of the head of the large rocket. The large rocket must have only half a diameter of charge rammed above the piercer; for, if filled to the usual height, it would turn before the small one takes fire, and entirely destroy the intended effect: when one rocket is headed with another, there will be no occasion for any blowing powder; for the force with which it sets off will be sufficient to disengage it from the head of the first fired rocket. The sticks for these rockets must be a little longer than for those headed with stars, rains, &c.

Caduceus Rockets, in rising, form two spiral lines, or double worm, by reason of their being placed obliquely, one opposite the other; and their counterpoise in their centre, which causes them to rise in a vertical direction. Rockets for this purpose must have their ends choaked close, without either head or bounce, for a weight at top would be a great obstruction to their mounting; though I have known them sometimes to be bounced, but then they did not rise so high as those that were not; nor do any caduceus rockets ascend so high as single, because of their serpentine motion, and likewise the resistance of air, which is much greater than two rockets of the same size would meet with if fired singly.

For fixing these rockets the sticks must have all their sides alike, which sides should be equal to the breadth of a stick proper for a sky-rocket of the same weight as those you intend to use, and to taper downwards as usual, long enough to balance them, one length of a rocket from the cross stick; which must be placed from the large stick 6 diameters of one of the rockets, and its length 7 diameters; so that each rocket, when tied on may form with the large stick an angle of 60 degrees. In tying on the rockets, place their heads on the opposite sides of the cross stick, and their ends on the opposite sides of the long stick; then carry a leader from the mouth of one into that of the other. When these rockets are to be fired, suspend them between two hooks or nails, then burn the leader through the middle, and both will take fire at the same time. Rockets of 1 lb. are a good size for this use.

Honorary

Honorary Rockets are the same as sky-rockets, except that they carry no head nor report, but are closed at top, on which is fixed a cone; then on the case, close to the top of the stick, you tie on a 2-ounce case, about 5 or 6 inches long, filled with a strong charge, and pinched close at both ends; then in the reverse sides, at each end, bore a hole in the same manner as in tourbillons; from each hole carry a leader into the top of the rocket. When the rocket is fired, and arrived to its proper height, it will give fire to the case at top; which will cause both rocket and stick to spin very fast in their return, and represent a worm of fire descending to the ground. There is another method of placing the small case, which is by letting the stick rise a little above the top of the rocket, and tying the case to it, so as to rest on the rocket: these rockets have no cones. There is also a third method by which they are managed, which is thus: In the top of a rocket fix a piece of wood, in which drive a small iron spindle; then make a hole in the middle of the small case, through which put the spindle: then fix on the top of it a nut, to keep the case from falling off; when this is done, the case will turn very fast, without the rocket: but this method does not answer so well as either of the former.

To divide the Tail of a Sky-rocket so as to form an Arch when ascending.—Having some rockets made, and headed according to fancy, and tied on their sticks; get some sheet tin, and cut it into round pieces about 3 or 4 inches diameter: then on the stick of each rocket, under the mouth of the case, fix one of these pieces of tin 16 inches from the rocket's neck, and support it by a wooden bracket, as strong as possible: the use of this is, that when the rocket is ascending the fire will play with great force on the tin, which will divide the tail in such a manner that it will form an arch as it mounts, and will have a very good effect when well managed: if there is a short piece of port-fire, of a strong charge, tied to the end of the stick, it will make a great addition; but this must be lighted before you fire the rocket.

To make several Sky-rockets rise in the same Direction, and equally distant from each other.—Take six, or any number of sky-rockets, of what size you please, then cut some strong packthread into pieces of 3 or 4 yards long, and tie each end of these pieces to a rocket in this manner: Having tied one end of your packthread round the body of one rocket, and the other end to another, take a second piece of packthread, and make one end of it fast to one of the rockets already tied, and the other end to a third rocket, so that all the rockets, except the two outside, will be fastened to two pieces of packthread: the length of thread from one rocket to the other may be what the maker pleases; but the rockets must be all of a size, and their heads filled with the same weight of stars, rains, &c.

Having thus done, fix in the mouth of each rocket a leader of the same length; and when you are going to fire them, hang them almost close; then tie the ends of the leaders together, and prime them: this prime being fired, all the rockets will mount at the same time, and divide as far as the strings will allow; which division they will keep, provided they are all rammed alike, and well made. They are called by some chained rockets.

Signal Sky-rockets are made of several kinds, according to the different signals intended to be given; but in artificial fire-works, two sorts are only used, which are one with reports and the other without;

out; but those for the use of the navy and army are headed with stars, serpents, &c.——Rockets which are to be bounced must have their cases made 1½ or 2 diameters longer than the common proportion; and after they are filled, drive in a double quantity of clay, then bounce and pinch them after the usual manner, and fix on each a cap.

Signal sky-rockets without bounces, are only sky-rockets closed and capped: these are very light, therefore do not require such heavy sticks as those with loaded heads; for which reason you may cut one length of the rocket off the stick, or else make them thinner. Signal rockets with reports are fired in small flights; and often both these, and those without reports, are used for a signal to begin firing a collection of works.

To fix a Sky-rocket with its Stick on the top of another.—Rockets thus managed make a pretty appearance, by reason of a fresh tail being seen when the second rocket takes fire, which will mount to a great height. The method of preparing these rockets is thus: Having filled a two-pounder, which must be filled only half a diameter above the piercer, and its head not more than 10 or 12 stars; the stick of this rocket must be made a little thicker than common; and, when made, cut it in half the flat way, and in each half make a groove, so that, when the two halves are joined, the hollow made by the grooves may be large enough to hold the stick of a half-pound rocket; which rocket make and head as usual: put the stick of this rocket into the hollow of the large one, so far that the mouth of the rocket may rest on the head of the two-pounder; from whose head carry a leader into the mouth of the small rocket; which being done, your rockets will be ready for firing.

To fix two or more Sky-rockets on one Stick—Two, three, or six, sky-rockets, fixed on one stick, and fired together, make a grand and beautiful appearance; for the tails of all will seem but as one of an immense size, and the breaking of so many heads at once will resemble the bursting of an air-balloon. The management of this device requires a skilful hand; but if the following instructions be well observed, even by those who have not made a great progress in this art, there will be no doubt of the rockets having the desired effect.—Rockets for this purpose must be made with the greatest exactness, all rammed by the same hand, in the same mould, and out of the same proportion of composition; and after they are filled and headed, must all be of the same weight. The stick must also be well made (and proportioned) to the following directions: first, supposing your rockets to be ½ pounders, whose sticks are 6 feet 6 inches long, then if 2, 3, or 6, of these are to be fixed on one stick, let the length of it be 9 feet 9 inches; then cut the top of it into as many sides as there are rockets, and let the length of each side be equal to the length of 1 of the rockets without its head; and in each side cut a groove (as usual); then from the grooves plane it round, down to the bottom, where its thickness must be equal to half the top of the round part. As their thickness cannot be exactly ascertained, we shall give a rule which generally answers for any number of rockets above two: the rule is this; that the stick at top must be thick enough, when the grooves are cut, for all the rockets to lie, without pressing each other, though as near as possible.

When only 2 rockets are to be fixed on one stick, let the length of the

the ſtick be the laſt given proportion, but ſhaped after the common method, and the breadth and thickneſs double the uſual dimenſions. The point of poiſe muſt be in the uſual place (let the number of rockets be what they will): if ſticks made by the above directions ſhould be too heavy, plane them thinner; and, if too light, make them thicker; but always make them of the ſame length.

When more than two rockets are tied on one ſtick, there will be ſome danger of their flying up without the ſtick, unleſs the following precaution is taken: For caſes being placed on all ſides, there can be no notches for the cord which ties on the rockets to lie in; therefore, inſtead of notches, drive a ſmall nail in each ſide of the ſtick, between the necks of the caſes: and let the cord, which goes round their necks, be brought cloſe under the nails; by this means the rockets will be as ſecure as when tied on ſingly. Your rockets being thus fixed, carry a quick-match, without a pipe, from the mouth of one rocket to the other; this match being lighted will give fire to all at once.

Though the directions already given may be ſufficient for theſe rockets, we ſhall here add an improvement on a very eſſential part of this device, which is, that of hanging the rockets to be fired; for before the following method was hit upon, many eſſays proved unſucceſsful. Inſtead, therefore, of the old and common manner of hanging them on nails or hooks, make uſe of this contrivance: Have a ring made of ſtrong iron wire, large enough for the ſtick to go in as far as the mouths of the rockets; then let this ring be ſupported by a ſmall iron, at ſome diſtance from the poſt or ſtand to which it is fixed; then have another ring, fit to receive and guide the ſmall end of the ſtick. Rockets thus ſuſpended will have nothing to obſtruct their fire; but, when they are hung on nails or hooks, in ſuch a manner that ſome of their mouths are againſt or upon a rail, there can be no certainty of their riſing in a vertical direction.

To fire Sky-rockets without Sticks.—You muſt have a ſtand, of a block of wood, a foot diameter, and make the bottom flat, ſo that it may ſtand ſteady: in the centre of the top of this block draw a circle 2½ inches diameter, and divide the circumference of it into three equal parts; then take 3 pieces of thick iron wire, each about 3 feet long, and drive them into the block, one at each point made on the circle; when theſe wires are drove in deep enough to hold them faſt and upright, ſo that the diſtance from one to the other is the ſame at top as at bottom, the ſtand is complete.

The ſtand being thus made, prepare your rockets thus: Take ſome common ſky-rockets, of any ſize, and head them as you pleaſe; then get ſome balls of lead, and tie to each a ſmall wire 2 or 2½ feet long, and the other end of each wire tie to the neck of a rocket. Theſe balls anſwer the purpoſe of ſticks when made of a proper weight, which is about ⅓ the weight of the rocket; but, when they are of a proper ſize, they will balance the rocket in the ſame manner as a ſtick, at the uſual point of poiſe. To fire theſe, hang them, one at a time, between the tops of the wires, letting their heads reſt on the point of the wires, and the balls hang down between them: if the wires ſhould be too wide for the rockets, preſs them together till they fit; and, if too cloſe, force them open; the wires for this purpoſe muſt be ſoftened, ſo as not to have any ſpring, or they will not keep their poſition when preſſed cloſe or opened.

Rain-falls and Stars for Sky-rockets, double and single.—Gold and silver rain compositions are drove in cases that are pinched quite close at one end: if you roll them dry, 4 or 5 rounds of paper will be strong enough; but, if they are pasted, 3 rounds will do; and the thin sort of cartridge-paper is best for those small cases, which in rolling you must not turn down the inside edge as in other cases, for a double edge would be too thick for so small a bore. The moulds for rain-falls should be made of brass, and turned very smooth in the inside; or the cases, which are so very thin, would tear in coming out; for the charge must be drove in tight; and the better the case fits the mould, the more driving it will bear. These moulds have no nipple, but instead thereof they are made flat. As it would be very tedious and troublesome to shake the composition out of such small ladles as are used for these cases, it will be necessary to have a funnel made of thin tin, to fit on the top of the case, by the help of which you may fill them very fast. For single rain-falls for 4-ounce rockets, let the diameter of the former be $\frac{2}{16}$ of an inch, and the length of the case 2 inches; for 8-ounce rockets, $\frac{3}{16}$, and 2 diameters of the rocket long; for 1-pound rockets, $\frac{5}{16}$, and 2 diameters of the rocket long; for 2-pound rockets, $\frac{5}{16}$, and $3\frac{1}{2}$ inches long; for 4-pound rockets, $\frac{6}{16}$, and $4\frac{1}{2}$ inches long; and for 6-pounders, $\frac{7}{16}$ diameter, and 5 inches long.

Of double rain-falls there are two sorts. For example, some appear first like a star, and then as rain; and some appear first as rain, and then like a star. When you would have stars first, you must fill the cases, within $\frac{1}{2}$ inch of the top, with rain-composition, and the remainder with star-composition; but when you intend the rain should be first, drive the case $\frac{1}{2}$ an inch with star-composition, and the rest with rain. By this method may be made many changes of fire; for in large rockets you may make them first burn as stars, then rain, and again as stars; or they may first show rain, then stars, and finish with a report; but when they are thus managed, cut open the first rammed end, after they are filled and bounced, at which place prime them. The star-composition for this purpose must be a little stronger than for rolled stars.

Strung Stars.—First take some thin paper, and cut it into pieces of $1\frac{1}{2}$ inch square, or thereabouts; then on each piece lay as much dry star-composition as you think the paper will easily contain; then twist up the paper as tight as you can; when done, rub some paste on your hands, and roll the stars between them; then set them to dry; your stars being thus made, get some flax or fine tow, and roll a little of it over each star; then paste your hands and roll the stars as before, and set them again to dry; when they are quite dry, with a piercer make a hole through the middle of each, into which run a cotton quick-match, long enough to hold 10 or 12 stars at 3 or 4 inches distance: but any number of stars may be strung together by joining the match.

Tailed Stars.—These are called tailed stars, because there are a great number of sparks issue from them, which represent a tail like that of a comet. Of these there are two sorts; which are rolled, and drove: when rolled, they must be moistened with a liquor made of half a pint of spirit of wine and half a gill of thin size, of this as much as will wet the composition enough to make it roll easy; when they are rolled, sift meal-powder over them, and set them to dry.

When

When tailed ſtars are drove, the compoſition muſt be moiſtened with ſpirit of wine only, and not made wet as for rolling: 1 and 2 oz. caſes, rolled dry, are beſt for this purpoſe; and, when they are filled, unrol the caſe within 3 or 4 rounds of the charge, and all that you unrol cut off; then paſte down the looſe edge: 2 or 3 days after the caſes are filled, cut them in pieces 5 or 6-8ths of an inch in length: then melt ſome wax, and dip one end of each piece into it, ſo was to cover the compoſition: the other end muſt be rubbed with meal-powder wetted with ſpirit of wine.

Drove Stars.—Caſes for drove ſtars are rolled with paſte, but are made very thin of paper. Before you begin to fill them, damp the compoſition with ſpirit of wine that has had ſome camphor diſſolved in it: you may ram them indifferently hard, ſo that you do not break or ſack the caſe; to prevent which, they ſhould fit tight in the mould. They are drove in caſes of ſeveral ſizes, from 8 drams to 4 oz. When they are filled in ½ oz. caſes, cut them in pieces of ¾ of an inch long; if 1 oz. caſes, cut them in pieces of 1 inch; if 2-ounce caſes, cut them in pieces of 1¼ inch long; and, if 4 oz. caſes, cut them in pieces of 1½ inch long: having cut your ſtars of a proper ſize, prime both ends with wet meal-powder. Theſe ſtars are ſeldom put in rockets, they being chiefly intended for air-balloons, and drove in caſes, to prevent the compoſition from being broke by the force of the blowing powder in the ſhell.

Rolling Stars are commonly made about the ſize of a muſket-ball; though they are rolled of ſeveral ſizes, from the bigneſs of a piſtol-ball to 1 inch diameter; and ſometimes very ſmall, but are then called *ſparks*. Great care muſt be taken in making ſtars, firſt, that the ſeveral ingredients are reduced to a fine powder; ſecondly, that the compoſition is well worked and mixed. Before you begin to roll, take about a pound of compoſition, and wet it with the following liquid, enough to make it ſtick together and roll eaſy:—Spirit of wine 1 quart, in which diſſolve ¼ of an ounce of iſinglaſs. If a great quantity of compoſition be wetted at once, the ſpirit will evaporate, and leave it dry, before you can roll it into ſtars: having rolled up one proportion, ſhake the ſtars in meal-powder, and ſet them to dry, which they will do in three or four days; but, if you ſhould want them for immediate uſe, dry them in an earthen pan over a ſlow heat, or in an oven. It is very difficult to make the ſtars all of an equal ſize when the compoſition is taken up promiſcuouſly with the fingers; but by the following method they may be made very exact:—When the mixture is moiſtened properly, roll it on a flat ſmooth ſtone, and cut it into ſquare pieces, making each ſquare large enough for the ſtars you intend. There is another method uſed by ſome to make ſtars, which is by rolling the compoſition in long pieces, and then cutting off the ſtar, ſo that each ſtar will be of a cylindrical form: but this method is not ſo good as the former; for, to make the compoſition roll this way, it muſt be made very wet, which makes the ſtars heavy, as well as weakens them. All ſtars muſt be kept as much from air as poſſible, otherwiſe they will grow weak and bad.

Scrolls of Sky-rockets.—Caſes for ſcrolls ſhould be made four or five inches in length, and their interior diameter 3-8ths of an inch: one end of theſe caſes muſt be pinched quite cloſe, before you begin to fill; and, when filled, cloſe the other end: then in the oppoſite ſides make

make a small hole at each end, to the composition, in the same manner as in tourbillons; and prime them with wet meal-powder. You may put in the head of a rocket as many of these cases as it will contain: being fired, they turn very quick in the air, and form a scroll or spiral line. They are generally filled with a strong charge, as that of serpents or brilliant fire.

Swarmers, or small Rockets.—Rockets that go under the denomination of *swarmers*, are those from 2 oz. downwards. These rockets are fired sometimes in flights, and in large water-works, &c. Swarmers of 1 and 2 oz. are bored, and made in the same manner as large rockets, except that, when headed, their heads must be put on without collars: the number of strokes for driving 1 oz. must be 8, and for 2 oz. 12.

All rockets under 1 oz. are not bored, but must be filled to the usual height with composition, which generally consists of fine meal-powder 4 oz. and charcoal or steel-dust 2 drams: the number of strokes for ramming these small swarmers is not material, provided they are rammed true, and moderately hard. The necks of unbored rockets must be in the same proportion as in common cases.

Stands for Sky-rockets.—Care must be taken, in placing the rockets when they are to be fired, to give them a vertical direction at their first setting out; which may be managed thus:—Have two rails of wood, of any length, supported at each end by a perpendicular leg, so that the rails be horizontal, and let the distance from one to the other be almost equal to the length of the sticks of the rockets intended to be fired; then in the front of the top rail drive square hooks at 8 inches distance, with their points turning sidewise, so that, when the rockets are hung on them, the points will be before the sticks, and keep them from falling or being blown off by the wind: in the front of the rail at bottom must be staples, drove perpendicular under the hooks at top; through these staples put the small ends of the rocket-sticks. Rockets are fired by applying a lighted port-fire to their mouths. When sky-rockets are made to perfection, and fired, they will stand 2 or 3 seconds on the hook before they rise, and then mount up briskly, with a steady motion, carrying a large tail from the ground all the way up, and just as they turn break and disperse the stars.

Girandole Chests for Flights of Rockets.—These are generally composed of four sides, of equal dimensions; but may be made of any diameter, according to the number of rockets designed to be fired; its height must be in proportion to the rockets, but must always be a little higher than the rockets with their sticks. When the sides are joined, fix in the top, as far down the chest as the length of one of the rockets with its cap on. In this top, make as many square or round holes to receive the rocket-sticks, as you intend to have rockets; but let the distance between them be sufficient for the rockets to stand without touching one another; then from one hole to another cut a groove large enough for a quick-match to lie in: the top being thus fixed, put in the bottom, at about 1½ foot distance from the bottom of the chest; in this bottom must be as many holes as in the top, and all to correspond; but these holes need not be so large as those in the top.

To prepare your chest, you must lay a quick-match, in all the grooves, from the hole to hole; then take some sky-rockets, and rub them

them in the mouth with wet meal-powder, and put a bit of match up the cavity of each; which match must be long enough to hang a little below the mouth of the rocket. Your rockets and chest being prepared according to the above directions, put the sticks of the rockets through the holes in the top and bottom of the chest, so that their mouths may rest on the quick-match in the grooves: by which all the rockets will be fired at once; for, by giving fire to any part of the match, it will communicate to all the rockets in an instant. As it would be rather troublesome to direct the sticks from the top to the proper holes in the bottom, it will be necessary to have a small door in one of the sides, which, when opened, you may see how to place the sticks. Flights of rockets being seldom set off at at the beginning of any fire-works, they are in danger of being fired by the sparks from wheels, &c. therefore, to preserve them, a cover should be made to fit on the chest, and the door in the side kept shut.

Serpents or Snakes for Pots of Aigrettes, small Mortars, Sky-rockets, &c.—Serpents for this use are made from 2½ inches to 7 inches long, and their formers from 3-16ths to 5-8ths of an inch diameter; but the diameter of the cases must always be equal to 2 diameters of the former. They are rolled and choaked like other cases, and filled with composition from 5-8ths of an inch to 1½ inch high, according to the size of the mortars or rockets they are designed for; and the remainder of the cases bounced with corn-powder, and afterwards their ends pinched and tied close: before they are used, their mouths must be primed with wet meal-powder.

Leaders, or Pipes of Communication.—The best paper for leaders is elephant; which you cut into long slips 2 or 3 inches broad, so that they may go 3 or 4 times round the former, but not more: when they are very thick, they are too strong for the paper which fastens them to the works, and will sometimes fly off without leading the fire. The formers for these leaders are made from 2 to 6-16ths of an inch diameter; but 4-16ths is the size generally made use of. The formers are made of smooth brass wire: when you use them, rub them over with grease, or keep them wet with paste, to prevent their sticking to the paper, which must be pasted all over. In rolling of pipes, make use of a rolling-board, but use it lightly: having rolled a pipe, draw out the former with one hand, holding the pipe as light as possible with the other; for, if it press against the former, it will stick and tear the paper. Make your leaders of different lengths, or in clothing of works you will cut a great many to waste. Leaders for marron batteries must be made of strong cartridge paper.

Crackers.—Cut some cartridge paper into pieces 3½ inches broad, and one foot long; one edge of each fold down lengthwise about ¼ of an inch broad; then fold the double edge down ¼ of an inch, and turn the single edge back half over the double fold; then open it, and lay all along the channel, which is formed by the folding of the paper, some meal-powder; then fold it over and over till all the paper is doubled up, rubbing it down every turn; this done, bend it backwards and forwards, 2½ inches, or thereabouts, at a time, as oft as the paper will allow; then hold all these folds flat and close, and with a small pinching cord give one turn round the middle of the cracker, and pinch it close; then bind it with a packthread as tight as you can; then, in the place where it was pinched, prime one end of it, and cap it with touch-paper. When these crackers

are

are fired, they will give a report at every turn of the paper: if you would have a great number of bounces, you must cut the paper longer, or join them after they are made; but, if they are made very long before they are pinched, you must have a piece of wood with a groove in it, deep enough to let in half the cracker; this will hold it straight while it is pinching.

Single Reports.—Cases for reports are generally rolled on one and two oz. formers, and seldom made larger but on particular occasions; they are made from two to four inches long, and very thick of paper. Having rolled a case, pinch one end quite close, and drive it down: then fill the case with corn-powder, only leaving room to pinch it at top; but before you pinch it, put in a piece of paper at top of the powder. Reports are fired by a vent, bored in the middle, at one end, just as required.

Marrons.—Formers for marrons are from ¾ of an inch to 1½ diameter. Cut the paper for the cases twice the diameter of the former broad, and long enough to go three times round: when you have rolled a case, paste down the edge and tie one end close; then with the former drive it down to take away the wrinkles, and make it flat at bottom; then fill the case with corn-powder one diameter and ½ high, and fold down the rest of the case tight on the powder. The marron being thus made, wax some strong pack-thread with shoemakers wax; this thread wind up in a ball, then unwind two or three yards of it, and that part which is near the ball make-fast to a hook; then take a marron, and stand as far from the hook as the pack-thread will reach, and wind it lengthwise round the marron as close as you can, till it will hold no more that way; then turn it, and wind the pack-thread on the short way, then lengthwise again, and so on till the paper is all covered; then make fast the end of the pack-thread, and beat down both ends of the marron to bring it in shape. The method of firing marrons is by making a hole at one end with an awl, and putting in a piece of quick-match; then take a piece of strong paper, in which wrap up the marron with two leaders, which must be put down to the vent, and the paper tied tight round them with small twine: these leaders are bent on each side, and their loose ends tied to other marrons, and are nailed in the middle to the rail of the stand. The use of winding the pack-thread in a ball is, that you may let it out as you want it, according to the quantity the marron may require; and that it may not be tied in knots, which would spoil the marron.

Marron Batteries, if well managed, will keep time to a march, or a slow piece of music. Marron batteries are made of several stands, with a number of cross rails for the marrons; which are regulated by leaders, by cutting them of different lengths, and nailing them tight, or loose, according to the time of the music. In marron batteries you must use the large and small marrons, and the nails for the pipes must have flat heads.

Line Rockets.—Are made and drove as the sky-rockets, but have no heads, and the cases must be cut close to the clay: they are sometimes made with six or seven changes, but in general not more than four or five. The method of managing those rockets, is thus:—First, have a piece of light wood, the length of one of the rockets, turned round about 2½ inches diameter, with a hole through the middle lengthwise, large enough for the line to go easily through:

if you design four changes, have four grooves cut in the swivel, one opposite the other, to lay the rockets in.

The mouths of the rockets being rubbed with wet meal-powder, lay them in the grooves head to tail, and tie them fast; from the tail of the first rocket carry a leader to the mouth of the second, and from the second to the third, and so on to as many as there are on the swivel, making every leader very secure; but, in fixing these pipes, take care that the quick-match does not enter the bores of the rockets: the rockets being fixed on the swivel and ready to be fired, have a line 100 yards long, stretched and fixed up-tight, at any height from the ground; but be sure to place it horizontally: this length of line will do for ½lb. rockets; but if larger, the line must be longer. Before you put up the line, put one end of it thro' the swivel; and, when you fire the line-rocket, let the mouth of that rocket which you fire first face that end of the line where you stand; then the first rocket will carry the rest to the other end of the line, and the second will bring them back; and so they will run out and in according to the number of rockets: at each end of the line there must be a piece of flat wood for the rocket to strike against, or its force will cut the line. Let the line be well soaped, and the hole in the swivel very smooth.

Different Decorations for Line Rockets.—To line rockets may be fixed great variety of figures, such as flying dragons, Mercuries, ships, &c. Or they may be made to run on the line like a wheel; which is done in this manner. Have a flat swivel made very exact, and on it tie two rockets obliquely, one on each side, which will make it turn round all the way it goes, and form a circle of fire; the charge for these rockets should be a little weaker than common. If you would shew two dragons fighting, get two swivels made square, and on each tie three rockets together on the under side; then have two flying dragons made of tin, and fix one of them on the top of each swivel, so as to stand upright; in the mouth of each dragon put a small case of common fire, and another at the end of the tail; you may put two or three port-fires, of a strong charge, on one side of their bodies, to shew them. This done, put them on the line, one at each end; but let there be a swivel in the middle of the line to keep the dragons from striking together: before you fire the rockets, light the cases on the dragons; and, if care be taken in firing both at the same time, they will meet in the middle of the line, and seem to fight. Then they will run back and return with great violence; which will have a very pleasing effect. The line for these rockets must be very long, or they will strike too hard together.

Chinese Flyers.—Cases for flyers may be made of different sizes, from one to eight ounces: they must be made thick of paper, and eight interior diameters long; they are rolled in the same manner as tourbillons, with a straight pasted edge, and pinched close at one end. The method of filling them is, the case being put in a mould, whose cylinder, or foot, must be flat at top without a nipple, fill it within ½ a diameter of the middle; then ram in ½ a diameter of clay, on that as much composition as before, on which drive ½ a diameter of clay; then pinch the case close, and drive it down flat: after this is done, bore a hole exactly through the centre of the clay in the middle; then in the opposite sides, at both ends, make a vent; and in that side you intend to fire first make a small hole to the composition

near the clay in the middle, from which carry a quick-match, covered with a single paper, to the vent at the other end; then, when the charge is burnt on one side, it will, by means of the quick-match, communicate to the charge on the other (which may be of a different sort). The flyers being thus made, put an iron pin, that must be fixed in the work on which they are to be fired, and on which they are to run, through the hole in the middle: on the end of this pin must be a nut to keep the flyer from running off. If you would have them turn back again after they are burnt, make both the vents at the ends on the same side, which will alter its course the contrary way.

Table Rockets are designed merely to shew the truth of driving, and the judgment of a fire-worker, they having no other effect, when fired, than spinning round in the same place where they begin, till they are burnt out, and shewing nothing more than an horizontal circle of fire.

The method of making these rockets is—Have a cone turned out of hard wood 2½ inches diameter, and as much high; round the base of it draw a line; on this line fix four spokes, two inches long each, so as to stand one opposite the other; then fill four nine-inch one-pound cases with any strong composition, within two inches of the top: these cases are made like tourbillons, and must be rammed with the greatest exactness. Your rockets being filled, fix their open ends on the short spokes; then in the side of each case bore a hole near the clay; all these holes, or vents, must be so made that the fire of each case may act the same way; from these vents carry leaders to the top of the cone, and tie them together. When you would fire the rockets, set them on a smooth table, and light the leaders in the middle, and all the cases will fire together, and spin on the point of the cone.

These rockets may be made to rise like tourbillons, by making the cases shorter, and boring four holes in the under side of each at equal distances: this being done, they are called double tourbillons. All the vents in the under side of the cases must be lighted at once; and the sharp point of the cone cut off, at which place make it spherical.

SHORT ACCOUNT OF RICHARD BAXTER.

RICHARD BAXTER, an eminent divine among the con-conformists, was born at Rowton in Shropshire, November 12, 1615; and distinguished himself by his exemplary life, his pacific and moderate principles, and his numerous writings. Upon the opening of the long parliament, he was chosen vicar of Kidderminster. In the heat of the civil wars he withdrew from that town to Coventry, and preached to the garrison and inhabitants. When Oliver Cromwell was made protector, he would by no means comply with his measures, though he preached before him. He came to London and preached before the parliament the day before they voted the return of Charles II. who upon his restoration appointed him one of his chaplains in ordinary. He assisted at the conference in the Savoy, as one of the commissioners for stating the fundamentals in religion, and then drew up a reformed liturgy. He was offered the bishopric of Hereford, which he refused, affecting no higher preferment than the liberty of continuing minister of Kidderminster; which he

he could not obtain, for he was not permitted to preach there above twice after the restoration. Whereupon he returned to London, and preached occasionally about the city, till the act of uniformity took place. In 1662, Mr. Baxter was married to Margaret Charleton, daughter to Francis Charleton, Esq. of the county of Salop. She was a woman of great piety, and entered thoroughly into her husband's views concerning religion. During the plague in 1665 he retired into Buckinghamshire; but afterwards returned to Acton, where he staid till the act against conventicles expired; and then his audience was so large that he wanted room. Upon this he was committed to prison; but, procuring an habeas corpus, he was discharged. After the indulgence in 1672, he returned to London; and in 1682 he was seized for coming within five miles of a corporation. In 1684 he was seized again; and in the reign of James II. was committed prisoner to the King's Bench, and tried before the Lord Chief Justice Jefferies for his Paraphrase on the New Testament, which was called a scandalous and seditious book against the government. He continued in prison two years; from whence he was at last discharged, and had his fine remitted by the king. He died December 8, 1691; and was buried in Christ-church. He was honoured with the friendship of some of the greatest and best men in the kingdom, as the Earl of Lauderdale, the Earl of Balcarras, Lord Chief Justice Hales, Dr. Tillotson, &c. and held correspondence with some of the most eminent foreign divines. He wrote above 120 books, and had above sixty written against him. Mr. Granger's character of him is very striking. "Richard Baxter (says he) was a man famous for weakness of body and strength of mind; for having the strongest sense of religion himself, and exciting a sense of it in the thoughtless and profligate; for preaching more sermons, engaging in more controversies, and writing more books, than any other non-conformist of his age. He spoke, disputed, and wrote, with ease; and discovered the same intrepidity when he reproved Cromwell and expostulated with Charles II. as when he preached to a congregation of mechanics. His zeal for religion was extraordinary; but it seems never to have prompted him to faction, or carried him to enthusiasm." Among his most famous works were, 1. The Saints Everlasting Rest. 2. Call to the Unconverted, of which 20,000 were sold in one year; and it was translated not only into all the European languages, but into the Indian tongue. 3. Poor Man's Family Book. 4. Dying Thoughts; and, 5. A Paraphrase on the New Testament. His practical works have been printed in four volumes folio.

ACCOUNT OF THE NIMIQUAS, A NATION OF SOUTHERN AFRICA.

[From LE VAILLANT's New Travels into the interior Parts of Africa.]

WHEN I entered the Nimiqua country, my design was to investigate every thing that had been said of it at the Cape. How many tales had I not heard of this nation! what wonderful things concerning its manners, its arts, its treasures, &c. The reader knows already what to think of its pretended mines of gold

and silver: and the tales of its arts and its laws are on a par with those of its mines.

Kolben is the man who has stamped authority on all these fables. Even I, having no idea respecting these distant and unknown people, gave some credit to the dreams of this writer. In consequence, as I penetrated into the interior of Africa, and visited the Hottentots, I every where sought the traces of that flourishing agriculture, "which they understand incomparably better than the Europeans of the Cape, who frequently apply to them for advice on the subject." I was desirous of seeing some of those solemn marriage ceremonies, which a priest performs, and which he legitimates by sprinkling the newly-united couple with his urine. I wished to visit the public prisons of these people, and be present at the sittings of their tribunals, and the decrees of their sovereign council. Perhaps I had destroyed monsters enough in Africa to aspire to the honour of being admitted into that order of knighthood; the progress and ceremonials of which the historian has described with no less pomp than minuteness. Alas! all these splendid chimeras vanished before me. Religion, police, laws, military tactics, orders of battle, treaties of peace, experienced generals, prisoners of war, vanquishers and vanquished, were all romances, existing only in the brain of the author, and in the taverns where they had been told him by those who made him their sport.

Thirty or forty years after the publication of his voyage, Abbé de la Caille made some stay at the Cape, and thus was enabled, on some points at least, to pass judgment on the work. He spoke of it as he ought, and as it deserves. Since la Caille, other travellers have given their opinions of Kolben; and the learned now know how far they may rely on the accounts of that traveller. To listen to him, in all the Hottentot tribes without exception, mothers have the inhuman prejudice of resolving not to have twins, and the abominable custom of destroying one of the two. If the twins consist of two boys, or two girls, they kill the weaker of the two; if a boy and girl, the girl, he says, is the victim; and he blushes not to avow, that he has witnessed these crimes.

Now I aver, that this charge is the blackest calumny against nature that ever defiled the pen of a writer destitute of modesty. The sight of the two twins of one of the wives of the chief was sufficient to convince me of this. However, as these children might have been an exception to the general law for some particular reason, I resolved to interrogate their father respecting this pretended massacre. Every morning before I went a-hunting, he came to see me with his two wives, and regale himself with a pipe of tobacco and a *sopje*, or small glass, of brandy. Though his language was different from that of the Hottentots on the western coast, yet, in the two months I had spent in the country, I had learned to understand it a little, and make myself understood.

One day, as I was sitting on the grass, near my tent, with him and his two wives, I turned the conversation to the subject of the twins, and asked his wife whether, if she should have twins again, she would not destroy one of them? This question appeared to offend her: she kept silence, and fell into a deep musing. But her husband, turning towards me, and reminding me that I had several times asked him similar questions, declared with warmth, that such

a sacrifice

a sacrifice was impossible. Thus we see how unjust are the whites who, believing Kolben, accuse the Nimiquas of a crime so abominable as to be an outrage against the common mother of all beings. I will here add, that the Nimiquas not only do not make away with one of their twins when they have them, but preserve and bring up all their children. This duty is so natural, that I could not have made them comprehend an idea repugnant to it.

Besides the grand and revolting charge of which I have just spoken, I had heard, respecting the Greater Nimiquas, another absurd fable, the falsehood of which I equally verified. This was not told me at the Cape, like the preceding one: I had it from Klaas Baster, who, being born near Orange River, might have known some things respecting these people with certainty. According to him, the fathers, to shew what affection they bear their children, feed their eldest in a particular manner, as being of right the first object of paternal care. For this purpose, they put him in a coop, as it were: that is, they shut him up in a trench made under their hut, where, being deprived of motion, he loses little by perspiration, while they feed and cram him in a manner with milk and grease. By degrees the child fattens, and gets as round as a barrel; and when he is come to such a state as not to be able to walk, but to bend under his own weight, the parents exhibit him to the admiration of the horde; who, from that period, conceive more or less esteem and consideration for the family, according as the monster has acquired more or less rotundity. Such was the account given me by Klaas Baster; and, though it appeared to me altogether improbable, yet the narrator related so many particulars, of which he pretended to have been an eye-witness; he had so little interest in imposing upon me; and the human mind, in uncultivated and ignorant nations, appears sometimes capable of such senseless customs and prejudices, that, notwithstanding my reluctance, I could not avoid believing it.

Soon, however, I was undeceived. Wherever I asked any questions on the subject, I saw that the people to whom I addressed myself were ready to laugh in my face. Still, as it appeared strange to me, that a man should talk of what he had seen, when he had in reality seen nothing; as it was possible, that the fable might have some foundation, without being true in all its particulars; I was willing to convince myself what could have given rise to it; and, every time I visited a horde, I took care, under different pretences, to examine, one after another, all the huts of the kraal, and to ask which was the eldest child of the family: but I no where saw any thing that indicated either this pretended coop, or this pretended cramming.

It is probable that such a tale may have originated among the planters residing on the Namero, and in the neighbourhood of the country of the Nimiquas; that it was a pleasantry of some wit of the place on the leanness of these people, which indeed is extreme; and that Klaas Baster, the son of a Hottentot and a planter, having had it instilled into him in his infancy, had finished, like other romancers, by asserting that he had seen what he had only been told. And thus it is, that, throughout the whole of the colony of the Cape, the planters and even the Hottentots will assure you, that sprinkling with urine is practised in the marriage ceremonies of the savage hordes.

In size, the Greater Nimiquas are taller than the other Hottentot tribes. They appear even to exceed in height the Gonaquas, though perhaps

perhaps they do not reality. Their ſlender bones, delicate air, thin ſhape, and ſmall legs, every thing, in ſhort, even to their cloaks, which reach from their ſhoulders to the ground, contributed to the illuſion. On ſeeing the bodies of theſe men as ſlender as the ſtem of a tree, you would almoſt ſuppoſe them to have paſſed through the inſtrument of a wire-drawer. Leſs deep in colour than the Caffres, they have at the ſame time more pleaſing features than the other Hottentots, becauſe their noſe is leſs flattened, and their cheeks leſs prominent. But their cold and unmeaning countenances, their phlegmatic and immoveable air, give them a particular character by which they are diſtinguiſhed. Every time I looked at them, I fancied I beheld one of thoſe lank, long-viſaged, gothic figures placed at the church-doors in certain catholic countries as if to ſerve as ſentinels.

I have already ſaid, that the women do not ſhare this tranquil apathy. Gay, lively, ſportive, and loving much to laugh, you would ſuppoſe them to be formed of different materials. It is eaſy enough to conceive, that a man and wife may live peaceably together, notwithſtanding ſuch difference of diſpoſition; but it is not eaſy to underſtand or explain how ſuch melancholy fathers can beget daughters ſo gay, or ſuch ſprightly women bear ſons ſo dull.

The kroſs differs not at all in ſhape from the Hottentot cloak; only, as I have before remarked, it is longer. Many of them uſe the ſkins of the hyæna, the jackal, or the iſatis, when they are lucky enough to procure a ſufficiency to make a kroſs. They ornament them with glaſs beads, and plates of copper, which they obtain from the Hottentots of the colony. I found among them a particular ſort of theſe beads, conſiſting of little long tubes of different colours, and tranſparent. Theſe being unknown at the Cape, I wiſhed to know whence the ſavages procured them. They informed me, that they got them by barter with other neighbouring nations, who had them only at the ſecond hand; and, that they came originally from the blacks who dwelt on the coaſt of the Indian ſea, to the eaſt of Africa, by whom they were fabricated.

If the beads of which I am ſpeaking were ſtones or gems coloured by nature, it might be believed that the blacks of the weſt, after having reduced them to little pieces, might know how to ſhape and perforate them; as the ſavages of Guiana do with the amazonian ſtone. I have found coloured ſubſtances in ſeveral rocks on the weſt of Africa, and there may be the ſame on the eaſt. But theſe in queſtion are enamels; that is to ſay, glaſs, made by fuſion and formed by blowing. Now as ſuch an operation requires, not only for the melting, but alſo for the compoſition of the colours, conſiderable ſkill, implements, chemical knowledge, &c. I think it may be affirmed, without any great raſhneſs, that the negroes of the eaſt were never maſters of ſuch an art; and, that the enamels they ſell to their neighbours probably come from the Portugueſe colonies of Moſambique. I have in my cabinet one of theſe girdles of glaſs beads, and I can aſſert that it is neither of French nor Dutch manufacture.

Beſides the kind of decoration which I have juſt deſcribed, the Greater Nimiquas uſe another, that of daubing their hair with a thick layer of greaſe, mingled with the powder of different odoriferous woods. Many of them tattoo their faces, arms, and even bodies. But the latter cuſtom is not ſo prevalent among them, as

among

among other people more to the north. This too may be a native custom, which the same spirit of coquetry that gave rise to it in other nations may have equally prompted the Nimiquas to invent.

As to religion, divine worship, priests, temples, and the idea of an immortal soul, they are all non-entities to them. On these subjects, like all the rest of the savages their neighbours, they have not the slightest notion. Nature has told them sufficiently plain, not to do to another what they would not another should do to them; and their little associations, which are a commencement of civilization, lead them in this respect farther than many cultivated people, by enjoining them to do to others as they would be done by.

After what I have said of the phlegmatic temper of the Nimiquas, it will be supposed that they are by no means warlike. Yet, like the surrounding nations, they have their assagays and poisoned arrows; and, like them can handle these arms with dexterity. They possess also those war-oxen, so formidable in battle, and so favourable to the cowardice or inactivity of the combatants. They have even a peculiar implement of war which their neighbours have not. This is a large buckler, of the height of the person who bears it, behind which the Nimiqua can completely conceal himself. But, besides that his natural apathy prevents him from giving or taking offence, he is in reality pusillanimous and cowardly from the coldness of his disposition. To utter only the name of Houzouana before him is sufficient to make him tremble. This name is that of a neighbouring nation, born brave and warlike, and distinguished from other African nations by peculiar features.

Notwithstanding his frigidity, the Nimiqua is not insensible to pleasure. He even seeks with avidity those which, requiring but little exertion, are capable of agitating him and procuring agreeable sensations. Every evening, as soon as the fire was kindled in my camp, thirty or forty persons, men and women, would come and sit with my people in a circle round it. For some time a profound silence was maintained: at length one of them would open his mouth to relate a story, and would then speak without ceasing for hours together. I was not sufficiently acquainted with the language to comprehend the whole of the narration, but I understood, that it commonly related to some event to the honour of the nation, and that the unfortunate hero of the tale was almost always a hyæna, a lion, or a Houzouana. Every now and then, the orator was interrupted by the noisy sallies of the women, who shook their very sides with laughter. The men, without taking any share in this extravagant mirth, reasoned gravely, and with an appearance of profound thought, on the circumstances they had just heard. In the midst of this grotesque and incongruous picture, I amused myself with the dignity of the reasoners; while the women, who saw me smile, and knew that I understood so little of the tale, redoubled their laughter till they were out of breath.

Their musical instruments are the same as those of the other Hottentots; but their dancing is very different, and resembles the temper of the nation. If the countenance have received from nature, features that can express our passions, the body has also its attitudes and movements that paint our temper and feelings. The dance of the Nimiqua is frigid, like himself, and so devoid of grace and hilarity,

larity, that, were it not for the extreme gaiety of the women, it might be called the dance of the dead. These tortoises, to whom dancing is a fatigue, shew little eagerness for any thing but wagers, games of calculation and chance, and all the sedentary amusements which require patience and reflection, of which they are more capable than they are of motion.

One of their favourite games is what they call the tiger and the lambs. It is nearly as follows: I say nearly, for I never understood it sufficiently to be able clearly to explain it. An oblong square is traced on the ground, in which are made a certain number of holes, two or three inches deep, forming a sort of chess-table. The holes are made in ranks, side by side, but the number is not fixed. I have seen them varying from twenty to forty. To play, they take a certain number of pieces of sheep's-dung, hardened by drying, proportionate to the number of holes, and which represent lambs. Some of the holes are also called lambs, and into these are put balls. The holes that remain empty, are called tigers. Perhaps they represent only different dens of the same animal, and the retreats or ambuscades which he occupies successively one after the other. The player begins by taking some lambs out of their holes, and putting them into other holes of the tiger. Perhaps this tiger has a regular movement like some of our pieces at chess, and the art of the player consists in avoiding this movement, to save his lambs, and prevent them from being devoured. At least, when it has been necessary to place them elsewhere, I have seen him double his attention; but he sometimes brings them together or separates them in such a confused manner, that, being unable to follow the game, I have been confounded by the movements, and could comprehend nothing farther, till the moment when the stakes were taken up.

There is another game, which, being much more easy, because it is simply a game of chance, is on that account so much the more dangerous; for the Nimiquas, fond of it to distraction, frequently risk, in playing at it, their herds and all they possess. It considerably resembles our hustle-cap. The seed of the mimosa of the country is a sort of bean, which constitutes the principal food of the giraffe. They take a certain number of these seeds, engrave some mark on one of their sides, which answers the same purpose to them that the head or the tale of a piece of money does to our gamblers, and, after they have hustled them some time between their two hands, they throw them on the ground, when they have nothing to do but to count whether the marked or unmarked sides uppermost are most numerous. This game, contrived equally to please the indolent, because it does not fatigue them, and the stupid, because it requires no capacity of thought, wonderfully delighted my Hottentots. They soon gave into it with such ardour, that they did nothing else from morning to night; and many of them, after having lost all they possessed, staked, as their last resource, the allowance of tobacco and brandy that they were to receive the succeeding days.—Nothing then was left for them but to rob me; and, I had reason to fear they would do so. To cut off the temptation, I re-established an equality of fortune among them, by restoring to each what he had lost, aware that the sole hope of regaining this makes gamblers; and I had then no need of proclamations to prevent in future such disorder in my camp.

Several

Several Nimiquas had accompanied me from the former horde to this; they appeared even to take pleasure in being with me; but, the moment my people were prohibited from playing with them, they no longer found my camp so agreeable, and came to announce to me their departure. Nevertheless, as they had every reason to be satisfied with my conduct towards them, they expressed, on quitting me, great friendship and attachment; and, as I had just purchased some oxen for my waggons, they even offered to take them under their care, and deliver them to Swanepoel at my camp on the Orange River. This offer I accepted. In return, I made them a few presents; I entrusted them with my cattle, after having marked them; and they went away satisfied.

Scarcely had they quitted me, when one of my Hottentos came to ask a favour of me. He was desirous of making one of the Nimiquas of the horde a present of a fine cow. He had already something towards paying for her which he had gained at play: but he had not enough, and requested me to advance him, in part of his wages, a little hard-ware, that he might have it in his power to conclude his bargain. A gift of such consequence implied some great service received. Before I assented to his request, I would know what had given rise to it; and I found that the cow was not a present, but an article of barter. My Hottentot was in love with the daughter of the Nimiqua: and, to obtain her, he had offered him a cow, which the Nimiqua had consented to accept.

In this manner are marriages made in all the African nations; and such was originally the custom throughout the world, before the imagination of poets, and the policy of civilized societies, had substituted in the stead of love a representative, who, under the name of Hymen, claiming alone the right of uniting the sexes, contributes but too often to disturb and deprave their union. Among savages there is no contract, no witness, no ceremony. A man and woman please each other; they live together; and this constitutes them husband and wife. If the woman have parents, she is considered as their property, and of course they must either give or sell her.

OF THE FORCE AND VARIETY OF SENTIMENT.

SENTIMENT, according to Lord Kames, is a term appropriated to such thoughts as are prompted by passion. It differs from a perception; for a perception signifies the act by which we become conscious of external objects. It differs from consciousness of an internal action, such as thinking, suspending thought, inclining, resolving, willing, &c. And it differs from the conception of a relation among objects; a conception of that kind being termed *opinion*.

To talk in the language of music, each passion hath a certain tone, to which every sentiment proceeding from it ought to be tuned with the greatest accuracy: which is no easy work, especially where such harmony ought to be supported during the course of a long theatrical representation. In order to reach such delicacy of execution, it is necessary that a writer assume the precise character and passion of the personage represented; which requires an uncommon genius. But it is the only difficulty; for the writer, who, annihilating himself, can thus become another person, need be in no pain about the sentiments that belong to the assumed character: these will flow without

the leaſt ſtudy, or even preconception; and will frequently be as delightfully new to himſelf as to his reader. But, if a lively picture even of a ſingle emotion require an effort of genius, how much greater the effort to compoſe a paſſionate dialogue with as many different tones of paſſion as there are ſpeakers? With what ductility of feeling muſt that writer be endued, who approaches perfection in ſuch a work; when it is neceſſary to aſſume different and even oppoſite characters and paſſions in the quickeſt ſucceſſion? Yet this work, difficult as it is, yields to that of compoſing a dialogue in genteel comedy, exhibiting characters without paſſion. The reaſon is that the different tones of character are more delicate, and leſs in ſight, than thoſe of paſſion; and, accordingly, many writers, who have no genius for drawing characters, make a ſhift to repreſent, tolerably well, an ordinary paſſion in its ſimple movements. But of all works of this kind, what is truly the moſt difficult, is a characteriſtical dialogue upon any philoſophical ſubject; to interweave characters with reaſoning, by ſuiting to the character of each ſpeaker a peculiarity not only of thought but of expreſſion, requires the perfection of genius, taſte, and judgment.

How difficult dialogue-writing is, will be evident, even without reaſoning, from the miſerable compoſitions of that kind found without number in all languages. The art of mimicking any ſingularity in geſture or in voice, is a rare talent, though directed by ſight and hearing, the acuteſt and moſt lively of our external ſenſes: how much more rare muſt that talent be, of imitating characters and internal emotions, tracing all their different tints, and repreſenting them in a lively manner by natural ſentiments properly expreſſed? The truth is, ſuch execution is too delicate for an ordinary genius; and for that reaſon the bulk of writers, inſtead of expreſſing a paſſion as one does who feels it, content themſelves with deſcribing it in the language of a ſpectator. To awaken paſſion by an internal effort merely, without any external cauſe, requires great ſenſibility; and yet that operation is neceſſary, not leſs to the writer than to the actor; becauſe none but thoſe who actually feel a paſſion can repreſent it to the life. The writer's part is the more complicated: he muſt add compoſition to paſſion: and muſt, in the quickeſt ſucceſſion, adopt every different character. But a very humble flight of imagination may ſerve to convert a writer into a ſpectator, ſo as to figure, in ſome obſcure manner, an action as paſſing in his ſight and hearing. In that figured ſituation, being led naturally to write like a ſpectator, he entertains his readers with his own reflections, with cool deſcription, and florid declamation; inſtead of making them eye-witneſſes, as it were, to a real event, and to every movement of genuine paſſion. Thus moſt of our plays appear to be caſt in the ſame mould; perſonages without character, the mere outlines of paſſion, a tireſome monotony, and a pompous declamatory ſtyle.

This deſcriptive manner of repreſenting paſſion is a very cold entertainment; our ſympathy is not raiſed by deſcription; we muſt firſt be lulled into a dream of reality, and every thing muſt appear as paſſing in our ſight. Unhappy is the player of genius who acts a part in what may be termed a *deſcriptive tragedy*; after aſſuming the very paſſion that is to be repreſented, how is he cramped in action, when he muſt utter, not the ſentiments of the paſſion he feels, but a cold deſcription in the language of a byſtander? It is that imperfection,

fection, undoubtedly, in the bulk of our plays, which confines our ſtage almoſt entirely to Shakeſpeare, notwithſtanding his many irregularities. In our late Engliſh tragedies, we ſometimes find ſentiments tolerably well adapted to a plain paſſion: but we muſt not in any of them expect a ſentiment expreſſive of character; and, upon that very account, our late performances of the dramatic kind are for the moſt part intolerably inſipid.

But it may be proper to illuſtrate this ſubject by examples. The firſt examples ſhall be of ſentiments that appear the legitimate offſpring of paſſion; to which ſhall be oppoſed what are deſcriptive only, and illegitimate: and, in making this compariſon, the inſtances ſhall be borrowed from Shakeſpeare and Corneille, who for genius in dramatic compoſition ſtand uppermoſt in the rolls of fame.—Shakeſpeare ſhall furniſh the firſt example, being of ſentiments dictated by a violent and perturbed paſſion:

LEAR. ——————— Filial ingratitude!
Is it not as if this mouth ſhould tear this hand
For lifting food to't?—But I'll puniſh home;
No, I will weep no more.——In ſuch a night,
To ſhut me out!——Pour on, I will endure.
In ſuch a night as this! Oh! Regan, Gonerill,
Your old kind father, whoſe frank heart gave all—
Oh! that way madneſs lies; let me ſhun that;
No more of that.————————
KENT. Good, my lord, enter here.
LEAR. Prithee, go in thyſelf, ſeek thine own eaſe,
This tempeſt will not give me leave to ponder
On things would hurt me more:—but I'll go in;
In, boy, go firſt. Yon houſeleſs poverty——
Nay, get thee in; I'll pray, and then I'll ſleep—
Poor naked wretches, wherſoe'er you are,
That bide the pelting of this pitileſs ſtorm!
How ſhall your houſeleſs heads, and unfed ſides,
Your loop'd and window'd raggedneſs, defend you
From ſeaſons ſuch as theſe!——Oh! I have ta'en
Too little care of this! take phyſic, Pomp;
Expoſe thyſelf to feel what wretches feel,
That thou may'ſt ſhake the ſuperflux to them,
And ſhew the heav'ns more juſt. LEAR, act iii. ſc. 5.

With regard to the French author, truth obliges us to acknowledge, that he deſcribes in the ſtyle of a ſpectator, inſtead of expreſſing paſſion like one who feels it; which naturally betrays him into a tireſome monotony, and a pompous declamatory ſtyle. It is ſcarcely neceſſary to give examples, for he never varies from that tone. We ſhall, however, take two paſſages at a venture, in order to be confronted with thoſe tranſcribed above. In the tragedy of Cinna, after the conſpiracy was diſcovered, Æmilia, having nothing in view but racks and death to herſelf and her lover, receives a pardon from Auguſtus, attended with the brighteſt circumſtances of magnanimity and tenderneſs. This is a lucky ſituation for repreſenting the paſſions of ſurpriſe and gratitude in their different ſtages, which ſeem naturally to be what follow. Theſe paſſions, raiſed at once to the utmoſt pitch, and being at firſt too big for utterance, muſt,

for some moments, be expressed by violent gestures only: so soon as there is vent for words, the first expressions are broken and interrupted: at last, we ought to expect a tide of intermingled sentiments, occasioned by the fluctuation of the mind between the two passions. Æmilia is made to behave in a very different manner: with extreme coolness she describes her own situation, as if she were merely a spectator; or rather the poet takes the task off her hands:

Et je me rends, seigneur, à ces hautes bontés:
Je recouvre la vue auprès de leurs clartés.
Je connois mon forfait qui me sembloit justice;
Et ce que n'avoit pû la terreur du supplice,
Je sens naitre en mon ame un repentir puissant,
Et mon cœur en secret me dit, qu'il y consent.
Le ciel a résolu votre grandeur supreme;
Et pour preuve, seigneur, je n'en veux que moi-même.
J'ose avec vanité me donner cet éclat,
Puisqu'il changé mon cœur, qu'il veut changer l'état.
Ma haine va mourir, que j'ai crue immortelle;
Elle est morte, et ce cœur devient sujet fidele;
Et, prenant déformais cette haine en horreur,
L'ardeur de vous servir succede à sa fureur. Act v. sc. 3.

So much in general upon the genuine sentiments of passion. We proceed to particular observations. And, first, passions seldom continue uniform any considerable time: they generally fluctuate, swelling and subsiding by turns, often in a quick succession; and the sentiments cannot be just unless they correspond to such fluctuation. Accordingly, a climax never shews better than in expressing a swelling passion. The following passages may suffice for an illustration:

ALMERIA. ——— How hast thou charm'd
The wildness of the waves and rocks to this;
That thus relenting they have giv'n thee back
To earth, to light and life, to love and me?
MOURNING BRIDE, act i. sc. 7.

I would not be the villain that thou think'st
For the whole space that's in the tyrant's grasp,
And the rich earth to boot, MACBETH, act iv. sc. 4.

The following passage expresses finely the progress of conviction:

Let me not stir, nor breathe, lest I dissolve
That tender, lovely form, of painted air,
So like Almeria. Ha! it sinks, it falls;
I'll catch it e'er it goes, and grasp her shade.
'Tis life! 'tis warm! 'tis she herself!
It is Almeria! 'tis, it is my wife!
MOURNING BRIDE, act ii. sc. 6.

In the progress of thought our resolutions become more vigorous as well as our passions:

If ever I do yield or give consent,
By any action, word, or thought, to wed
Another lord; may then just heav'n show'r down, &c.
MOURNING BRIDE, act i. sc. 1.

And

And this leads to a ſecond obſervation, that the different ſtages of a paſſion, and its different directions, from birth to extinction, muſt be carefully repreſented in their order; becauſe otherwiſe the ſentiments, by being miſplaced, will appear forced and unnatural.—Reſentment, for example, when provoked by an atrocious injury, diſcharges itſelf firſt upon the author: ſentiments therefore of revenge come always firſt, and muſt in ſome meaſure be exhauſted before the perſon injured think of grieving for himſelf. In the Cid of Corneille, Don Diegue, having been affronted in a cruel manner, expreſſes ſcarcely any ſentiment of revenge, but is totally occupied in contemplating the low ſituation to which he is reduced by the affront:

O rage! o deſeſpoir! o vieilleſſe ennemie!
N'ai-je donc tant vecu que pour cette infamie?
Et ne ſuis-je blanchi dans les travaux guerriers,
Que pour voir en un jour fletrir tant de lauriers?
Mon bras, qu'avec reſpect tout l'Eſpagne admire,
Mon bras, qui tant de fois a ſauvé cet empire,
Tant de fois affermi le trone de ſon roi,
Trahit donc ma querelle, et ne fait rien pour moi!
O cruel ſouvenir de ma gloire paſſé!
Oeuvre de tant de jours en un jour effacée!
Nouvelle dignité fatale à mon bonheur!
Precipice élevé d'où tombe mon honneur!
Faut-il de votre eclat voir triompher le comte,
Et mourir ſans vengeance, ou vivre dans la honte?
Comte, ſois de mon prince à preſent gouverneur,
Ce haut rang n'admet point un homme ſans honneur;
Et ton jaloux orgueil par cet affront inſigne,
Malgré le choix du roi, m'en a ſu rendre indigne.
Et toi, de mes exploits glorieux inſtrument,
Mais d'un corps tout de glace inutile ornement,
Fer jadis tant à craindre, et qui, dans cette offenſe,
M'as ſervi de parade, et non pas de defenſe,
Va, quitte deſormais le dernier des humains,
Paſſe pour me venger en de meilleures mains.

CID, act i. ſc. 7.

Theſe ſentiments are certainly not the firſt that are ſuggeſted by the paſſion of reſentment. As the firſt movements of reſentment are always directed to its object, the very ſame is the caſe of grief. Yet, with relation to the ſudden and ſevere diſtemper that ſeized Alexander bathing in the river Cydnus, Quintus Curtius deſcribes the firſt emotions of the army as directed to themſelves, lamenting that they were left without a leader, far from home, and had ſcarcely any hopes of returning in ſafety: their king's diſtreſs, which muſt naturally have been their firſt concern, occupies them but in the ſecond place according to that author. In the Aminta of Taſſo, Sylvia, upon a report of her lover's death, which ſhe believed certain, inſtead of bemoaning the loſs of her beloved, turns her thoughts upon herſelf, and wonders her heart does not break:

Ohime! ben ſon di ſaſſo,
Poi che queſta novella non m'uccide.

Act iv. ſc. 2.

In

In the tragedy of Jane Shore, Alicia, in the full purpose of destroying her rival, has the following reflection:

Oh Jealousy! thou bane of pleasing friendship,
Thou worst invader of our tender bosoms;
How does thy rancour poison all our softness,
And turn our gentle nature into bitterness!
See where she comes! Once my heart's dearest blessing;
Now my chang'd eyes are blasted with her beauty,
Loathe that known face, and sicken to behold her.

Act iii. sc. 1.

These are the reflections of a cool spectator. A passion, while it has the ascendant, and is freely indulged, suggests not to the person who feels it any sentiment to its own prejudice: reflections like the foregoing occur not readily till the passion has spent its vigour.

A person sometimes is agitated at once by different passions; and the mind in that case, vibrating like a pendulum, vents itself in sentiments that partake of the same vibration. This we give as a third observation:

QUEEN. Would I had never trod this English earth,
Or felt the flatteries that grow upon it!
Ye've angels faces, but heav'n knows your hearts.
What shall become of me now? wretched lady!
I am the most unhappy woman living.
Alas! poor wenches, where are now your fortunes?
[*To her women.*
Shipwreck'd upon a kingdom, where no pity,
No friends, no hope, no kindred, weep for me!

HENRY VIII. act iii. sc. 1.

OTHELLO. Oh devil, devil!
If that the earth could teem with woman's tears,
Each drop she falls would prove a crocodile.
Out of my sight!
DESDEMONA. I will not stay t'offend you. [*Going.*
LODOVICO. Truly, an obedient lady:
I do beseech your lordship, call her back.
OTH. Mistress.——— DES. My lord.
OTH. What would you with her, sir?
LOD. Who, I, my lord?
OTH. Ay; you did wish that I would make her turn.
Sir, she can turn, and turn, and yet go on;
And turn again. And she can weep, sir, weep;
And she's obedient: as you say, obedient:
Very obedient—proceed you in your tears—
Concerning this, sir,—oh well-painted passion!—
I am commanded home—get you away,
I'll send for you anon.—Sir, I obey the mandate,
And will return to Venice.——Hence, avaunt!
[*Exit* Desdemona.

OTHELLO, act iv. sc. 6.

ÆMILIA. O my good lord, I would speak a word with you.
OTHELLO. Yes, 'tis Æmilia.—By and by.—She's dead.
'Tis like she comes to speak of Cassio's death;

The

The noise was high.—Ha! no more moving?
Still as the grave. Shall she come in? wer't good?
I think she stirs again—No—what's the best?
If she come in, she'll, sure, speak to my wife:
My wife! my wife! what wife? I have no wife;
Oh insupportable? oh heavy hour! OTHELLO, act v. sc. 7.

A fourth observation is, That nature, which gave us passions, and made them extremely beneficial when moderate, intended undoubtedly that they should be subjected to the government of reason and conscience. It is therefore against the order of nature, that passion in any case should take the lead in contradiction to reason and conscience: such a state of mind is a sort of anarchy which every one is ashamed of and endeavours to hide or dissemble. Even love, however laudable, is attended with a conscious shame when it becomes immoderate: it is covered from the world, and disclosed only to the beloved object:

Et que l'amour souvent de remors combattu
Paroisse une foiblesse, et non une vertu. BOILEAU.

Oh! they love least that let men know they love.
TWO GENTLEMEN OF VERONA, act i. sc. 3.

Hence a capital rule in the representation of immoderate passions, that they ought to be hid or dissembled as much as possible. And this holds in an especial manner with respect to criminal passions: one never counsels the commission of a crime in plain terms; guilt must not appear in its native colours, even in thought; the proposal must be made by hints, and by representing the action in some favourable light. Of the propriety of sentiment upon such an occasion, Shakespeare, in the Tempest, has given us a beautiful example, in a speech by the usurping Duke of Milan, advising Sebastian to murder his brother the King of Naples:

ANTONIO. ——————— What might,
Worthy Sebastian,—Oh! what might—no more.
And yet, methinks, I see it in thy face
What thou shouldst be: the occasion speaks thee, and
My strong imagination sees a crown
Dropping upon thy head. Act ii. sc. 2.

A picture of this kind, perhaps still finer, is exhibited in King John, where that tyrant solicits (act iii. sc. 5.) Hubert to murder the young Prince Arthur; but it is too long to be inserted here.

As things are best illustrated by their contraries, we proceed to faulty sentiments, disdaining to be indebted for examples to any but the most approved authors. The first class shall consist of sentiments that accord not with the passion; or, in other words, sentiments that the passion does not naturally suggest. In the second class shall be ranged sentiments that may belong to an ordinary passion, but unsuitable to it as tinctured by a singular character. Thoughts that properly are not sentiments, but rather descriptions, make a third. Sentiments that belong to the passion represented, but are faulty as being introduced too early or too late, make a fourth. Vicious sentiments exposed in their native dress, instead of being concealed or disguised,

disguised, make a fifth. And in the last class shall be collected sentiments to no character nor passion, and therefore unnatural.

1. Of sentiments that are faulty by being above the tone of the passion, the following may serve as an example:

OTHELLO. ——————— O my soul's joy!
If after every tempest come such calms,
May the winds blow till they have waken'd death:
And let the labouring bark climb hills of seas
Olympus high, and duck again as low
As hell's from heaven? OTHELLO, act ii. sc. 6.

This sentiment may be suggested by violent and inflamed passion; but is not suited to the satisfaction, however great, that one feels upon escaping danger.

2. Instance of sentiments below the tone of the passion. Ptolemy, by putting Pompey to death, having incurred the displeasure of Cæsar, was in the utmost dread of being dethroned: in that agitating situation, Corneille makes him utter a speech full of cool reflection, that is in no degree expressive of the passion:

Ah! si je t'avois cru, je n'aurois pas de maitre,
Je serois dans le trône où le ciel m'a fait naitre;
Mais c'est une imprudence assez commune aux rois,
D'écouter trop d'avis, et se tromper au choix.
Le Destin les aveugle au bord du précipice,
Ou, si quelque lumiere en leur ame se glisse,
Cette fausse clarté dont il les eblouit
Le plonge dans une gouffre, et puis s'evanouit.
MORT DE POMPE'E, act iv. sc. 1.

3. Sentiments that agree not with the tone of the passion; as where a pleasant sentiment is grafted upon a painful passion, or the contrary. In the following instances, the sentiments are too gay for a serious passion:

No happier task these faded eyes pursue;
To read and weep is all they now can do.
ELOISA TO ABELARD, l. 47.

Heav'n first taught letters for some wretch's aid,
Some banish'd lover, or some captive maid:
They live, they speak, they breathe what love inspires,
Warm from the soul, and faithful to its fires;
The virgin's wish without her fears impart,
Excuse the blush, and pour out all the heart;
Speed the soft intercourse from soul to soul,
And waft a sigh from Indus to the pole. ID. l. 51.

These thoughts are pretty; they suit Pope, but not Eloisa.—Satan, enraged by a threatening of the angel Gabriel, answers thus:

Then when I am thy captive, talk of chains,
Proud limitary cherub; but ere then
Far heavier load thyself expect to feel
From my prevailing arm, though heaven's King
Ride on thy wings, and thou with thy compeers,
Us'd to the yoke, draw'st his triumphant wheels
In progress thro' the road of heav'n *star-pav'd*.
PARADISE LOST, b. 4.

The concluding epithet forms a grand and delightful image, which cannot be the genuine offspring of rage.

4. Sentiments too artificial for a serious passion. The first example is a speech of Percy expiring:

O Harry, thou hast robb'd me of my growth!
I better brook the loss of brittle life,
Than those proud titles thou hast won of me;
They wound my thoughts worse than thy sword my flesh.
But thought's the slave of life; and life, time's fool;
And time, that takes survey of all the world,
Must have a stop. FIRST PART OF HEN. IV. act v. sc. 9.

The sentiments of the Mourning Bride are for the most part no less delicate than just copies of nature: in the following exception the picture is beautiful, but too artful to be suggested by severe grief:

ALMERIA. O no! Time gives increase to my afflictions.
The circling hours, that gather all the woes
Which are diffus'd through the revolving year,
Come heavy laden with th' oppressive weight
To me; with me, successively, they leave
The sighs, the tears, the groans, the restless cares,
And all the damps of grief, that did retard their flight;
They shake their downy wings, and scatter all
The dire collected dews on my poor head;
Then fly with joy and swiftness from me. Act i. sc. 1.

In the same play, Almeria seeing a dead body, which she took to be Alphonso's, expresses sentiments strained and artificial, which nature suggests not to any person upon such an occasion:

Had they or hearts or eyes, that did this deed?
Could eyes endure to guide such cruel hands?
Are not my eyes guilty alike with theirs,
That thus can gaze, and yet not turn to stone?
—I do not weep! The springs of tears are dry'd,
And of a sudden I am calm, as if
All things were well; and yet my husband's murder'd!
Yes, yes, I know to mourn: I'll sluice this heart,
The source of woe, and let the torrent in. Act v. sc. 11.

Pope's Elegy to the Memory of an Unfortunate Lady, expresses delicately the most tender concern and sorrow that one can feel for the deplorable fate of a person of worth. Such a poem, deeply serious and pathetic, rejects with disdain all fiction. Upon that account, the following passage deserves no quarter; for it is not the language of the heart, but of the imagination indulging its flights at ease, and by that means is eminently discordant with his subject. It would be a still more severe censure, if it should be ascribed to imitation, copying indiscreetly what has been said by others;

What though no weeping loves thy ashes grace,
Nor polish'd marble emulate thy face?
What though no sacred earth allow thee room,
Nor hallow'd dirge be mutter'd o'er thy tomb?

Yet shall thy grave with rising flow'rs be dreſt,
And the green turf lie lightly on thy breaſt:
There shall the morn her earlieſt tears beſtow,
There the firſt roſes of the year shall blow;
While angels with their ſilver wings o'erſhade
The ground, now ſacred by thy relics made.

5. Fanciful or finical ſentiments. Sentiments that degenerate into point or conceit, however they may amuſe in an idle hour, can never be the offspring of any ſerious or important paſſion. In the Jeruſalem of Taſſo, Tancred, after a ſingle combat, ſpent with fatigue and loſs of blood, falls into a ſwoon; in which ſituation, underſtood to be dead, he is diſcovered by Erminia, who was in love with him to diſtraction. A more happy ſituation cannot be imagined, to raiſe grief in an inſtant to its higheſt pitch; and yet, in venting her ſorrow, ſhe deſcends moſt abominably into antitheſis and conceit even of the loweſt kind:

E in lui versò d'ineſſicabil vena
Lacrime, e voce di ſoſpiri miſta.
In che miſero punto hor qui me mena
Fortuna? a che veduta amara e triſta?
Dopo gran tempo i' ti ritrovo à pena
Tancredi, e ti riveggio, e non ſon viſta,
Viſta non ſon da te, benche preſente
Ti trovando ti perdo eternamente. CANTO xix. ſt. 105.

Armida's lamentation reſpecting her lover Rinaldo is in the ſame vicious taſte. Vid. canto xx. ſtan. 124, 125, 126.

QUEEN. Give me no help in lamentation,
I am not barren to bring forth complaints:
All ſprings reduce their currents to mine eyes,
That I, being govern'd by the wat'ry moon,
May ſend forth plenteous tears to drown the world,
Ah, for my huſband, for my dear lord Edward.
Richard III. act. ii. ſc. 2.

Jane Shore utters her laſt breath in a witty conceit:

Then all is well, and I ſhall ſleep in peace——
'Tis very dark, and I have loſt you now——
Was there not ſomething I would have bequeath'd you?
But I have nothing left me to beſtow,
Nothing but one ſad ſigh. Oh mercy, Heav'n! [*Dies.*] Act v.

Guilford to Lady Jane Gray, when both were condemned to die:

Thou ſtand'ſt unmov'd;
Calm temper ſits upon thy beauteous brow;
Thy eyes, that flow'd ſo faſt for Edward's loſs,
Gaze unconcern'd upon the ruin round thee,
As if thou had'ſt reſolv'd to brave thy fate,
And triumph in the midſt of deſolation.
Ha! ſee, it ſwells, the liquid cryſtal riſes,
It ſtarts in ſpite of thee——but I will catch it,
Nor let the earth be wet with dew ſo rich. JANE GRAY, act iv.

The

The concluding ſentiment is altogether finical, unſuitable to the importance of the occaſion, and even to the dignity of the paſſion of love.

Corneille, in his Examen of the Cid, anſwering an objection, That his ſentiments are ſometimes too much refined for perſons in deep diſtreſs, obſerves, that, if poets did not indulge ſentiments more ingenious or refined than are prompted by paſſion, their performances would often be low, and extreme grief would never ſuggeſt but exclamations merely. This is in plain language to aſſert, that forced thoughts are more agreeable than thoſe that are natural, and ought to be preferred.

The *ſecond* claſs is of ſentiments that may belong to an ordinary paſſion, but are not perfectly concordant with it, as tinctured by a ſingular character.

In the laſt act of that excellent comedy The Careleſs Huſband, Lady Eaſy, upon Sir Charles's reformation, is made to expreſs more violent and turbulent ſentiments of joy than are conſiſtent with the mildneſs of her character.

LADY EASY. O the ſoft treaſure! O the dear reward of long-deſiring love.—Thus! thus to have you mine, is ſomething more than happineſs; 'tis double life, and madneſs of abounding joy.

The following inſtances are deſcriptions rather than ſentiments, which compoſe a *third* claſs.

Of this deſcriptive manner of painting the paſſions, there is in the Hippolytus of Euripides, act v. an illuſtrious inſtance, viz. the ſpeech of Theſeus, upon hearing of his ſon's diſmal exit. In Racine's tragedy of Eſther, the queen, hearing of the decree iſſued againſt her people, inſtead of expreſſing ſentiments ſuitable to the occaſion, turns her attention upon herſelf, and deſcribes with accuracy her own ſituation:

Juſte ciel! tout mon ſang dans mes veines ſe glace. Act i. ſc. 3.

AMAN. C'en eſt fait. Mon orgueil eſt forcé de plier.
L'inexorable Aman eſt reduit à prier. ESTHER, act 3. ſc. 5.

ATHALIE. Quel prodige nouveau me trouble et m'embarraſſe?
La douceur de ſa voix, ſon enfance, ſa grace,
Font inſenſiblement à mon inimitié
Succeder —— Je ſerois ſenſible à la pitié? ATHALIE, act ii. ſc. 7.

TITUS. O de ma paſſion fureur deſeſperée! BRUTUS, act iii. ſc. 6.

What other are the foregoing inſtances but deſcribing the paſſion another feels?

The *fourth* claſs is of ſentiments expreſſed too early or too late.—Some examples mentioned above belong to this claſs. Add the following from Venice Preſerv'd, act 5. at the cloſe of the ſcene between Belvidera and her father Priuli. The account given by Belvidera of the danger ſhe was in, and of her huſband's threatening to murder her, ought naturally to have alarmed her relenting father, and to have made him expreſs the moſt perturbed ſentiments. Inſtead of which, he diſſolves into tenderneſs and love for his daughter, as if he had already delivered her from danger, and as if there were a perfect tranquility:

Canst thou forgive me all my follies past!
I'll henceforth be indeed a father; never,
Never more thus expose, but cherish thee,
Dear as the vital warmth that feeds my life,
Dear as those eyes that weep in fondness o'er thee:
Peace to thy heart.

Immoral sentiments exposed in their native colours, instead of being concealed or disguised, compose the *fifth* class.—The Lady Macbeth, projecting the death of the king, has the following soliloquy:

——————— The raven himself's not hoarse
That croaks the fatal entrance of Duncan
Under my battlements. Come, all you spirits
That tend on mortal thoughts, unsex me here,
And fill me from the crown to the toe, top full
Of direct cruelty; make thick my blood,
Stop up th' access and passage to remorse,
That no compunctious visitings of nature
Shake my fell purpose. MACBETH, act i. sc. 7.

This speech is not natural. A treacherous murder was never perpetrated even by the most hardened miscreant without compunction: and that the lady here must have been in horrible agitation, appears from her invoking the infernal spirits to fill her with cruelty, and to stop up all avenues to remorse. But in that state of mind it is a never-failing artifice of self-deceit to draw the thickest veil over the wicked action, and to extenuate it by all the circumstances that imagination can suggest: and, if the crime cannot bear disguise, the next attempt is to thrust it out of mind altogether, and to rush on to action without thought. This last was the husband's method:

Strange things I have in head, that will to hand;
Which must be acted ere they must be scann'd. Act iii. sc. 5.

The lady follows neither of these courses, but in a deliberate manner endeavours to fortify her heart in the commission of an execrable crime, without even attempting to colour it. This, we think, is not natural; we hope there is no such wretch to be found as is here represented.

The last class comprehends sentiments that are unnatural, as being suited to no character nor passion. These may be subdivided into three branches: first, sentiments unsuitable to the constitution of man, and to the laws of his nature; second, inconsistent sentiments; third, sentiments that are pure rant and extravagance.

When the fable is of human affairs, every event, every incident, and every circumstance, ought to be natural, otherwise the imitation is imperfect. But an imperfect imitation is a venial fault, compared with that of running cross to nature. In the Hippolytus of Euripides, (act iv. sc. 5.) Hippolytus, wishing for another self in his own situation, "How much (says he) should I be touched with his misfortune!" as if it were natural to grieve more for the misfortune of another than for one's own.

OSMYN. Yet I behold her—yet—and now no more.
Turn your lights inward, eyes, and view my thought;
So shall you still behold her—'Twill not be.

O impotence

O impotence of sight! mechanic sense,
Which to exterior objects ow'st thy faculty,
Not seeing of election, but necessity.
Thus do our eyes, as do all common mirrors,
Successively reflect succeeding images.
Nor what they would, but must; a star or toad;
Just as the hand of chance administers! MOURN. BRIDE, act ii. sc. 8.

No man, in his senses, ever thought of applying his eyes to discover what passes in his mind; far less of blaming his eyes for not seeing a thought or idea. In Moliere's *l'Avare*, (act iv. sc. 7.) Harpagon, being robbed of his money, seizes himself by the arm, mistaking it for that of the robber. And again he expresses himself as follows: "Je veux aller querir la justice, et faire donner la question à toute ma maison; à servantes, à valets, à fils, à fille, et à moi aussi." This is so absurd as scarcely to provoke a smile, if it be not at the author.

Of the second branch the following example may suffice:

——————— Now bid me run,
And I will strive with things *impossible*,
Yea, get the better of them. JULIUS CÆSAR, act ii. sc. 3.

Of the third branch, take the following samples. Lucan, talking of Pompey's sepulchre:

——————— Romanum nomen, et omne
Imperium magno est tumuli modus. Obrue saxa
Crimine plena deûm. Si tota est Herculis Oete,
Et juga tota vacant Bromio Nyseia; quare
Unus in Egypto Magno lapis? Omnia Lagi
Rura tenere potest, si nullo cespit nomen
Hæserit. Erremus populi, cinerumque tuorum,
Magne, metu nullas Nili calcemus arenas. LIB. viii. 798.

Thus, in Rowe's translation:

Where there are seas, or air, or earth, or skies,
Where'er Rome's empire stretches, Pompey lies.
Far be the vile memorial then convey'd!
Nor let this stone the partial gods upbraid.
Shall Hercules all Oeta's heights demand,
And Nysa's hill for Bacchus only stand;
While one poor pebble is the warrior's doom
That fought the cause of liberty and Rome?
If Fate decrees he must in Egypt lie,
Let the whole fertile realm his grave supply,
Yield the wide country to his awful shade,
Nor let us dare on any part to tread,
Fearful we violate the mighty dead.

The following passages are pure rant. Coriolanus, speaking to his mother,

What is this?
Your knees to me? to your corrected son?
Then let the pebbles on the hungry beach
Fillop the stars: then let the mutinous winds
Strike the proud cedars 'gainst the fiery sun:
Murd'ring impossibility, to make
What cannot be, slight work. CORIOLANUS, act v. sc. 3.

CÆSAR. —— Danger knows full well,
That Cæsar is more dangerous than he.
We were two lions litter'd in one day,
And I the elder and more terrible. JULIUS CÆSAR, act ii. sc. 4.

VENTIDIUS. But you, ere love misled your wand'ring eyes,
Were sure the chief and best of human race,
Fram'd in the very pride and boast of nature,
So perfect, that the gods who form'd you wonder'd
At their own skill, and cry'd, A lucky hit
Has mended our design. DRYDEN, ALL FOR LOVE, act i.

Not to talk of the impiety of this sentiment, it is ludicrous instead of being lofy.

The famous epitaph on Raphael is not less absurd than any of the foregoing passages:

Raphael, timuit, quo sospite, vinci,
Rerum magna parens, et moriente mori.

Imitated by Pope, in his epitaph on Sir Godfrey Kneller:

Living, great Nature fear'd he might outvie
Her works; and dying, fears herself may die.

Such is the force of imitation; for Pope of himself would never have been guilty of a thought so extravagant.

BITE OF A RATTLE-SNAKE.

AS it so rarely happens that any person recovers from the bite of this terrible and destructive animal, we shall here present the reader with a very remarkable account of a gentleman who got over a calamity of this kind. The narrative is contained in a letter from Mr. J. Breintal, to Mr. Peter Collinson, F. R. S. (published in the Transactions,) dated Philadelphia, Feb. 10, 1746.

"On the 2d of last May, in the afternoon, I took a turn down to the river; and, returning home up the hill, as it was stony, sometimes I was ready to fall, so saved myself by my hands, and got safe very near the top; where either my foot slipt, or the stone under it gave way, and brought me down upon my knees, I laid my hand on a broad stone to stay myself; and, I suppose, the snake lay on the opposite side, and might be offended by some motion of the stone, so bit my hand in an instant; then slid under the stones, and sounded his rattles.

"I felt a sort of chilness when I heard the sound; because I had a constant thought, that, if ever I was bit, my life was at an end. I tore up the stones, resolving to slay my murderer: at last I found him, crushed his head to pieces with a stone, took him up in my left hand, and ran to my quarters, sucking the wound on my right hand as I went, and spitting out the poison. This kept it easy; but my tongue and lips became stiff and numb, as if they had been frozen. So getting quickly home, 'I am bit by a rattle-snake, (said I;) and there lies my murderer!' casting him down on the ground.

"All hands were busy in a minute; some for one thing, some another. The first thing applied was a fowl; his belly ript up, and put on my hand alive, like a gauntlet, and there tied fast. This drew out

out some of the poison; for immediately he swelled, grew black, and stunk. I kept my elbow bent, and my fingers up, to keep the poison from my arm. Next we procured some turmeric. This we bruised well, tops and roots; so made a plaister, and bound it round my arm, to keep the poison in the hand. My hand grew cold and numb, and now pust up on a sudden, and grew furious; so I slit my fingers with a razor, and this gave some ease. I also slit my hand on the back, and cupped it, and drew out a quart or more of ugly poisony slimy stuff. But my arm swelled for all we could do: then I got it tied so fast, that all communication might be stopped with the body, that it seemed almost void of feeling; yet would it work, jump, writhe, and twist, like a snake in the skin, and change colours, and be spotted; and they would move to and fro upon the arm, which grew painful in the bone. Thus was it tied two days, and all things applied that could be got or thought on. At last, the ashes of white ash-bark, and vinegar, made into a plaister, and laid to the bite, drew out the poison apace.

"My tongue and lips swelled that night, but were not very painful, occasioned only, I suppose, by sucking the wound. The swelling of my arm being sunk, till it was at least half gone, we then untied it; but, in two hours, all my right side was turned black, yet swelled but little; nor was there any pain went along with that change of colour: I bled at the mouth soon after, and continued spitting blood and feverish four days.

"The pain raged still in the arm, and the fever more violent; and by turns I was delirious for an hour or two. This happened three or four times; and, nine days being over, the fever abated, and I began to mend; but my hand and arm were spotted like a snake, and continued so all the summer. In the autumn my arm swelled, gathered, and burst; so away went the poison, spots and all. Heaven be thanked for ridding me of such a cursed adversary."

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 138.

OF WHEELS AND OTHER WORKS.

Single Vertical Wheels.

THERE are different sorts of vertical wheels; some having their fells of a circular form, others of an hexagon, octagon, or decagon, form, or any number of sides, according to the length of the cases you design for the wheel: your spokes being fixed in the nave, nail slips of tin, with their edges turned up, so as to form grooves for the cases to lie in, from the end of one spoke to another; then tie your cases in the grooves head to tail, in the same manner as those on the horizontal water-wheel, so that the cases successively taking fire from one another, will keep the wheel in an equal rotation. Two of these wheels are very often fired together, one on each side of a building; and both lighted at the same time, and all the cases filled alike, to make them keep time together; which they will do if made by the following directions. In all the cases of both wheels, except the first, on each wheel drive two or three ladles full of slow fire, in any part of the cases; but be careful to ram the same

ſame quantity in each caſe, and in the end of one of the caſes, on each wheel, you may ram one ladleful of dead-fire compoſition, which muſt be very lightly drove; you may alſo make many changes of fire by this method. Let the hole in the nave of the wheel be lined with braſs, and made to turn on a ſmooth iron ſpindle. On the end of this ſpindle let there be a nut, to ſcrew off and on; when you have put the wheel on the ſpindle, ſcrew on the nut, which will keep the wheel from flying off. Let the mouth of the firſt caſe be a little raiſed. Vertical wheels are made from ten inches to three feet diameter, and the ſize of the caſes muſt differ accordingly; four-oz. caſes will do for wheels of 14 or 16 inches diameter, which is the proportion generally uſed. The beſt wood for wheels of all ſorts is a light and dry beech.

Horizontal Wheels, are beſt when their fells are made circular; in the middle of the top of the nave muſt be a pintle, turned out of the ſame piece as the nave, two inches long, and equal in diameter to the bore of one of the caſes of the wheel: there muſt be a hole bored up the center of the nave, within half an inch of the top of the pintle. The wheel being made, nail at the end of each ſpoke (of which there ſhould be ſix or eight) a piece of wood, with a groove cut in it to receive the caſe. Fix theſe pieces in ſuch a manner that half the caſes may incline upwards and half downwards, and that, when they are tied on, their heads and tails may come very near together; from the tail of one caſe to the mouth of the other carry a leader, which ſecure with paſted paper. Beſides theſe pipes, it will be neceſſary to put a little meal-powder inſide the paſted paper, to blow off the pipe, that there may be no obſtruction to the fire from the caſes. By means of theſe pipes the caſe will ſucceſſively take fire, burning one upwards and the other downwards. On the pintle fix a caſe of the ſame ſort as thoſe on the wheel; this caſe muſt be fired by a leader from the mouth of the laſt caſe on the wheel, which caſe muſt play downwards: inſtead of a common caſe in the middle, you may put a caſe of Chineſe fire, long enough to burn as long as two or three of the caſes on the wheel. Horizontal wheels are often fired two at a time, and made to keep time like vertical wheels, only they are made without any ſlow or dead fire; 10 or 12 inches will be enough for the diameter of wheels with ſix ſpokes.

Spiral Wheels, are only double horizontal wheels, and made thus: —The nave muſt be about ſix inches long, and ſomewhat thicker than the ſingle ſort; inſtead of the pintle at top, make a hole for the caſe to be fixed in, and two ſets of ſpokes, one ſet near the top of the nave, and the other near the bottom. At the end of each ſpoke cut a groove wherein you tie the caſes, there being no fell; the ſpokes ſhould not be more than 3½ inches long from the nave, ſo that the wheel may not be more than 8 or 9 inches diameter; the caſes are placed in ſuch a manner, that thoſe at top play down, and thoſe at bottom play up, but let the third or fourth caſe play horizontally. The caſe in the middle may begin with any of the others you pleaſe: ſix ſpokes will be enough for each ſet, ſo that the wheel may conſiſt of twelve caſes, beſides that on the top: the caſes ſix inches each.

Plural Wheels, are made to turn horizontally, and to conſiſt of three ſets of ſpokes, placed ſix at top, ſix at bottom, and four in the middle, which muſt be a little ſhorter than the reſt: let the diameter of

of the wheel be ten inches; the cases must be tied on the ends of the spokes in grooves cut on purpose, or in pieces of wood nailed on the ends of the spokes, with grooves cut in them as usual: in clothing these wheels, make the upper set of cases play obliquely downwards, the bottom set obliquely upwards, and the middle set horizontally. In placing the leaders, you must order it so that the cases may burn thus, viz. first up, then down, then horizontal, and so on with the rest. But another change may be made, by driving in the end of the 8th case two or three ladlefuls of slow fire, to burn till the wheel has stopped its course; then let the other cases be fixed the contrary way, which will make the wheel run back again: for the case at top you may put a small gerbe; and let the cases on the spokes be short, and filled with a strong brilliant charge.

Illuminated Spiral Wheels.—First have a circular horizontal wheel made two feet diameter, with a hole quite through the nave; then take three thin pieces of deal, three feet long each, and ¾ of an inch broad each: one end of each of these pieces nail to the fell of the wheel, at an equal distance from one another, and the other end nail to the block with a hole in its bottom, which must be perpendicular with that in the block of the wheel, but not so large. The wheel being thus made, have a hoop planed down very thin and flat; then nail one end of it to the fell of the wheel, and wind it round the three sticks in a spiral line from the wheel to the block at top: on the top of this block fix a case of Chinese fire; on the wheel you may place any number of cases, which must incline downwards, and burn two at a time. If the wheel should consist of ten cases, you may let the illuminations and Chinese fire begin with the second cases. The spindle for this wheel must be a little longer than the cone, and made very smooth at top, on which the upper block is to turn, and the whole weight of the wheel to rest.

Double Spiral Wheel.—For this wheel the block, or nave, must be as long as the height of the worms, or spiral lines, but must be made very thin, and as light as possible. In this block must be fixed several spokes, which must diminish in length, from the wheel to the top, *so as not to exceed the surface of a cone of the same height.* To the ends of these spokes nail the worms, which must cross each other several times: these worms clothe with illuminations, the same as those on the single wheels; but the horizontal wheel you may clothe as you like. At top of the worm place a case of spur-fire, or an amber light.

Balloon Wheels, are made to turn horizontally: they must be made two feet diameter, without any spokes; and very strong, with any number of sides. On the top of a wheel range and fix in pots, three inches diameter and seven inches high each, as many of these as there are cases on the wheel: near the bottom of each pot make a small vent; into each of these vents carry a leader from the tail of each case; some of the pots load with stars, and some with serpents, crackers, &c. As the wheels turn, the pots will successively be fired, and throw into the air a great variety of fires.

Fruiloni Wheels.—First have a nave made nine inches long, three in diameter: near the bottom of this nave fix eight spokes, with a hole in the end of each, large enough to receive a two or four ounce case: each of these spokes may be 14 inches long from the block. Near the top of this block fix eight more of the same spokes, exactly

over the others, but not so long by two inches. As this wheel is to run horizontally, all the cases in the spoke must play obliquely upwards, and all those in the spokes at bottom obliquely downwards. This being done, have a small horizontal wheel made with eight spokes; each five inches long from the block: on the top of this wheel place a case of brilliant fire: all the cases on this wheel must play in an oblique direction downwards, and burn two at a time, and those on the large wheel four at a time; that is, two of those in the top set of spokes, and two of those in the bottom set of spokes.

The four first cases on the large wheel, and the two first on the small, must be fired at the same time, and the brilliant fire at top at the beginning of the last cases. The cases of the wheels may be filled with a grey charge. When these wheels are completed, you must have a strong iron spindle, made four feet six inches long, and fixed perpendicularly on the top of a stand: on this put the large wheel, whose nave must have a hole quite through from the bottom to the top. This hole must be large enough to turn easy round the bottom of the spindle, at which place there must be a shoulder, to keep the wheel from touching the stand: at the top of the spindle put the small wheel, and join it to a large one with a leader, in order that they may be fired both together.

Cascades of Fire.—The top piece of the cascade may be of any length, so as to hold the cases at a little distance from each other; all the cross pieces are fixed horizontally, and supported by brackets; the bottom cross piece should be about one foot six inches broad in the middle, the second one foot, the third nine inches, and the top piece four inches: the cases may be made of any length, but must be filled with a brilliant charge. On the edges of the cross pieces must be nailed bits of wood, with a groove cut in each piece, large enough for a case to lie in. These bits of wood are fixed so as to incline downwards, and that the fire from one tier of cases may play over the other. All the cases being tied fast on, carry leaders from one to the other; and let there be a pipe hung from the mouth of one of the cases, covered at the end with a single paper, which you burn to fire the cascade.

The Fire-Tree.—To make a fire-tree, you must first have a piece of wood six feet long, and three inches square; then at nine inches from the top, make a hole in the front, and in each side; or, instead of holes, you may fix short pegs, to fit the inside of the cases. At nine inches lower, fix three more pegs; at one foot nine inches from thence, fix three pegs; at nine inches lower, fix three pegs; at nine inches from thence, fix three pegs, inclining downwards; but all the other pegs must incline upwards; then at top place a four-inch mortar, loaded with stars, rains, and crackers. In the middle of this mortar place a case filled with any sort of charge, but let it be fired with the other cases: a brilliant charge will do for all the cases; but the mortar may be made of any diameter, and the tree of any size; and on it any number of cases, provided they are placed in the manner described.

Chinese Fountains.—To make a Chinese fountain, you must have a perpendicular piece of wood seven feet long and 2½ inches square. Sixteen inches from the top, fix on the front a cross-piece one inch thick, and 2½ broad, with the broad side up: below this, fix three more pieces of the same width and thickness, at sixteen inches from each

each other: let the bottom rail be five feet long, and the others of such a length as to allow the fire-pumps to stand in the middle of the intervals of each other. The pyramid being thus made, fix in the holes made in the bottom rail five fire-pumps, at equal distances; on the 2d rail, place four pumps; on the 3d, three; on the 4th, two; and on the top of the post, one; but place them all to incline a little forwards, that, when they throw out the stars, they may not strike against the cross rails. Having fixed your fire-pumps, clothe them with leaders, so that they may all be fired together.

Of illuminated Globes with horizontal Wheels.—The hoops for these globes may be made of wood, tin, or iron wire, about two feet diameter. For a single globe take two hoops, and tie them together, one within the other, at right angles; then have a horizontal wheel made, whose diameter must be a little wider than the globe, and its nave six inches long; on the top of which the globe is fixed, so as to stand three or four inches from the wheel: on this wheel you may put any number of cases, filled with what charge you like; but let two of them burn at a time: they may be placed horizontally, or to incline downwards, just as you choose. Now, when the wheel is clothed, fix on the hoops as many illuminations as will stand within 2½ inches of each other: these you fasten on the hoops with small iron binding wire; and, when they are all on, put on your pipes of communication, which must be so managed as to light them all with the second or third case on the wheel. The spindle on which the globe is to run must go through the block of the wheel, up to the inside of the top of the globe; where must be fixed a bit of brass, or iron, with a hole in it to receive the point of the spindle on which the whole weight of the wheel is to bear, which represents a globe on its spindle. By this method may be made a crown, which is done by having the hoops bent in the form of a crown. Sometimes globes and crowns are ordered so as to stand still, and the wheel only to turn round; but when you would have the globe or crown to stand still, and the wheel to run by itself, the block of the wheel must not be so long, nor the spindle any longer than to just raise the globe a little above the wheel; and the wheel cases and illumination must begin together.

Dodecaedron, so called because it nearly represents a twelve-sided figure, is made thus. First have a ball turned out of some hard wood, fourteen inches diameter: when done, divide its surface into fourteen equal parts, from which bore holes 1½ inch diameter, perpendicular to the centre, so that they may all meet in the middle: then let there be turned in the inside of each hole a female screw; and to all the holes but one, must be made a round spoke five feet long, with four inches of the screw at one end to fit the holes; then in the screw-end of all the spokes bore a hole, five inches up, which must be bored slanting, so as to come out at one side, a little above the screw; from which cut a small groove along the spoke, within six inches of the other end, where you make another hole through to the other side of the spoke. In this end fix a spindle, on which put a small wheel of three or four sides, each side six or seven inches long: these sides must have groove cut in them, large enough to receive a two or four oz. case. When these wheels are clothed, put them on the spindles, and at the end of each spindle put a nut to keep the wheel from falling off. The wheels being thus fixed, carry

a pipe from the mouth of the first case on each wheel, through the hole in the side of the spoke, and from thence along the groove, and through the other hole, so as to hang out at the screw-end about an inch. The spokes being all prepared in this manner, you must have a post, on which you intend to fire the work, with an iron screw in the top of it, to fit one of the holes in the ball: on the screw fix the ball; then in the top hole of the ball put a little meal-powder, and some loose quick-match: then screw in all the spokes; and in one side of the ball bore a hole, in which put a leader, and secure it at the end; and your work will be ready to be fired. By this leader the powder and match in the centre is fired, which will light the match at the ends of the spokes all at once, whereby all the wheels will be lighted at once. There may be an addition to this piece, by fixing a small globe on each wheel, or one on the top wheel only. A grey charge will be proper for the wheel-cases.

The Yew-Tree of brilliant Fire.—First, let there be an upright piece of wood, four feet long, two inches broad, and one thick: at top of this piece, on the flat side, fix a hoop fourteen inches diameter; and round its edge and front place illuminations, and in the centre a five-pointed star; then at 1½ foot from the edge of the hoop, place two cases, of brilliant fire, one on each side: these cases should be one foot long each: below these fix two more cases of the same size, and at such a distance, that their mouths may almost meet them at top: then close to the ends of these cases fix two more of the same cases; and they must stand parallel. The cases being thus fixed, clothe them with leaders; so that they, with the illuminations and stars at top, may all take fire together.

Stars with Points for regulated Pieces, &c.—These stars are made of different sizes, according to the work for which they are intended: they are made with cases from 1 oz. to 1 lb. but in general with 4 oz. cases, four or five inches long: the cases must be rolled with paste, and twice as thick of paper as a rocket of the same bore. Having rolled a case, pinch one end of it quite close: then drive in half a diameter of clay; and when the case is dry, fill it with composition, two or three inches to the length of the cases with which it is to burn: at top of the charge drive some clay; as the ends of these cases are seldom pinched, they would be liable to take fire. Having filled a case, divide the circumference of it at the pinched end close to the clay into five equal parts; then bore five holes with a gimblet, about the size of the neck of a common four-oz. case, into the composition: from one hole to the other carry a quick-match, and secure it with paper: this paper must be put on in the manner of that on the ends of wheel-cases, so that the hollow part, which projects from the end of the case, may serve to receive a leader from any other work, to give fire to the points of the stars. These stars may be made with any number of points.

Fixed Sun with a transparent Face.—To make a sun of the best sort, there should be two rows of cases, which will shew a double glory, and make the rays strong and full. The frame, or sun-wheel, must be made thus:—Have a circular flat nave made very strong, 12 inches diameter: to this fix six strong flat spokes. On the front of these fix a circular fell, five feet diameter; within which fix another fell, the length of one of the sun-cases less in diameter; within this fix a third fell, whose diameter must be less than the second by the length

length of one case and ½. The wheel being made, divide the fells into so many equal parts as you would have cases (which may be done from 24 to 44): at each division fix a flat iron staple; these staples must be made to fit the cases, to hold them fast on the wheel; let the staples be so placed, that one row of cases may lie in the middle of the intervals of the other.

In the centre of the block of the sun drive a spindle, on which put a small hexagon wheel, whose cases must be filled with the same charge as the cases of the sun: two cases of this wheel must burn at a time, and begin with them on the fells. Having fixed on all the cases, carry pipes of communication from one to the other, and from one side of the sun to the wheel in the middle, and from thence to the other side of the sun. These leaders will hold the wheel steady while the sun is fixing up, and will also be a sure method of lighting both cases of the wheel together. A sun thus made is called a *brilliant sun*, because the wood work is entirely covered with fire from the wheel in the middle, so that there appears nothing but sparks of brilliant fire: but, if you would have a transparent face in the centre, you must have one made of pasteboard of any size. The method of making a face is, by cutting out the eyes, nose, and mouth, for the sparks of the wheel to appear through; but instead of this face, you may have one painted on oiled paper, or Persian silk, strained tight on a hoop; which hoop must be supported by three or four pieces of wire at six inches distance from the wheel in the centre, so that the light of it may illuminate the face. By this method you may have, in the front of a sun, Vivat Rex, cut in pasteboard, or Apollo painted on silk; but, for a small collection, a sun with a single glory, and a wheel in front, will be most suitable. Half-pound cases, filled ten inches with composition, will be a good size for a sun of five feet diameter; but, if larger, the cases must be greater in proportion.

Three Vertical Wheels illuminated, which turn on their own Naves upon a horizontal Table.—Let there be a deal table three feet in diameter: this table must be fixed horizontally on the top of a post; on this post must be a perpendicular iron spindle, which must come through the centre of the table: then let there be three spokes joined to a triangular flat piece of wood, in the middle of which make a hole to fit easily over the spindle: let there be pieces of wood, four or five inches long each, and two inches square, fixed on the under sides of the spokes; in these pieces make holes lengthwise to receive the thin part of the blocks of the wheels, which, when in, are prevented from coming out by a small iron pin being run through the end of each. Fix on three vertical octagon wheels, eighteen inches diameter each: the blocks of these wheels must be long enough for three or four inches to rest on the table; round which part drive a number of sharp points of wire, which must not project out of the blocks more than 1-16th of an inch: the use of these points is, that, when the blocks run round, they will stick in the table, and help the wheels forward: if the naves are made of strong wood, one inch will be enough for the diameter of the thin part, which should be made to turn easy in the holes in the pieces. On the front of the wheels make four or five circles of strong wire, or flat hoops, and tie on them as many illuminations as they will hold at two inches from each other; instead of circles you may make spiral lines,

clothed with illuminations, at the same distance from each other as those on the hoops. When illuminations are fixed on a spiral line in the front of a wheel, they must be placed a little on the slant, the contrary way that the wheel runs: the cases for these wheels may be filled with any coloured charge, but must burn only one at a time.

The wheels being thus prepared, you must have a globe, crown, or spiral wheel, to put on the spindle in the middle of the table: this spindle should be just long enough to raise the wheel of the globe, crown, or spiral wheel, so high that its fire may play over the three vertical wheels: by this means their fires will not be confused, nor will the wheels receive any damage from the fire of each other. In clothing this work, let the leaders be so managed, that all the wheels may light together, and the illuminations after two cases of each wheel are burned. *(To be continued.)*

DESCRIPTION OF ST. DOMINGO; ITS POPULATION, PRODUCE, &c.

THE possessions of the French in St. Domingo were divided into three great departments, called the Northern, the Western, and the Southern, provinces. The Northern province comprehends a line of sea-coast extending about forty leagues, from the river Massacre, to Cape St. Nicholas, and contained (including Tortuga) twenty-five parishes. Its population, in the beginning of 1790, consisted of 11,996 white inhabitants of all ages, and 164,656 negro slaves. The number of sugar plantations was 288, of which 258 made what is called *clayed* or soft white sugar, and thirty *muscovado* or new sugar. It reckoned 2,009 plantations of coffee, sixty-six of cotton, 443 of indigo, and 215 small establishments, such as provision-polinks, cacao-groves, tan-pits, potteries, brick-kilns, &c.

Of the towns and harbours in the northern province, the chief were those of Cape François, Fort Dauphin, Port Paix, and Cape St. Nicholas. We shall treat only of the first and the last.

The town of Cape François (which in time of war was seat of the French government) would have ranked among the cities of the second class, in any part of Europe, for beauty and regularity. It consisted of between eight and nine hundred houses of stone and brick, many of them handsome and commodious, besides shops and warehouses; and it contained two magnificent squares, ornamented each with a public fountain. The chief public buildings were the church; the Jesuits' college, (converted after the revolution into a government-house, and place of meeting for the colonial and provincial assemblies;) a superb barrack for troops; a royal arsenal; a prison; a play-house; and two hospitals. The number of free inhabitants of all colours was estimated at eight thousand, exclusive of the king's troops and seafaring people. The domestic slaves were said to be about twelve thousand. The situation of the town, however, was not to be commended. It was built at the foot of a very high mountain, called Le Haut du Cap, which abounds indeed with springs of excellent water, and furnished a great supply of garden vegetables, but it served as a screen from the land wind, and reverberated the rays of the sun. The town arose to opulence chiefly from the commodiousness of its harbour, and the extreme fertility of the plan adjoining it to the east, a district fifty miles in length, and

and twelve in breadth, appropriated ſolely to the cultivation of ſugar, (the plantations of which were divided from each other only by hedges of citrons and limes,) and yielding greater returns than perhaps any other ſpot of the ſame extent in the habitable globe.

The town of Cape St. Nicholas conſiſts of two hundred and fifty houſes, which are chiefly built of American wood. It is ſituated at the foot of a high bluff, called the Mole; but, having been a free port, it was a place of conſiderable trade, and particularly reſorted to by the ſhips of America. It is chiefly known, however, for the ſafety and extent of its harbour, which is juſtly called the key of the windward paſſage; and the fortifications towards the ſea are reckoned among the ſtrongeſt in the Weſt Indies. On the ſide of the land they are overlooked by the ſurrounding heights, and hence it is concluded, that, although it might be difficult to take the place by an invading armament, it would be ſtill more difficult to retain it afterwards, unleſs poſſeſſion was obtained alſo of the interior country.

The weſtern province began at Cape St. Nicholas, and extending along the line of coaſt which forms the bight of Leogane, for upwards of one hundred leagues, terminated at Cape Tiburon. It contained fourteen pariſhes, and five chief towns, namely, Port au Prince, St. Marc, Leogane, Petit Goave, and Jeremie; beſides villages, of which thoſe of Gonaives, Arcahaye, and Croix des Bouquets, are not inconſiderable. The only good harbours in this great extent of coaſt are thoſe of Port au Prince and Gonaives. All the other ſhipping places are open roads, ſometimes much expoſed.

Port au Prince (except in time of war, when the governor-general was directed to remove to Cape François) was conſidered as the metropolis of the colony. It was deſtroyed by a dreadful earthquake on the 3d of June 1770, and had never been completely rebuilt. In 1790 it conſiſted of about ſix hundred houſes, and contained 2,754 white inhabitants. The ſituation is low and marſhy, and the climate, in conſequence, very unhealthy. It is ſurrounded moreover by hills, which command both the town and the harbour; but both the hills and the vallies are abundantly fertile. To the eaſt is ſituated the noble plain of Cul de Sac, extending from thirty to forty miles in length by nine in breadth, and it contained one hundred and fifty ſugar plantations, moſt of which were capable of being watered, in times of drought, by canals admirably contrived and diſpoſed for that purpoſe. The circumjacent mountains were at the ſame time clothed with plantations of coffee, which extended quite to the Spaniſh ſettlements.

The population and ſtate of agriculture in the weſtern province were as follow: White inhabitants of all ages 12,798; negroes in a ſtate of ſlavery 192,961; plantations of clayed ſugar 135, of muſcovado 222. Plantations of coffee 894, of cotton 489, of indigo 1952, beſides 343 ſmaller ſettlements.

The ſouthern province, extending upwards of ſixty leagues from Cape Tiburon, along the ſouthern coaſt of the iſland to l'Ance à Pitre, contained ten pariſhes, and two chief towns, Aux Cayes and Jacmel. It poſſeſſes no ſafe harbours, and its roads are dangerous. The ſhipping that load at Aux Cayes take refuge during the hurricane ſeaſon at La Baye des Flamands.

The population in this department was compoſed of 6,037 whites, and 76,812 negro ſlaves. Its eſtabliſhments conſiſted of thirty-eight plantations

plantations of white sugar, and 110 of muscovado; 214 coffee plantations, 234 of cotton, 765 of indigo, and 119 smaller settlements.

The quantity of land in cultivation throughout all the parishes was 763,923 carreaux, equal to 2,289,480 English acres, of which about two thirds were situated in the mountains; and, that the reader may have a state of the agriculture at one view, we shall subjoin a summary of the preceding accounts, from whence it will appear that the French colony contained, the beginning of 1790,

431	plantations of clayed sugar,	
362	- of muscovado.	
Total 793	plantations of sugar.	
3117	- of coffee,	
789	- of cotton,	
3160	- of indigo,	
54	- of cacao, or chocolate,	
623	smaller settlements, chiefly for raising grain, yams, and other vegetable food.	
Making 8536	establishments of all kinds throughout the colony.	

The population in 1790, on a like summary, appears to have been, 30,831 whites of both sexes and all ages (exclusive of European troops and sea-faring people), and 434,429 negro slaves. In this account, however, the domestic slaves, and negro mechanics employed in the several towns, are not comprehended. They amounted to about 46,000, which made the number of negro slaves throughout the colony 480,000.

Of the free people of colour, no very accurate account was obtained. Monf. Marbois, the intendant, reported them in 1787 at about, 20,000. In 1790, the general opinion fixed them at 24,000.

The exterior appearance of the colony, as we have observed in another place, every where demonstrated great and increasing prosperity. Cultivation was making rapid advances over the country. The towns abounded in ware-houses, and the harbours were crowded with shipping. There were freighted, in 1787, 470 ships, containing 112,253 tons, and navigated by 11,220 seamen. The following is an account, from the intendant's reports, of the general exports, on an average, of the years 1787, 1788, and 1789; viz.

Average Exports from the French part of St. Domingo, before the Revolution.

	lbs.	Livres.
Clayed sugar - -	58,642,214 - -	41,049,549
Muscovado - -	86,549,829 -	34,619,931
Coffee - -	71,665,187 -	71,663,187
Cotton - -	6,698,858 -	12,397,726
	Hhds.	
Indigo - -	951,607 -	8,564,463
Molasses - -	23,061 -	2,767,320
An inferior sort of rum called taffia	2,600 -	312,000
Raw hides - -	No. 6,500 -	52,000
Tanned ditto - -	No. 7,900 -	118,500

The total value at the ports of shipping, in livres of St. Domingo, was - - 171,544,666

being equal to 4,765,129l. sterling money of Great Britain.

By

By this it will be found that the planters of Jamaica receive smaller returns from the labours of their negroes, in proportion to their numbers, than the planters of St. Domingo have received from theirs. For this difference various causes have been assigned, and advantages allowed, and qualities ascribed to the French planters, which I venture to pronounce, on full enquiry, had no existence. The true cause arose, undoubtedly, from the superior fertility of the soil; and, above all, from the prodigious benefit which resulted to the French planters from the system of watering their sugar lands in dry weather. This is an advantage which nature has denied to the lands in Jamaica, except in a very few places; but has freely bestowed on many parts of St. Domingo, and the planters there availed themselves of it with the happiest success.

On the 22d of May, 1798, it was determined by the commanding officer of the British forces at St. Domingo, (Brigadier general the Hon. Thomas Maitland,) to evacuate some of the places then in our possession on that island, namely, the towns of Port au Prince and St. Marc's with their dependencies, together with the parish of Arcahaye; and this measure was carried into complete effect without the smallest loss of any kind. He began on the 23d ult. to embark the heavy stores of every description; stating a full determination to all the parties concerned, and sending at the same time a flag of truce to General Toussaint l'Ouverture, at Gonaives, leaving to his option, either to obtain the possessions we evacuated in a state of ruin, or in a state of perfect order, provided he would guarantee, in a solemn manner, the lives and properties of such persons as chose to remain. General Toussaint immediately agreed to the last proposition, and sent to Port au Prince on the 28th of April a confidential officer, who, having met Lieutenant-colonel Nightingale, deputy adjutant-general, on the 30th of April an agreement was mutually exchanged and ratified by both parties. The stipulation in favour of the inhabitants and planters afforded them a security with which they were so entirely satisfied, that, although at first they had universally resolved to follow the king's forces, yet, upon hearing of this agreement in their favour, many of them who had actually embarked relanded, and there were not ten rich proprietors who ultimately, upon this occasion, quitted their properties.

We proceed now to the enumeration of the different classes which form the entire population of St. Domingo: observing, by the way, that there is not a single descendant to be found of the original inhabitants. The first then, is, of course, the white class. It comprehends the governor, the intendant, all the agents of government of every degree, the clergy, all the resident proprietors, the managers, the attornies, and agents of the non-residents, the merchants, the soldiers, the retail dealers, the artists, and, finally, all the race of industrious labourers, whom the negroes call little whites; and whom want, shame, misconduct, despair, and sometimes the hopes of making a fortune, bring to a country of the world where living is the dearest, where the industry has the fewest channels, where arts are the least honoured, and where the ill use which some of their predecessors made of the ancient and celebrated hospitality of the colonists, has rendered the inhabitants too circumspect to admit into their houses any but people well known, or well recommended. It was in consequence of remonstrances on the facility with which adventurers of all

kinds passed from Europe to the colonies, that the court made a regulation, which obliged every passenger to appear with the captain of the vessel, and a surety, at the office of the admiralty of the port from which he proposed to embark.

This salutary law, however, like every other, is evaded; because few captains refused to pass, as they call it, the first vagabond who finds the art of interesting their pity, or the means of tempting their cupidity by a slight retribution. Whatever be the motive of such an action, it is at once a violation of the law, and a species of robbery; since such a passenger must live entirely on the ship's stores, and consequently at the expence of the merchants. But the agents of commerce long since discovered, in the principles which direct it, the justification of those by which they believe themselves exonerated from keeping too exact an account with probity.

The second class is that of the mulattos, quarterons, demi-quarterons, or metis, and all, in short, who are called *people of colour*; amongst whom we place the free mulattos, proprietors of land, or living on their industry; as well as the domestics, free or slaves, of both sexes: for here the law comes to the support of opinion, and forbids the white to derogate from the dignity of his colour, by causing himself to be served by a white! The following is an exact account of the progression of colour. The white and the female negro produce the mulatto; the mulatto and the female negro the *Griff*; the white and the female mulatto the *Quarteron*; the white and the female *Quarteron* the *Tierceron*; the white and the female *Tierceron* the *Métis*; the white and the female *Métis* the *Mamelouc*.

Originally every mulatto was free at the age of four-and-twenty; not in consequence of a positive law, but by the unanimous consent of the colonists. This regulation was extremely wise; as the vast disproportion between the number of the blacks and the whites shewed the necessity of attaching the mulattoes to the latter. On the representations, however, of some of the planters, whose calculations were deranged by the prohibition of selling their own flesh and blood, the king, by an edict dated in 1674, declared that the children should follow the condition of their mother! And I must observe, to the eternal shame of the Europeans, that if a law which debases them, by devoting their posterity to slavery, is observed with the most rigorous exactness, it is not so with another, which expressly ordains that every master shall give each of his slaves two pounds and a half of salt meat a week.

The black class is the last: it comprises the free negroes who are proprietors of land, and by no means numerous; and the slaves, whether Creoles, that is, born in the colonies, or Bossales, imported from Africa.

Although the distance between the slave and the free man be immense, yet, to avoid subdivisions, and minute distinctions, we have adopted the division of colour, as the most simple. For we must farther observe, that the male and female negroes as well as the male and female mulattos, in spite of the acquisition of liberty, remain in a state of abjectness, which not only disqualifies them from any employ, but forbids them to contract with the whites a sufficient degree of intimacy, we will not say to sleep with them, but even to eat. If you visit a rich mulatto, he will call you sir, and not master, like the rest. You call him friend, dear friend, &c. he will ask you

to

to dinner, but, if he be correct, he will not presume to sit at table with you.

Such, is the total division. Each of the three classes has besides its shades—such as those which, in despite of complexion, separate the governor from the other whites, the mulatto from the free negro, &c. &c.

The compulsatory precautions arising from the prejudice of colour, have procured for the inhabitants two advantages, which in some degree compensate for the ridiculousness of it. They render the government more circumspect in its arbitrary proceedings; and they imprint on the colonists a character of haughty independence, from which despotic administrators have more than once experienced a resistance so inflexible, that the court has been finally obliged to recal a governor, whom the habit of playing the nabob in the East has daily tempted to transgress the bounds of his authority.

The natural consequence of the order of things which prevails here is, that all those titles of honour, which are elsewhere the *pabula* of emulation, of rivalry, and of discord; which inspire so much pride, and create so many claims in some; so much ambition and envy in others; shrink to nothing, and entirely disappear, before the sole title of White. It is by your skin, however branded it may be, and not by your parchment, however worm-eaten, that your pretensions to gentility are adjusted. Thus you see that vanity, which on your side of the water torments and turns herself a thousand ways, to impose on the public, and usurp the tribute of respect which it accords to the claims of birth, would here lose both her time and her labour.

Each of the different classes of the inhabitants of St. Domingo has, as you will readily imagine, a turn of thinking, a style of living, more or less approximate or distinct; which, after all, has little resemblance to what you will find elsewhere; because the climate, the regimen, the manners, the wants, the occupations, the degree of reciprocal dependency, establish here connections of the slightest nature; very different from those which, with you, bind together the members of the same society.

We might here seize the opportunity of entering into some details on this subject. As the study of man, however, in his moral capacity, requires more application, and more experience, than that of his existence in a social state; as the influence of the climate, and of a manner of living totally distinct from ours, acts necessarily on his character; and, finally, as too servile a regard to method would infallibly conduct us to a fatiguing monotony, we hold it to be the part of prudence not to hasten our judgment, and accumulate on one point observations, which, to be conclusive, should be result of time, comparison, and experience.

For example: the first thing that strikes every traveller who arrives here with the faculty of observation, is, that in spite of the conformity of origin, colour, and interests, the whites from Europe and the white Creoles form two classes, which, by their reciprocal pretensions, are so widely sundered, that necessity alone can bring them together. The former, with more breeding, more politeness, and more knowledge of the world, affect over the latter a superiority which is far from contributing to unite them. Yet, if the Creoles were a little more cautious than they are at present in their

too early connections with women; if they cultivated with more care their extraordinary propensities to excel in all bodily exercises; if they seconded by a better method of education the natural facility of their genius; we are persuaded that, not having to struggle against the influence of the climate under which they were born, nor against the habitudes of a kind of life differing essentially from that to which a European is obliged to submit himself on his arrival here, we are persuaded, that all the advantages would be on their side. Nothing is wanting to the Creole but a sufficient degree of good sense to enable him to use, without abusing, the faculties with which nature has endued him.

CULTIVATION OF THE OLIVE-TREE ABOUT GALLIPOLI.

THE olive-tree is here propagated, either by grafting, by slips, or by runners from the master roots, called in some places Barbatelle. They graft upon the wild olive, which abounds upon the pastures, where old and half-decayed trunks give reason to suppose that olive plantations formerly existed. This operation is performed between the end of March and the beginning of May; in three years fruit is produced, and this is the quickest method of producing it. The second mode is here called Culmonare. Between November and March, the branch of a bearing tree, from four to seven palms long, and from two to three inches thick, is slipped off, and put into a hole which had been dug some time before. The earth is then heaped up around the branch, within a foot of the top, in order that it may remain perfectly fresh; and in ten years it becomes a profitable tree. The third method, here called Mazarellare, consists in planting very small shoots, at a proper distance, in ground previously prepared. They are carefully watered during summer, and transplanted the third year; but it is only at the end of thirteen or fourteen years, that any real profit can be derived from such trees.

In the propagation of the olive-tree, less attention is paid to the quality of the olive than ought to be shewn to that article; for here, as amongst other kinds of fruit-trees, we shall find several varieties, especially if we are governed by their different appellations. But besides that, almost every town has its own peculiar term for one and the same sort; botanizers declare that the varieties are very trifling, although the nature of the climate, and the mode of cultivation, assuredly occasion some sort of distinction. It is certain, however, that the woods and uncultivated places produce a tree called by the peasantry Termete and Olivastro, which entirely corresponds with the Olea Europæa, and brings forth a great quantity of fruit, which is only half the size of that produced by an engrafted olive-tree. From these wild trees, when improved by cultivation, probably spring the numberless varieties which are to be found in this kingdom, and of which Dr. Presta mentions several in the quarto edition of his *Memoria intorno di Sessanti due saggi d'Oglio presentati alla Maestà del Re di Napoli*, published at Naples, in 1778. Amongst them he principally distinguishes only two kinds, called at Gallipoli, Ogliarola and Cellina; from whose fruit he extracted a dissimilar oil, although he at the same time allows the difference to be inconsiderable. The former corresponds with that which the ancients termed Salentina; and its fruit is by far the best in quality, as well as the most common

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in the province; but the tree that bears it is subject to the blight, or brusca. This olive is commonly nine lines long, six lines thick, somewhat curved, of a brownish hue, and black when it is perfectly ripe: it weighs between thirty and forty grains, including the stone, which is almost smooth, and weighs about six or eight grains.

The other sort, called Cellina, is, after the above, the most common; but it has many different appellations, as Uliva di Nardo, Cascirolo, Misciana, and others; and Columella is said to mention it by the name of Oleastellum. This olive is commonly eight lines long, six broad, and has a very light stone. At first it appears as if covered with a silvery sort of crape, but becomes quite black when it is ripe; it yields less than the foregoing, and the oil sooner turns rancid. The tree which bears this olive, is now very generally cultivated, it being less subject to diseases, and particularly to the brusca.

The process of cultivating the olive-tree consists, first, in stirring the ground around the tree. This is done at the beginning of the year, when the earth is dug five or six feet around the trunk of the tree, to a certain depth, and some fine manure is put to the roots; but very judicious cultivators will not allow of the manure, and say that it is prejudicial to the quality of the oil. Only the trees upon the hills and fallow grounds are treated as above; the earth around those upon the plains being sufficiently stirred in the tillage of the land. Far more difficult is the next operation of pruning, which is best understood by the inhabitants of the environs of Taranto, and especially by those of Mazafra, who are universally employed. Trees that do not shoot very fast are pruned in December; and such as are planted in a very rich soil, undergo that operation in the spring. The principal rule seems to be, to suffer but few centrical branches, to let in as much air as possible to the interior of the crown, and to form it more in breadth and rotundity than in height. But I doubt whether the true principles of pruning be understood here; and indeed, in some parts of this province, especially near Lecce, the trees, being never pruned at all, attain a very unusual height, and yield but very little fruit. Dr. Presta tried the experiment of pruning and treating his trees like espaliers, with considerable success.

The olive-trees usually blossom in June. In October the fruit begins to ripen; but does not reach its full perfection until December, when the skin, the pulp, and the surface of the stone, become black. At that period they yield the best oil; and, although in many places the olives are seen hanging upon the trees until the beginning of April, it is extremely detrimental to the quality of the oil, if the olives are allowed to remain upon the trees later than the close of December. Before the stone is hard, which takes place in August, no pressure whatever can force any oil out of the fruit. Although green in October, they are quite ripe enough for the table; and in November they assume a reddish hue, but are still too acrid to produce oil of the best quality. At that time, indeed, a certain sort of oil, called Oglio Onfacino, is extracted from them, but is only used for particular purposes. According to Dioscorides, Mat. Med. lib. i. cap. 27. this oil was likewise prepared by the ancients, who knew how to give it a white colour, its natural one being a greenish yellow. It was by them considered as the best oil; but they must have possessed a method of preparing and colouring it, which is now lost; for, notwith-

notwithstanding Dr. Presta has with infinite attention tried every method of making it, the oil has always turned sharp, and been of a greenish yellow colour. The Oleum strictivum of the ancients was prepared from olives, which, having attained a middle state of maturity, were neither green nor black, but spotted in a very particular manner. In some of the environs of Taranto, they wait until the olives fall to the ground, before they gather them; so that the harvest lasts from the end of October until the end of March. But at Taranto itself, where the management of this useful and profitable fruit is better understood, the olives are gathered in December with the greatest care, and heaped up in cellars, until it be convenient to press them. As very few individuals have an oil press, and as in the baronial towns the lord has generally the exclusive right of possessing one, of which his subjects are constrained to make use, they are frequently obliged to wait so long before they can extract their oil, that the olives necessarily fall into a state of too great fermentation, which is succeeded by putrefaction; and this is one of the principal causes of the general badness of the oil. The Duke of Martina has indeed constructed magazines for olives, arched over, and contiguous to his presses, upon one of his estates, called Casalerotto, where he has 900 moggie of olive plantations; and the olives are well preserved therein; but such expensive works can only be undertaken by very opulent proprietors.

The oil-mills, called Trappeti, are of two kinds; one which has been in common use for a long period of time; and another that was found in the overwhelmed town of Stabia, and has been improved by Lavegha. The first consists of a solid piece of lime-stone, or marble, fashioned like a mill-stone, seven palms in diameter, and two in thickness: this vertical sort of wheel is placed upright upon a round flat stone, from six to seven palms in diameter, which has a raised border, and is fixed upon a pedestal four palms high. From the bottom of this stone rises a moveable cylinder, from which an axle extends into the centre of the upright stone, in such a manner, that it can turn round, as in the nave of a wheel. An axs being harnessed to a bar, that stretches also from the cylinder across the wheel, gives motion both to the cylinder and the wheel, whose weight crushes the olives upon the stone beneath. The other machine, which was found under the ruins of Stabia, and has been improved and rendered fit for present use by Lavegha, consists of a round pedestal, four or five palms high, in which is fixed a concave hemisphere, of lava, or other very hard stone, two palms deep in the middle, and seven and a half in diameter, including the brim, which is one palm and a half broad. From the centre of this hemisphere rises a moveable cylinder, whose upper end is let into a cross beam, in which also it moves around. At a certain distance from the lower end, a very strong iron axle passes through the cylinder; upon each side of which a piece of lava, of an hemispherical form, is placed, so that the axle passes them far enough for nuts to be fixed at the ends of it, in such a manner, that the two segments may be moved at pleasure, to or from the cylinder. The convexity of these segments, which, when united, are four palms in diameter, exactly coincides with the concavity of the mortar, from which the segments can however be withdrawn by means of the nuts. In the

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ſpace between the ſegments are two iron inſtruments, of which one is inſerted in either ſtone; the one is in the form of a ſickle, and keep the olives under the ſegments; and the other ſcratches off the thick pulp that adheres to them. A hole is cut through one ſide of the concave ſtone, and furniſhed with a cork, which, when the olives are ſufficiently cruſhed, is drawn out, and the motion of the machine forces out the pulp, when freſh olives are thrown into the mill. The advantage of this oil-mill over the other, conſiſts in its requiring fewer hands, and in ſhortening the time of grinding. For, with the common machine, one man is conſtantly employed in replacing under the mill-ſtone ſuch olives as fall out, and in taking out the pulp, before he can put in freſh fruit. Somewhat leſs oil is perhaps produced by Lavegha's mill; but this defect is amply remedied by the ſuperior quality of the oil; for, as his mill poſſeſſes the peculiar advantage of cruſhing the olive without grinding the ſtone, the oil is free from that raw and acrid ſort of taſte, to which the oil produced from the other mill is but too ſubject. In ſhort, its numerous opponents can reproach it with nothing but being of more expenſive conſtruction; for their other objections, that it yields much leſs oil, and that their forefathers always made uſe of and were ſatisfied with the common one, can have but little weight with reaſonable people. And, with reſpect to the expence, it is indeed certain that the Duke of Martina expended a large ſum in the conſtruction of his mills at Caſalerotto, for which he cauſed the lava to be tranſported by ſea from the foot of mount Veſuvius to Taranto; but it is not neceſſary for every one to follow the example of that opulent noblemen, eſpecially when it is known that the neighbouring mountains of Calabria abound in ſtone as proper for the purpoſe as lava, &c. As ſoon as the olives are ſufficiently cruſhed, the pulp is put into a cylindrical ſort of ſtraw baſkets, called fiſchioli, placed one upon another, under a preſs that is worked by four or five men. When the oil has done running, warm water is thrown upon the baſkets, which undergo a ſecond preſſure. The oil is received either in wooden or earthen veſſels, out of which it is poured into a deep brick ciſtern, where it is uſually well preſerved.

CHARACTER OF THE REIGNING SULTAN, SELIM III.

SULTAN SELIM III. is the eldeſt male deſcendant of the houſe of Oſman, who in 1299 eſtabliſhed the fifth dynaſty of the kalifes. At the death of his father Muſtafa III. in 1775, he was fourteen years old. According to the known precedent amongſt the Turks, Abdul-hamid, his uncle, ſucceeded to the throne; for they diſdain to be governed either by a woman or a boy. At his acceſſion, Abdul-hamid had reached the age of forty-nine, and during the fifteen years reign of his brother Muſtafa had endured a ſtate of impriſonment, which the jealous policy of the ſeraglio had long ordained. As a ſolace of his confinement, he cultivated literature and the arts of peace. His diſpoſition, mild and beneficent, induced him to forego the ancient prejudice, and to ſuperintend the education of Sultan Selim, giving him every liberal indulgence. Sultan Muſtafa, and Sultan Mahmood, the ſons of Abul-hamid, and the only remaining heirs of the empire, are both minors. They experience a generous return for their father's kindneſs, and are treated with

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suitable respect. Each has his separate suite of apartments, and sixty attendants, amongst whom are thirty elderly female slaves, with an annual revenue of 5000l. sterling. The good mussulman, who laments the possible extinction of the imperial family, is comforted by the astrologers, who have publicly declared, that, after he has attained to forty years, Sultan Selim will be blessed with a numerous progeny.

His countenance is handsome and impressive, and his figure good; he is affable, and possesses much speculative genius, is not ill-informed of the characters and separate interests of his contemporary princes, and has every inclination to reconcile his subjects to the superior expediency of European maxims, both in politics and war. But it is dubious if he be capable of that energetic activity, and that personal exertion, which are required in an absolute prince to re-model a people whose opinions are not to be changed but by an universal revolution. Peter the Great and Charles XII. in their plans of regenerating, or conquering their subjects, did not depend solely upon the agency of ministers for success.

The curiosity of Selim respecting the other nations of Europe, originated in frequent conversations with Rachib Effendi, the present historiographer-royal, who was for some time envoy at Vienna, after the last war. Those who have gained his confidence since the commencement of his reign, have consulted that inclination, and improved every opportunity of extending his intelligence on those subjects. I have heard it asserted, that the young men in the seraglio are now instructed in the French language by his command; and his partiality to French wine is no secret amongst the well-informed. The first efforts towards improvement have been applied to the army and marine. Forts have been erected on the Bosphorus, regiments have been trained to European discipline, chiefly by French officers, and the fleet will become in a certain degree formidable.

When he has leisure to render his vast territory, at least in the vicinity of his capital, more resemblant of civilized nations, he will probably establish a post, which may facilitate communication between distant provinces. During the last war many places of importance were taken, or evacuated, weeks before the ministry were in possession of the fact. The only imperial works now seen in his dominions are mosques, aqueducts, and fountains; he may hereafter turn his attention to great roads, now barely passable, which would be as useful monuments of his fame.

Mehmèt Mèlek Pasha, the late visier, resigned in 1794. He was a favourite, in his youth, of Mustafa III. who gave him his sister in marriage, and the appellation of Melèk, or the Angel, on account of his singular beauty; for the Turks usually take their surname from some personal excellence or peculiarity. After having enjoyed some of the most lucrative governments in the empire, he returned to Constantinople, and was called to the visirate, at the advanced age of ninety years, in 1789. He has retired to his palace on the Asiatic side of the Bosphorus, and, as an extraordinary fact in natural history, has had a son born to him, whose legitimacy cannot be invalidated.

The present system of government aims at the suppression of the former sole authority of the visier, and has reduced him to a mere member of the cabinet council. As the sultan takes a more active share than his predecessor in public affairs, and listens to more advisers, it seems to draw to an end. The visier now in office is likewise

wise a harmless old man, so that they may probably soon "sit state-statues only." The ruling persons of the present day are, 1. Yusûf Agha, kiayah, or high-steward to the sultan's mother, who retains a very decided influence with him. Yusûf's private life has been marked by uncommon circumstances. He is a native of Candia, and was originally a writer to a ship, from which employment he passed into the service of Abdullâh Pasha, beglerbey of Anatolia, residing at Kutayah. During ten years he so ingratiated himself with the pasha, that he determined to secure to him his great wealth in his life-time. Accordingly he gave him entire possession, ordering him to fly to the Porte and to urge the heaviest complaints against him for his injustice and ill-treatment. Meanwhile the pasha died. The Capidji bashi was dispatched by the sultan to seize the treasure, but found nothing; and Yusûf, from the predicament in which he stood, was the last person to be suspected. With this wealth he lived in splendour at Constantinople, and frequented the audiences of the visier. He was soon appointed taraphanâ eminy, or master of the mint, from which he was advanced to his present post. 2. Ratîb Effendi has twice held the important office of reis-effendi, or secretary of state. He rose from a public clerk, passing through all the preliminary gradations with distinguished ability. He is beyond comparison the best-informed and most capable minister in the cabinet. 3. Tchiuséh, kiayah, or deputy to the visier, is at the head of the finance, and planned the new taxes.

The present capudân pasha, or high admiral, called Kuchuk Hussein, from his diminutive stature, was a Georgian slave, and the companion of the sultan in his childhood. From the seraglio he emerged to take the command of the navy, it may be presumed without much previous acquaintance with maritime affairs. But his administration has been very beneficial; for he has raised the marine from the miserable state it was left in at the conclusion of the Russian war, to respectability. The new ships are built under the inspection of European surveyors, and French nautical terms have been adopted. At the beginning of the present century, the Turkish fleet consisted of thirty-two ships of the line, thirty-four galleys, and some brigantines; they can now send to sea fourteen first rates, six frigates, and fifty sloops of war.

Every spring he leaves Constantinople with a few ships, to visit the Archipelago, to receive the capitation tax from the different islands, and to free the seas from pirates, and the Maltese cruisers. The time of his coming is generally known, so that the service is little more than a matter of form. His reception by the sultan, both at his departure and return, is a brilliant spectacle. He is married to the only daughter of Abdul-hamid, and is honoured with the private friendship of his sovereign.

In 1784, a school of theoretical navigation was instituted by the Visier Hamid Halil Pasha, who was beheaded the next year.

Boscovitz discovered errors in the navigation of the Black Sea, by which so many lives are annually lost; but no salutary reformation has taken place.

The first idea of European fortifications was given to the Turks by Baron de Tott, who was employed to erect those at the Dardanelles, and at the mouth of the Bosphorus. Had his plans been adopted to their full extent, they would not have looked so much

like card-boxes; but the Turks curtail all their national works by parsimony and jobbing.

Every scheme for defending the coast of the Black Sea, by forts and batteries, and for military regulations, is submitted to Cheliby Effendi, who surveys their execution, if approved. He was master of the mathematical school, founded in 1773 by Ghazi, Hassan pasha, a very celebrated character in the last reign. This extraordinary person was, likewise, a Georgian slave, and afterwards a Barbary corsair. Having been taken prisoner by the Spaniards, he passed six years of slavery at Madrid, from whence he was sent to Naples, where he was exchanged, and returned to Constantinople. His reputation for personal courage procured him the command of a galley, and afterwards of a frigate. At the unfortunate battle of Cheshmè he had a ship of the line under Jaffer, capudan pasha, who upon his disgrace died of chagrin, and was succeeded by Hassan. He was extremely whimsical, and kept a lion's whelp always on his sofa, which he had trained up to follow him, but which, having killed one of the domestics, was afterwards chained. He became visier, and died at the age of more than seventy, in the camp against the Russians, not without suspicion of poison. So singular was his bravery, and so frequent his successes, that he assumed the name of Ghazi the victorious. Abdul-hamid was fearful, and considered the safety of the empire endangered by his absence from Constantinople.

Of his prevailing influence the following relation is a proof, and gives traits of secret machinations practised in the seraglio. One of his slaves, named Yusûf, had so recommended himself by superior talents, that he gave him liberty, and promotion to the most considerable offices. At the time Yusûf returned from his government of the Morea, to take upon him the office of visier, Mavro-yeni, a Greek of a noble family, was the dragoman, or interpreter, to his patron Hassan. Petraki, another Greek, was master of the mint, and imperial banker, and had amassed seven millions of piastres.

This man being ambitious of becoming Prince of Wallachia, he three times procured the appointment of Mavro-yeni to that high station, who procured Hassan and the visier to be superseded. But they, impatient of the disappointment, represented to Abdul-hamid, that the people demanded the life of Petraki in atonement of his peculation, who timidly consented to his execution, and he was instantly imprisoned. On the very day of the high ceremony of Mavro yeni's investiture, he was led to the gate of the seraglio to kiss his stirrup, and sue for pardon. At that instant the executioner struck off his head, and Mavro-yeni had the satisfaction of seeing his rival dead at his feet. Another Hassan pasha, who hated him, becoming visier, ordered him to be beheaded upon the charge of betraying Giurgevow, the first Turkish fortress upon the Danube, to the Germans. He died a mussulman. Abdul-hamid, when informed of the last-mentioned circumstance, was so far convinced of his innocence, that in a few months the vindictive visier shared the same fate.

PYROTECHNY;

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 166.

ILLUMINATED WORKS.

ILLUMINATED works are much admired by the Italians, and indeed are a great addition to a collection of works: in a grand exhibition an illuminated piece should be fired after every two or three wheels, or fixed pieces of common and brilliant fires; and likewise illuminated works may be made cheap, quick, and easy.

Illuminated Chandelier.—To make an illuminated chandelier, you must first have one made of thin wood. The chandelier being made, bore in the front of the branches, and in the body, and also in the crown at top, as many holes for illuminations as they will contain at 3 inches distance from each other: in these holes put illuminations filled with white, blue, or brilliant charge. Having fixed in the port-fires, clothe them with leaders, so that the chandelier and crown may light together. The mouths of the illuminations must project straight from the front.

Illuminated Yew Tree.—First have a tree made of wood, as described above. The middle piece or stem, on which the branches are fixed, must be 8 feet 6 inches high: at the bottom of this piece draw a line, at right angles, 2 feet 6 inches long at each side; then at one foot 6 inches from the bottom, fix the branches. Set on the two top branches parallel to them at bottom: let the length of each of these branches be one foot from the stem: then fix on 5 more branches between, at an equal distance from each other. When the branches are fixed, place illuminating portfires on the top of each, as many as you choose: behind the top of the stem fasten a gerbe or white fountain, which must be fired at the beginning of the illuminations on the tree.

Flaming Stars with brilliant Wheels.—To make a flaming star, you must first have made a circular piece of strong wood about 1 inch thick and 2 feet diameter: round this block fix 8 points, 2 feet 6 inches long each; 4 of these points must be straight and 4 flaming: these points being joined on very strong, and even with the surface of the block, nail tin or pasteboard on their edges, from the block to the end of each, where they must be joined: this tin must project in front 8 inches, and be joined where they meet at the block; round the front of the block fix 4 pieces of thick iron wire, 8 inches long each, equally distant from each other: this being done, cut a piece of pasteboard round, 2 feet diameter, and draw on it a star. Cut out this star, and on the back of it paste oiled paper; then paint each point half red and half yellow, lengthwise; but the body of the star must be left open, wherein must run a brilliant wheel, made thus: Have a light block turned 9 inches long; at each end of it fix 6 spokes; at the end of each spoke put a two-ounce case of brilliant fire: the length of these cases must be in proportion to the wheel, and the diameter of the wheel when the cases are on must be a little less than the diameter of the body of the small star: the cases on the spokes in front must have their mouths incline outwards, and those on the inside spokes must be placed so as to form a vertical circle of fire.

When you place your leaders, carry the first pipe from the tail of one of the cases in front to the mouth of one of the inside cases, and from the tail of that to another in front, and so on to all the cases. Your wheel being made, put it on a spindle, in the centre of the star; this spindle must have a shoulder at the bottom, to keep the wheel at a little distance from the block. This wheel must be kept on the spindle by a nut at the end; having fixed on the wheel, fasten the transparent star to the 4 pieces of wire: when you fire it, you will only see a common horizontal wheel; but when the first case is burnt out, it will fire one of the vertical cases, which will shew the transparent star, and fill the large flames and points with fire; then it will again appear like a common wheel, and so on for 12 changes.

Projected regulated Piece of nine Mutations.

A regulated piece, if well executed, is as curious as any in fireworks: it consists of fixed and moveable pieces on one spindle, representing various figures, which take fire successively one from another, without any assistance after lighting the first mutation.

1. Names of the mutations, with the colour of fire and size of the case belonging to each.

First mutation is a hexagon vertical wheel, illuminated in front with small portfires tied on the spokes; this wheel must be clothed with 2-ounce cases, filled with black charge; the length of these cases is determined by the size of the wheel, but must burn singly.

Second mutation is a fixed piece, called a *golden glory*, by reason of the cases being filled with spur-fire. The cases must stand perpendicular to the block on which they are fixed, so that, when burning, they may represent a glory of fire. This mutation is generally composed of 5 or 7 two-ounce cases.

Third mutation is moveable; and is only an octagon vertical wheel, clothed with 4-ounce cases, filled with brilliant charge: 2 of these cases must burn at a time. In this wheel you may make changes of fire.

Fourth mutation, is a fixed sun of brilliant fire, consisting of 12 four-ounce cases: the necks of these cases must be a little larger than those of 4-ounce wheel-cases. In this mutation may be made a change of fire, by filling the cases half with brilliant charge, and half with grey.

Fifth mutation, is a fixed piece, called the *porcupine's quills*. This piece consists of 12 spokes, standing perpendicular to the block in which they are fixed; on each of these spokes, near the end, must be placed a 4-ounce case of brilliant fire. All these cases must incline either to the right or left, so that they may all play one way.

Sixth mutation, is a standing piece, called the *cross fire*. This mutation consists of 8 spokes fixed in a block; near the end of each of those spokes must be tied two 4-ounce cases of white charge, one across the other, so that the fires from the cases on one spoke may intersect the fire from the cases on the other.

Seventh mutation, is a fixed wheel, with 2 circular fells, on which are placed 16 eight-ounce cases of brilliant fire, in the form of a star. This piece is called a *fixed star of wild-fire*.

Eighth mutation. This is a beautiful piece, called a *brilliant star-piece*. It consists of 6 spokes, which are strengthened by two fells of

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a hexagon form, at some distance from each other; at the end of each spoke, in the front, is fixed a brilliant star of 5 points; and on each side of every star is placed a 4-ounce case of black or grey charge; these cases must be placed with their mouths sideways, so that their fires may cross each other.

Ninth mutation, is a wheel-piece. This is composed of 6 long spokes, with a hexagon vertical wheel at the end of each; these wheels run on spindles in the front of the spokes; all the wheels are lighted together: 2-ounce cases will do for these wheels, and may be filled with any coloured charge.

II. Proportions of the mutations, with the method of conveying the fire from one to the other, and the distance they stand one from the other on the spindle.

First mutation, must be a hexagon vertical wheel 14 inches diameter; on one side of the block, whose diameter is 2¼ inches, is fixed a tin barrel. This barrel must be a little less in diameter than the nave; let the length of the barrel and block be 6 inches. Having fixed the cases on the wheel, carry a leader from the tail of the last case into the tin barrel through a hole made on purpose, 2 inches from the block; at the end of this leader let there be about 1 inch or 2 of loose match; but take care to secure well the hole wherein the pipe is put, to prevent any sparks falling in, which would light the second mutation before its time, and confuse the whole.

Second mutation is thus made. Have a nave turned 2½ inches diameter, and 3 long; then let ½ an inch of that end which faces the first wheel be turned so as to fit easy into the tin barrel of the first mutation, which must turn round it without touching. On the other end of the block fix a tin barrel. This barrel must be 6 inches long, and only half an inch of it to fit on the block. Round the nave fix 5 spokes, 1½ inch long each; the diameter of the spokes must be equal to a 2-oz. former. On these spokes put five 7-inch 2-oz. cases of spur-fire, and carry leaders from the mouth of one to the other, that they may all light together. Then from the mouth of one of the cases carry a leader through a hole bored slantwise in the nave, from between the spokes, to the front of the block near the spindle hole: the end of this leader must project out of the hole into the barrel of the first mutation, so that when the pipe which comes from the end of the last case on the first wheel flashes, it may take fire, and light the 2d mutation. To communicate the fire to the 3d mutation, bore a hole near the bottom of one of the five cases to the composition, and from thence carry a leader into a hole made in the middle of the barrel; this hole must be covered with pasted paper.

Third mutation, may be either an octagon or hexagon wheel, 20 inches diameter; let the nave be 3¼ inches diameter, and 3½ in length; 1½ inch of the front of the nave must be made to fit in the barrel. On the other end of the block fix also a tin barrel. This barrel must be 6½ inches in length, one inch of which must fit over the block. The cases of this wheel must burn 2 at a time; and from the mouths of the 2 first cases carry a leader through holes in the nave, into the barrel of the second mutation, after the usual manner: but besides these leaders let a pipe go across the wheel from one first case to the other; then from the tail of one of the last cases carry a pipe into a hole in the middle of the barrel; at the end of this pipe let there be some loose quick-match.

Fourth

Fourth and fifth mutations. These may be described under one head, as their naves are made of one piece, which is 14 inches; first, a block 4 inches diameter, with 10 or 12 short spokes, on which are fixed 11 inch 8-oz. cases: let the front of this block be made to fit easy in the barrel, and clothe the cases so that they may all light together; and let a pipe be carried through a hole in the block into the barrel, in order to receive the fire from the leader brought from the last case on the wheel. The nave of the 5th mutation, must be 4½ inches in diameter; in this nave fix 10 or 12 spokes, 1½ foot in length each; these spokes must stand 7 inches distant from the spokes of the 4th mutation; and at the end of each spoke tie a 4-oz. case. All these cases are to be lighted together, by a leader brought from the end of one of the cases.

Sixth and seventh mutations. The blocks of these 2 mutations are turned out of one piece of wood, whose length is 15 inches. First, a block 5 inches diameter, in which are fixed 8 spokes, each 2 feet 4 inches long; at the end of each spoke tie two 4-oz. cases. All these cases must be fired at the same time, by a pipe brought from the end of one of the cases on the 5th mutation. Let the distance between the spokes, and those in the 5th mutation, be 7 inches. The nave of the 7th mutation must be 5½ inches diameter; in this nave fix 8 spokes, and on the front of them 2 circular fells, one of 4 feet 8 inches diameter, and one of 3 feet 11 diameter; on these fells tie 16 8-oz. or pound cases, and carry leaders from one to the other, so that they may be all fired together. This mutation must be fired by a leader brought from the tail of one of the cases on the 6th mutation.

Eighth and ninth mutations. The blocks of these may be turned out of one piece, whose length must be 12 inches. The block of the 8th mutation, must be 6 inches diameter; and in it must be fixed 6 spokes, each three feet in length, strengthened by an hexagon fell within 3 or 4 inches of the ends of the spokes: close to the end of each spoke, in the front, fix a five-pointed brilliant star; then 7 inches below each star tie two 10-inch 8-oz. cases, so that the upper ends of the cases may rest on the fells, and their ends on the spokes. Each of these cases must be placed parallel to the opposite fell.

The 9th mutation must have a block 7 inches diameter. In this block must be screwed 6 spokes, 6 feet long each, with holes and grooves for leaders, as those in the dodecaedron; at the end of each spoke, in the front, fix a spindle for a hexagon vertical wheel, 10 inches diameter. When these wheels are on, carry a leader from each into the block, so that they may all meet; then lead a pipe from the end of one of the cases of the 8th mutation, through a hole bored in the block, to meet the leaders from the vertical wheels, so that they may all be fired together.

The spindles for larger pieces are required to be made very strong, and as exact as possible: for a piece of 9 mutations, let the spindle be at the large end 1 inch diameter, and continue that thickness as far as the 7th mutation; and thence to the 5th, let its diameter be ¾ of an inch; from 5th to the 4th, 5-8ths of an inch; from the 4th to the 2d, ½ inch; and from the 2d to the end, 3-8ths of an inch. At the small end must be a nut to keep on the first wheel, and at the thick end must be a large nut; so that the screw part of the spindle being put through a post, and a nut screwed on tight, the spindle

will be held fast and steady: but you are to observe, that that part of the spindle on which the moveable pieces are to run, be made long enough for the wheels to run easy without sticking; the fixed pieces being made on different blocks, the leaders must be joined, after they are fixed on the spindle. The best method of preventing the fixed mutations from moving on the spindle, is to make that part of the spindle which goes through them square; but, as it would be difficult to make square holes through such long blocks as are sometimes required, it will be best to make them thus: Bore a hole little larger than the diameter of the spindle, and at each end of the block, over the hole, fasten a piece of brass with a square hole in it to fit the spindle.

To make an Horizontal Wheel change to a Vertical Wheel with a Sun in front.

The sudden change of this piece is very pleasing; and gives great surprise to those who are not acquainted with the contrivance. A wheel for this purpose should be about three feet diameter, and its fell circular; on which tie 16 half-pound cases filled with brilliant charge: two of these cases must burn at a time; and, on each end of the nave must be a tin barrel of the same construction as those on the regulated piece. The wheel being completed, prepare the post or stand thus:—First have a stand made of any heigh', about three or four inches square; then saw off from the top a piece two feet long; this piece join again at the place where it was cut, with a hinge on one side, so that it may lift up and down in the front of the stand; then fix on the top of the bottom-part of the stand, on each side, a bracket; which brackets must project at right angles with the stand, one foot from the front, for the short piece to rest on. These brackets must be placed a little above the joint of the post, so that when the upper stand falls, it may lie between them at right angles with the bottom stand; which may be done by fixing a piece of wood, one foot long, between the brackets, and even with the top of the bottom stand; then, as the brackets rise above the bottom stand, they will form a channel for the short post to lie in, and keep it steady without straining the hinge. On the side of the short post, opposite the hinge, nail a piece of wood, of such a length, that, when the post is perpendicular, it may reach about 1½ foot down the long post; to which being tied, it will hold the short stand upright. The stand being thus prepared, in the top of it fix a spindle ten inches long: on this spindle put the wheel: then fix on a brilliant sun with a single glory; the diameter of this sun must be six inches less than that of the wheel. When you fire this piece, light the wheel first, and let it run horizontally till four cases are consumed: then from the end of the fourth case carry a leader into the tin barrel that turns over the end of the stand: this leader must be met by another brought through the top of the post, from a case filled with a strong port-fire charge, and tied to the bottom post, with its mouth facing the packthread which holds up the stand; so that, when this case is lighted, it will burn the packthread, and let the wheel fall forward, by which means it will become vertical: then from the last case of the wheel, carry a leader into the barrel next the sun, which will begin as soon as the wheel is burnt out.

Grand Volute illuminated with a projected Wheel in front.— First have two hoops made of strong iron wire, one of 6 feet diameter, and one

one of 4 feet 2 inches; these hoops must be joined to scrolls. These scrolls must be made of the same sort of wire as the hoops; on these scrolls tie, with iron-binding wire, as many illuminating port-fires as they will hold, at two inches distance; clothe these port-fires with leaders, so that they may all take fire together.—Then add a circular wheel of four spokes, 3 feet 6 inches diameter; and on its fell tie as many 4-oz. cases, head to tail, as will complete the circle, only allowing a sufficient distance between the cases, that the fire may pass free; which may be done by cutting the upper part of the end of each case a little shelving: on each spoke fix a 4-oz. case, about three inches from the fell of the wheel: these cases are to burn one at a time, and the first of them to begin with those on the fell, of which four are to burn at a time; so that the wheel will last no longer than ¼ of the cases on the fell, which in number should be 16 or 20. On the front of the wheel form a spiral line with strong wire, on which tie port-fires, placing them on a slant, with their mouths to face the same way as the cases on the wheel: all these port-fires must be fired with the second cases of wheel. Let the spokes of wood be all made to screw into a block in the centre; each of these spokes may be in length about 4 feet 6 inches; in the top of each fix a spindle, and on each spindle put a spiral wheel of eight spokes. The blocks of these wheels must have a hole at top for the centre cases, and the spindle must have nuts screwed on their ends; which nuts should fit in the holes at top of the blocks, so that all the wheels must be put on before you fix in the centre cases: as some of these wheels, by reason of their situation, will not bear on the nut, it will be necessary to have smooth shoulders made on the spindles for the blocks to run on. The cases of these wheels are to burn double; and the method of firing them, is by carrying a leader from each down the spokes into the block in the centre, as in the dodecaedron, but the centre case of each wheel must begin with the two last cases as usual. It is to be observed, that the large circular wheel in front must have a tin barrel on its block, into which a pipe must be carried from one of the second cases on the wheel; this pipe being met by another from the large block, in which the eight spokes are screwed, will fire all the spiral wheels and the illuminating port fires at the same time. The cases of the projected wheel may be filled with a white charge, and those of the spiral wheels with a grey.

Moon and Seven Stars.—Procure a smooth circular board 6 feet diameter: out of the middle of it cut a circular piece 12 or 14 inches diameter; and over the vacancy put white Persian silk, on which paint a moon's face: also sundry stars, each 4 or 5 inches diameter, cut out with five points, and covered with oiled silk: on the front of the large circular board draw a 7-pointed star, as large as the circle will allow; then on the lines which form this star, bore holes, wherein fix pointed stars. When this case is to be fired, it must be fixed upon the front of a post, on a spindle, with a wheel of brilliant fire behind the face of the moon: so that, while the wheel burns, the moon and stars will appear transparent: and when the wheel has burnt out, they will disappear, and the large star in front, which is formed of pointed stars, will begin, being lighted by a pipe of communication from the last case of the vertical wheel, behind the moon; this pipe must be managed in the same manner as those in regulated pieces.

Double

Double Cone-Wheel illuminated.—Make a ſtrong decagon wheel, 2 feet 6 inches diameter; then on each ſide of it fix a cone; theſe cones are to conſiſt of a number of hoops, ſupported by 3 or 4 pieces of wood, in the manner of the ſpiral wheels. Let the height of each cone be 3 feet 6 inches; and on all the hoops tie port-fires horizontally, with their mouths outwards, and clothe the wheel with 8-oz. caſes, all to play horizontally, two at a time: the cones may be fired with the firſt or ſecond caſes. The ſpindle for this piece muſt go through both the cones, and riſe three feet above the point of the cone at top; ſo that its length will be 10 feet 4 inches from the top of the poſt, in which it is fixed, allowing four inches for the thickneſs of the block of the wheel. The whole weight of the wheel and cones muſt bear on a ſhoulder in the ſpindle, on which the block of the wheel muſt turn.—Near the top of the ſpindle muſt be a hole in the front, into which ſcrew a ſmall ſpindle, after the cones are on: then on this ſmall ſpindle fix a ſun, compoſed of ſixteen 9-inch 4-oz. caſes of brilliant fire; which caſes muſt not be placed on a ſell, but only ſtuck into a block of ſix inches diameter: then in the front of this ſun muſt be a circular vertical wheel, ſixteen inches diameter; on the front of this wheel form with iron wire a ſpiral line, and clothe it with illuminations after the uſual method. As this wheel is not to be fired till the cones are burnt out, the method of firing it is thus:—Let the hole in the block, at the top of the uppermoſt cone, be a little larger than the ſpindle which paſſes through it. Then, from the firſt caſe of the vertical wheel before the ſun, carry a leader down the ſide of the ſpindle to the top of the block of the horizontal wheel, on which muſt be a tin barrel: then this leader being met by another brought from the end of the laſt caſe of the horizontal wheel, will give fire to the vertical wheel ſo ſoon as the cones are extinguiſhed: but the ſun muſt not be fired till the vertical wheel is quite burnt out.

[*To be continued.*]

PRESENT STATE OF SCIENCE IN PIEDMONT.

MATHEMATICS.

THE Piedmonteſe cheriſh with exultation the remembrance that La Grange is their countryman. His father had deſtined him for the profeſſion of the law, but the irreſiſtible force of true genius impelled him to thoſe ſtudies which he has cultivated with ſo much ſucceſs, and which render him ſo bright an ornament to the polytechnical ſchool at Paris. The celebrated Counts de Saluces, and Michelotti, with the Abbé de Caluzo, are ſtill living, and there is no room to doubt that their lucubrations will in ſome meaſure indemnify the republic of letters for the loſs it has ſuſtained by their retirement.

EXPERIMENTAL PHYSICS.—The high reputation which Beccaria acquired in this branch of ſcience, is ſufficiently known. His ſucceſſors, Landi and Vaſſali, have rendered themſelves illuſtrious by a number of learned works in this department, particularly by a Treatiſe on Electricity. The cabinet of natural philoſophy ſcarcely admits of improvement, and Turin may juſtly claim a ſuperiority in experimental phyſics.

CHEMISTRY.—Giobert has long combated the new principles of chemistry. His works, which are numerous, bear inconteſtable evidence to his conſummate knowledge of the ſcience, which ſtands indebted to him for a much approved acidiometer. Doctor Buonvicini is indefatigable in his reſearches for the promotion of chemical knowledge. His laboratory is on a very extenſive ſcale, and he gives private lectures in this ſcience, as the univerſity of Turin cannot, as yet, boaſt the advantage of a public profeſſorſhip for chemiſtry.

NATURAL HISTORY and BOTANY.—If Switzerland is proud of its Bauhins, France of its Tournefort, and Sweden of the great Linnæus, Turin is not leſs vain of Charles Allioni. This veteran of ſcience, who is turned of ſeventy, retains the unimpaired uſe of his excellent faculties. Like Bonnet, whom he ſtrongly reſembles, he has nearly loſt his eye-ſight by intenſe ſtudy. This defect obliges him to employ an amanuenſis. His Piedmonteſe Flora is deſervedly celebrated; and the Tranſactions of the Academy at Turin have been enriched by a number of intereſting memoirs from his pen, on almoſt every ſubject of natural hiſtory.

Dana, profeſſor of botany, and Doctor Belardi, the worthy pupil of Allioni, are entitled to conſiderable praiſe. The latter, who has acquired no ſmall reputation by his Appendix to the Piedmonteſe Flora, is at preſent occupied upon a work on the *cryptogamia*. The botanical garden, though ſmall, contains four thouſand different ſpecies of plants. Allioni, whoſe indefatigable zeal in the cauſe of ſcience out-ſtrips all panegyric, has lately obtained from government the grant of a neighbouring piece of ground, which will be chiefly devoted to the plantation of thoſe trees, the actual number of which, at preſent, is but ſmall.

MINERALOGY.—Although this ſcience has not attained to an equal degree of improvement with botany, it is nevertheleſs very generally cultivated. Among the moſt celebrated characters in this department, is the Chevalier Napioni, who has lately publiſhed the firſt volume of a work on this ſcience, in Italian. This firſt volume treats of lithology; and the maſterly manner in which the author has handled his ſubject, cauſes the reader to wiſh, that the publication of the two remaining volumes may be accelerated as much as poſſible. He founds his ſyſtem upon the phyſiognomy and analyſis of minerals. The mineral collection belonging to the academy is far from being conſiderable; it poſſeſſes, however, ſome varieties. The cabinet of Allioni, in particular, is uncommonly rich in petrifactions.

MEDICINE.—This ſcience has lately ſuſtained a very ſevere loſs in the deaths of Cigna and Somis. The former of theſe gentlemen was one of the founders of the academy, and has obliged the world with ſome learned diſquiſitions on phyſiology. A number of memoirs inſerted in the tranſactions of the academy at Turin, ſufficiently atteſt the profound medicinal erudition of the ſecond.

Allioni, whoſe name is an ornament to the whole range of ſcience, is the author of ſeveral works on medicine in general, on the military fever, the pellagra, &c. &c. He propoſes ſhortly to publiſh a new confirmation of the doctrine of Bordeu and Fouquet, relative to the pulſe. Among the profeſſors of the univerſity, the names of Dana and Juli, profeſſors of anatomy, are in high eſtimation.

LITERATURE

LITERATURE and FINE ARTS.—The justly celebrated historian Charles Denina, published, in 1792, a new augmented edition of his Revoluzioni d'Italia, and his Delle Vicende della Literatura.

The fine arts, being the offspring of luxury and peace, have, of course, felt the effects of war, and will, no doubt, require a considerable length of time to recover their original lustre; as the government is not in the capacity of giving them sufficient encouragement.

Vincenzio-Antonio Revelli has recently published the *prospectus* of an Italian work, entitled, Opere Filosofiche Pittoriche. The importance and grandeur of the plan, entitle it to particular notice. After a pompous eulogium on the art of painting, considered in its relations to politics and morals, the author communicates the different processes he observed in painting, by natural and artificial lights, with his motives for engaging in the present work. The learned dissertations of Winckelman, Mengs, Sulzer, &c. on the subject of Ideal Beauty, appear to him, he observes, by no means to have exhausted the subject, which he treats in a point of view altogether novel and original. He examines upon what basis the ideal beautiful is founded, and on what laws it depends; and concludes, that the Beautiful, or Bellezza, consists in the particular form and organization best adapted to the animal functions. This assertion he corroborates by an exact analysis of twelve master-pieces of sculpture, which have been preserved from the works of antiquity. He next enters upon an examination of the works of Camper, explores his ideas of different temperaments, original tactics, characters, &c. &c. and, by a natural transition, treats of the passions, which he divides into simple and compound; of their general and particular effects; of all accidental impressions, &c. He points out the method of rendering them according to their true expression, in conformity to the lessons furnished by the twelve models which he has selected. Nothing escapes his discernment, and it is to be hoped, that the work will fully answer the expectation universally excited by the *prospectus*, which there is every reason to look for.

The academy, which owes its foundation to the zeal of La Grange, Cigna, and Saluces, consists of nearly all the literary characters in Piedmont. Its memoirs occupy an honourable station in academical collections.

Exclusive of five volumes of Miscellanea, there have appeared five additional volumes of Memoirs, in the French language. The Count de Morozzo continues to merit the honourable rank of president by his zeal and knowledge. His colleagues assist him with ardour; and, with the support of such brilliant talents, there is every reason to hope that this society will maintain the high reputation it so justly possessed before the revolution.

The Public Library contains about 24,000 volumes. It abounds eminently in works upon the subject of Natural History. The botanists contemplate, with pleasure, twenty-eight volumes of plants, coloured after nature, by a Piedmontese artist. Each volume contains one hundred and fifty plants, and it is supposed that the number of volumes, when complete, will amount to forty-five. A new volume appears every year.

SIGNS OF DANGER IN A THUNDER STORM, AND BEST METHOD OF SHELTER AND PROTECTION.

THE signs of approaching danger which may be selected as the most unequivocal and decisive are the following: 1st, *A rapid approach of the charged clouds.*—The longer any given portion of charged air is over the earth, the more is it affected by points and prominences; but, when a cloud seems to be no sooner formed than it is over our heads, we are then exposed to its undiminished fury. The same may be said of a cloud, which, while it is near us, grows darker and darker; for, in this case, we may be certain that the collection is not materially lessened by any exhaustion, and that the charge must soon accumulate to its striking height.

2dly, *The perpendicular direction of the flashes.*—This is a certain evidence that the charged clouds are at that height from which they can strike into the ground. Some electricians have considered the appearances of two flashes at the same moment as an evidence that the earth is acting as a discharging-rod. But though this may often happen, as often the two extremities of the flash, when passing behind a cloud which partly hides it, will shew the same appearance. The sign therefore is not sufficiently appropriate, and consequently cannot be considered as expressing more than a certain degree of probability.

3dly, An insulated conductor, whose language, to those who are acquainted with it, is seldom equivocal; a torrent of sparks flows through its interruption when danger is near. If that torrent, after continuing for some time, should suddenly stop, and again, after an entire absence of all signs, should rapidly return with an electricity opposite to what it shewed at first, it is certain, that during the cessation of sparks, the conductor passed the limits of the greatest danger. The torrent of fluid, whose strength and rapidity are peculiar to this case, is attended with a loud and singular succession of sounds. Mr. Brook very accurately compares it to the noise made by a church or turret clock immediately after it has ceased striking.

Let us next suppose that we are justified, by the preceding signs, in apprehending that our situation is within the striking distance, it is an object of importance, in such circumstances, to know how the threatened injury may be avoided.

If the lightning should enter your dwelling, you are certain it will pass from one partial conductor to another, and that this series of partial conductors is always the appendage of walls and partitions: you will therefore place yourselves in the middle of a room, because the air will then separate you from the ceiling and the sides of the room, and will form such an interruption in the circuit as must necessarily determine the preference of the stroke through the connected parts of the building.

In the open air, it is the safest method to keep at a distance from all high and pointed objects; for, if you stand near them during the storm, you may become part of their circuit, similarly to what happens when you are near a wall or a partition. Besides, if the object be stricken, you may be destroyed by the circumstances of its destruction. Many are the instances in which travellers, who have fled

fled under high trees for shelter, have been either killed by the lightning, or dashed to pieces by splinters of wood.

In the open air, you should avoid every approach to rivers and brooks, and more especially to those fresh streams of water which have been formed by the thunder-showers; for they are all excellent discharging-rods; and, when it is joined to them, the height of a human being furnishes a prominence very likely to determine the course and to lengthen the striking distance of the lightning.

In the open air, any covered carriage is a protection, provided you can sit in it at the distance of some inches from the sides. Indeed, vehicles of this kind might be made the safest of all possible situations, by surrounding them at the top and the bottom with thin metallic fillets, connected with each other by a strip of the same substance.

It is admitted by all electricians, that buildings and ships may, by certain means, be completely protected from the violence of lightning; but the reputation of every method, hitherto prescribed, has been shaken by accidents of injury within the supposed sphere of their activity. Many are the instances in which houses have been damaged when armed with a single pointed conductor; and we have seen much labour bestowed on the investigation of one frightful case, in which a building, secured by six pointed conductors, was set on fire by a single flash.

It appears to us, that the best means of protection can be known only in consequence of a thorough search into the various combinations of perilous circumstances which can occur. When these are clearly understood, we have every necessary direction for the situation of our rods; in other words, our conductors may be so placed, that the lightning cannot possibly enter into any circuit of which they are not a part.

MISCELLANEOUS COMMUNICATIONS.

WATER WORKS.

THE Russian government has, by a canal in its late Polish acquisitions, opened a navigation between the Black Sea and the Baltic. A vessel laden with salt, of 100 tons burden, has already passed by this canal from Cherson, in the Crimea, to Konigsberg, in Prussia. The rivers which flow into these distant seas are so near, that the canal itself is only eight miles; yet there are few inland navigations in the world which unite more remote countries with each other by the band of commercial intercourse.

The following is a description of a communication between the counties of Kent and Essex, projected by Mr. R. Dodd, engineer, to be effected by a tunnel under the River Thames from Gravesend to Tilbury.

The communication is proposed by the projector, to be by a cylindrical tunnel, to be constructed wholly with key-stones; therefore, the greater the pressure, the stronger will be the work.—The diameter to be 16 feet in the clear, which Mr. Dodd imagines will be sufficient for foot, horse, and carriage, passengers—the passage to be illuminated with lamps, and a steam engine to be erected in a proper situation to draw off the drainage water, if any should accumulate.

The expence of this ſtupendous undertaking is eſtimated at ſo low a ſum as 15,955l. for 900 yards of tunnelling, relaying the bottom, lamps, lamp irons, ſteam engines, pipes, and other neceſſary machinery.

This projected meaſure will ſave a circuitous route of 50 miles by land; (the diſtance from Graveſend to Tilbury, along London bridge.) Independent of the advantage it would afford to commercial eſtabliſhments and agricultural improvements, the general benefit to the counties of Kent and Eſſex muſt be immenſe.

Mr. Dodd is of opinion, that whether the meaſure is conſidered as a great national improvement, or a local one to the two counties, of forming a military poſt of the firſt conſequence in that part of the kingdom, for enabling troops, &c. to paſs through, its importance claims the greateſt attention. Another queſtion he ſuggeſts, is, what may be the moſt proper method of raiſing the ſupplies to defray the expence of the undertaking.—Whether by the joint expence of both counties, or by a ſubſcription of private individuals, incorporated by parliament, with authority to levy tolls? The latter mode, he is convinced, would be beneficial to the individuals, and amply repay the ſhare-holders.

The following are the eſtimates of the expence, as ſuggeſted by Mr. Dodd, in the firſt inſtance:

To 900 yards (running meaſure) of tunnelling, including excavations, vaulting with key ſtones, &c. at 12l. per yard,	£10,800
Relaying the bottom with new-made ground, 900 yards, at 1l. each,	900
Placing lamps and lamp-irons through the tunnel, collectors rooms, and gates at each end,	400
Making good the entrance roads at each end of the tunnel,	160
To a ſteam engine to draw off drainage water,	1,780
Neceſſary machinery during the execution,	500
Ten per cent. upon the whole for contingencies,	1,400
Total,	£15,955

An engineer, of the name of Detrouville, has communicated to the council of five hundred, at Paris, an hydraulic diſcovery, by which he could raiſe, without mechanics, water in a large body to the greateſt diſtance and height. He had laid his plan before the conſtituent aſſembly, who, upon the report of their committees of agriculture and commerce, placed the diſcovery under the national protection, as likely to have the greateſt influence upon trade, agriculture, and the arts. As the decree of that aſſembly had not been executed, he requeſted that it might be carried into execution, and that a committee might be named to examine the different applications of the art of raiſing water without mechanics, for the Luxembourg, the Thuilleries, and the fountains of Paris, and particularly for the completing of the canal from Havre to Paris, by the Park of Verſailles. This canal, 16 feet deep, would bring ſhips of 4 or 500 tons to anchor in the Elyſian Fields, by a ſhortening of the diſtance of more than 30 leagues. The expence would be 50 millions, which he propoſed ſhould be raiſed by public ſubſcription. The plan was referred to a ſpecial commiſſion.

HEALTH.

HEALTH.—It is obſervable, that, notwithſtanding the total diſregard to cleanlineſs on-board the Ruſſian ſhips of war, the ſeamen are ſeldom infected with that marine peſtilence the ſcurvy, and never in that inveterate degree which is common in the Engliſh navy after long voyages. The exemption of the Ruſſian ſeamen from the ſcurvy is attributed to the quality of their ordinary beverage, an account of the method of preparing which here follows.

The Ruſſians prepare at ſea as well as land, a liquor of a middle quality, between wort and ſmall beer, in the following manner: They take ground malt and rye-meal in a certain proportion, which they knead into ſmall loaves, and bake in the oven. Theſe they occaſionally infuſe in a proper quantity of water, which begins ſo ſoon to ferment, that in the ſpace of 24 hours, their beverage is completed, in the production of a ſmall, briſk, acidulous, liquor, which they call quas, palatable to themſelves, and not diſagreeable to the taſte of ſtrangers.

The late Dr. Mounſey, member of the royal ſociety, who had lived long in Ruſſia, and had been archiater under two ſucceſſive ſovereigns, informs us that quas was the common and wholeſome drink both of the fleets and armies of that empire, and that it is particularly good againſt the ſcurvy. He adds, that happening to be at Moſcow when he peruſed "Obſervations on the Gaol-fever," publiſhed in London, he was induced to compare what he read in that treatiſe with what he ſhould ſee in the ſeveral priſons of that large city; but to his ſurprize, after viſiting them all, and finding them full of malefactors, he could diſcover no fever among them, nor learn that any acute diſtemper peculiar to gaols had ever been known there. He obſerves that ſome of thoſe places of confinement had a yard, into which the priſoners were allowed to come for air; but there were others without this advantage, yet not ſickly; ſo that he could aſſign no other reaſon for the healthful condition of thoſe men than the kind of diet they uſed; which was the ſame with that of the common people of the country, who, not being able to purchaſe fleſh-meat, live moſtly on rye-bread (the moſt aceſcent of any bread) and drink quas. He concludes with ſaying, that upon his return to Peterſburgh he made the ſame enquiries there, and with the ſame reſult.

NATURAL HISTORY.—A correſpondent informs us, that a horſe mackarel was lately caught at Province-Town, Cape Cod, North America, which weighed from eight to nine cwt. he got entangled in the eel-graſs, where the tide left him, and was drawn out with a boat-hook. The perſon who caught this large fiſh reſides in Butler's-row, in Boſton, and was then at Province-Town on buſineſs. A large number of the inhabitants were fed from it for ſeveral days, ſending their children to cut off pieces as it lay on the beech. From the cawl and the remnant of the carcaſe twenty-eight gallons of oil were obtained.

Some fiſhermen at the Black Rock, near the Troon, brought on ſhore a ſhark of conſiderable magnitude, and pretty lively, but unable to make any reſiſtance, on the ſandy beach. About two hours after, a gentleman (who had ſeen it when taken) went again to view the animal, when obſerving its belly to be of an uncommon bigneſs, and in a ſtate of agitation, he took a knife and ripped it open,

open, and, to his aſtoniſhment, found therein nineteen young ſharks, about a foot in length, and all alive.

The following ſingular circumſtance happened lately at Eaſt Bourne:—As Serjeant Richards, of the Monmouth and Brecon militia, was buſily employed in drilling a number of men, a very large ſwarm of bees alighted upon his head and ſhoulders, from whence they were hived, without any other hurt to the ſerjeant than a ſingle ſting, which he received from the firſt bee that ſettled on his arm, and which with his other hand he attempted to kill or drive away.

There is now in the poſſeſſion of Mr. Mundy, of Wick Farm, near Abingdon, a cock turkey, which being tired of his life, during the confinement of the hens while ſitting, ſeemed deſirous to ſit himſelf, which he did very cloſely for a week upon a rotten gooſe egg: Mr. Mundy, thinking it a pity that ſo good a nurſe ſhould not be rewarded for his attention, put 13 hens eggs in a neſt, on which he ſat three weeks longer, and hatched 12 fine chickens, which enjoy, if poſſible, more attention than uſual.

SALTEE ISLAND, the retreat of the late Mr. Bagenal Harvey, who ſuffered death for the part he took in the preſent Iriſh rebellion, lies at about three miles diſtance off Waterford, and was the property of Mr. Grogan, who with his wife and child had accompanied Mr Harvey in his flight.

The iſland which is only inhabited by an old man and his wife, who were dependent on Mr. Grogan, is an extremely romantic ſpot, abounding with rocks and caves, but produces nothing of conſequence, and is ſeldom viſited except in the fiſhing and ſhooting ſeaſons; ſometimes indeed ſmugglers put in there to conceal their run goods, for which no ſituation can be better calculated, as without ſome information to lead to the depot, all ſearch would be in vain, which indeed proved to be the fact in reſpect to Mr. Harvey and his companions; for though they were ſuſpected of having ſecreted themſelves there, notwithſtanding the ſtory of the boatman, who pretended he had landed them at St. David's, in Wales, yet a party of the Iriſh yeomanry, who went in purſuit of them, returned without being able to diſcover their retreat, after exploring various caverns and holes, where perhaps the human form had never entered before.

Satisfied, however, that he muſt be there, they went a ſecond time, taking with them ſome of the regular troops; and, finding the old man perſiſt in denying any knowledge of Mr. Harvey's being there, they proceeded to coercive means, and, after giving him about 100 laſhes, he confeſſed the truth, and conducted them to the ſpot, a cavern in the moſt remote part of the iſland, the mouth of which was ſtopped up with ſtones, which, on being removed, preſented a dark ſubterraneous paſſage, on penetrating which they were led to a large ſpace or room, formed by nature in a rock, where they found Mr. Harvey, Mr. Grogan, and his wife and child, ſitting by a lighted lamp, and who had taken with them ſufficient proviſion for a month, and every neceſſary that could afford comfort in ſo ſecluded a retreat.

They ſubmitted without the leaſt oppoſition; but the ſcene that took place between Mr. Grogan and his wife was truly affecting. Among their baggage was found 2000 guineas, the property of Mr. Harvey. They were marched to a ſmall boat, which waited for the officers, and

and landed in Wexford. On landing at the Quay, Mr. Harvey appeared quite dejected and extremely pale, but Mr. Colclough's fortitude did not apparently forsake him, until he approached the jail, where he beheld his friend Keogh's head on a spike: on enquiring whose that head was, and hearing it was Keogh's, he seemed like a man electrified, and sunk into all the anguish of despair and guilt. He never recovered any show of spirits. They were both tried the next morning, and convicted. On the ensuing day they were hanged, pursuant to their sentence.—Mr. Harvey possessed an unincumbered estate of near 2000l. a year, besides personal property to the amount of 20,000l. He married, about a year since, a young woman of considerable personal merit, but no fortune, the daughter of an honest industrious tradesman, of Clonegall. She was lately delivered of a son, and remains in a situation of mind bordering on distraction.

The unfortunate younger brother of Mr. Grogan, who was executed, went from Arklow, under an escort of yeomanry to Wexford, to take possession of his brother's property, on hearing of his death. The second brother was killed fighting for the king the day the other was executed. The eldest was worth 7 or 8000l. per annum. Grogan and Harvey were executed together. Before Grogan was turned off, he turned round to Harvey, and said, "Harvey, speak the truth in your last moments. Was I not forced?" Harvey answered, "You were." Grogan was an avaricious man, and his avarice led to his death. Before the rebels entered Wexford, he quitted it; but recollecting that there were bonds and notes to the amount of 6000l. he returned for them, and was detained by the rebels. He then made a virtue of necessity—acted as commissary to the rebel army—and appeared in those situations from whence his guilt was clearly inferred.

Messrs. SHEARES. These two young men, whose dreadful fate was contrary to the expectations with which they were ushered into life, were the sons of an eminent banker of Cork, who left Henry, the elder, about 400l. per annum, which, by the addition of his mother's jointure, was soon encreased to 800l. a-year or upwards. At an early age he married a Miss Sweet, of Cork, who was reputed an immense fortune, not less than 40,000l. but, instead of this golden expectation being in any degree answered, it is said that his endeavours to relieve the affairs of this lady's deceased father from the embarrassments in which they were involved had so materially injured his own, as to oblige him to go to the South of France for purposes of œconomy, where he resided for more than three years; part of this period being previous, and part during, the early struggles of the French revolution. His brother John was his companion in this œconomical emigration, and they both entered into the spirit of the times with emulous ardour; and it is said were in Paris during the most convulsive efforts which ushered the republic into existence. When they returned to this country, they did not leave behind them the spirit they had imbibed, and its manifestation caused Henry a short period of arrest (if we mistake not) in the year 1792. In the formation and early growth of the original Society of United Irishmen, H. Sheares assumed a conspicuous part, and his name appears annexed to the chair, when some of their strongest resolutions were passed, and their most spirited sentiments were expressed. The two brothers were also distinguished equally for their zeal and imprudence at the

 time

time when the measures of J. N. Tandy and A. H. Rowan subjected the one to flight, and the other to imprisonment: the Messrs Sheares having travelled about the country in an open chaise, circulating a printed paper of a most dangerous and inflammatory nature. Indeed the complexion of their politics was so well and so generally known, that it is matter of public astonishment they were able to act with such caution as to ensure their exemption from arrest at the time when Mess. Bond, Jackson, and so many others, were taken up. H. Sheares had been a lieutenant in the 11th foot previous to his taking to the bar. John possessed by much the greater portion of talent, and even his enemies pay considerable deference to his literary abilities: his original fortune was 2000l. the professional practice of either was not very considerable. It was a singular, and to one of the parties must have been a distressing, fact, that Lord Carleton, who presided during the trial, and pronounced judgment on these unfortunate gentlemen, was one of the executors to their father's will, and had been his old and intimate friend.

About eleven o'clock on the morning of the day on which those unhappy gentlemen were to have been executed, they intimated to government that they would make a full and ample discovery of all that they knew respecting the present conspiracy and rebellion in this kingdom: not for the purpose of saving their lives altogether, but merely on the condition of being allowed some time for necessary recollection, and for the adjustment of Henry Sheares's affairs. This was communicated to Lord Castlereagh by the Rev. Mr. Gamble, ordinary of Newgate, who, from the moment of their being sentenced to that of their death, paid them every attention which humanity and the duties of his office required. Their proposal was, however, rejected by government, and they were told that it was thought expedient, for the welfare of the country and the suppression of rebellion, to accelerate, with all possible speed, the awful example of their deaths. From the moment this determination was announced to them, they made immediate and manly efforts to arouse themselves from that state of grief and dejection into which they had been immersed, and to meet their fate with fortitude and resignation—those who saw them executed can witness they succeeded. On the scaffold, Mr. J. Sheares, who was throughout the whole business by much the firmer of the two, said, that he earnestly hoped their deaths would be followed by the desired effect, and contribute to the restoration of the public tranquillity; but much he feared that the expectation would be fruitless, and that their deaths would be found an unpropitious and a barren sacrifice. Mr. Gamble observed, that such sentiments seemed to intimate, that the forms of justice were strained to the purposes of a local policy, adding, that the law was above being vindictive, and, if it punished some to deter others, the guilt of the party formed the ground of its judgments; that they could not be ignorant what a deluge of blood had been shed in this afflicted country, through the example which a few men of birth and talents had held forth to a flexile and deluded multitude; and he hoped and believed, since such was the assurance which they gave him, that this terrible waste of blood and national calamity formed no part of their intentions, but certainly these sad effects were the consequences. Their intentions were between God and their consciences, and he hoped the latter were clear on that point. Mr. J. Sheares

Sheares said, that the government acted with a blind and erring impetus, and little knew whom they ought to execute. Mr. G. censured this observation, and the manner of its being expressed, as favouring of vindictiveness; but he hoped that, as Mr. S. had in the morning communicated with his God, and availed himself of the religious advantages which the death of Christ held forth to penitent humanity, he was about to die in perfect charity with all mankind. Mr. John Sheares then replied, and they were the last words he spoke, "As I expect forgiveness, I forgive the world." Henry Sheares resigned himself silently, but in a manly manner, to his fate.

ACCURATE DESCRIPTION OF SICILY.

THIS island, which is the most considerable in the Mediterrenean, was anciently known by several names; as those of Trinacria, and Triquetra, from its triangular form; and Sicania and Sicilia from its ancient inhabitants the Sicanii. It terminates in three points or capes; that nearest Italy is called Capo di Faro; that which regards the Morea is called Capo Passaro; and the third, which points to Africa, is named Capo di Bono. Its greatest length is two hundred and ten miles, and its greatest breadth one hundred and thirty-three. Sicily is separated from the kingdom of Naples by the straight of Messina, which, in the narrowest part, is not above three miles in breadth. This straight was much dreaded by the ancients, on account of its rocks, currents, and whirlpool. The tides here flow very irregularly, and generally with great violence, from both the Tuscan and Sicilian seas. The rocky promontory, anciently called Scylla, is now called Capo de Faro in Sicily. The whirlpool, anciently called Charibdis, and now Calosara and La Rema, lies not far from Messina, near the bottom of the cape, and seems at present to be little dreaded.

Sicily is so hot a country, that, even in the beginning of January, the shade is found refreshing: no chilling winds are felt, except for a few days in March. The only appearance of winter is towards the summit of Mount Ætna, where the snow falls, and is preserved by the inhabitants. The air is, however, wholesome, being refreshed with sea breezes on every side. Though the island appears as one entire rock, the soil is extremely fertile. Anciently it was stiled the granary or store-house of Italy, and it is still entitled to that appellation, producing, in great abundance, corn, wine, oil, fruits, sugar, honey, wax, silk, and saffron.

The fertility of many of the plains, says Mr. Brydone, is truly astonishing, without inclosures, without manure, and almost without culture. It is with reason that this island was styled *Romani imperii horreum*, the granary of the Roman empire. Were it cultivated, it would still be the great granary of Europe. Pliny says, it yielded a hundred after one; and Diodorus, who was a native of the island, and wrote on the spot, assures us that it produced wheat and other grain spontaneously. The bowels of the earth yield gold, silver, iron, and other metals; together with minerals of various kinds, as alum, vitriol, salt-petre, and mineral salts.

The mountains in Sicily are, Ætna, the largest volcano in Europe; Erix, or Monte S. Giuliano, Madonia, Erei, Busamar, and Monti di Peloro.

Ætna, being the highest mountain in Sicily, is consequently first described by mariners at a distance; to whom it has the appearance of a prodigious chimney, or a very large rugged pillar. The inhabitants, by an odd kind of composition, call it Monte Gibello, the Mount of Mounts: the ascent to it from Catania is thirty thousand paces; but on the side near Rondazza, only twenty thousand. It is unconnected with any of the other mountains; its figure is circular, and terminates in a cone. The lower parts of it are very fertile in corn and sugar-canes; the middle is covered with woods, olive-trees, vines, and shrubs, affording harbour for different animals; and a circle of snow appears round the mouth of the volcano the greatest part of the year. Sometimes it throws out calcined stones, and red hot cinders from an aperture of the breadth of five hundred paces; and sometimes it pours forth such torrents of burning matter as to produce alarming consequences. The most remarkable eruptions were in 1169, 1329, 1408, 1444, 1447, 1536, 1537, 1554, 1669, 1693, 1753, 1755, and 1783.

Swinburne asserts, that Pindar is the oldest writer extant who speaks of Ætna as a volcano. The first recorded eruption was in the time of Pythagoras: Plato was invited, by the younger Dionysius, to examine the state of the mountain after the sixth eruption. It threw up flames and lava near an hundred times between that period and the battle of Pharsalia; and it was particularly furious while Sextus Pompeius was adding the horrors of war to its devastations. Charlemagne was at Catania during one of the eruptions; that which happened in the year 1669 was horrible in the extreme. The lava burst forth at a place called Ricini, and ran in a stream fifty feet deep, and four miles broad, destroying all before it.

Ætna has never been measured with geometrical accuracy; the following dimensions are given by different authors: Height above the surface of the sea, 50,036 feet; 180 miles circumference at the base. Faujas de S. Fon, in his Volcans du Vivarais. Height 12,000 feet. Brydone's Tour to Sicily. Others make its height 2000 toises, and its superficies three hundred square miles. It is divided into circles or zones: the largest and lowest of which is called Piemontese, and occupies a breadth of eighteen miles of rich cultivation; the second, (Nemorosa) ascends six miles above it: the lower part of the third (Netta or Scoperta,) is covered with snow in winter only; but perpetual snows lie on the upper half of this sterile region, which measures two leagues in breadth, and terminates in the summit of the mountain.

The eruptions of Mount Ætna are generally preceded by an earthquake, producing devastation infinitely more to be deplored. By an earthquake on the 9th, 10th, and 11th, of January 1693, sixteen towns and eighteen manors, with the inhabitants and cattle, were entirely swallowed up, several other towns and villages laid in ruins, and nineteen thousand of the inhabitants perished in the general wreck. Another, which happened on the 5th of February, 1783, exhibited a calamitous scene: by that earthquake, a great part of the lower district of the city and port of Messina was destroyed, and much damage done to the lofty uniform buildings, called Palazzata. But the effects of this shock were not so fatal at Messina, or Reggio, as on the plain; for of thirty thousand, the supposed population of the city, only seven hundred were destroyed. The greatest number of

of sufferers were the inhabitants of the towns and countries situated in the plain of Calabria Ultra. At Casal Nuovo, the Princess Gerace, with upwards of four thousand of the inhabitants, were swallowed up by the dreadful abyss; at Baguara three thousand and seventeen perished; Radicina and Palmi estimated their dead at about three thousand each; Terra Nova fourteen hundred; and Seminera a greater number. The sum total of the mortality occasioned by the earthquake, according to the returns in the secretary of state's office in Naples, is thirty-two thousand six hundred and twenty-seven: but Sir William Hamilton is of opinion that forty thousand, including strangers, may at least be allowed, without exaggeration.

Formerly, says Mr. Brydone, there were a variety of wild beasts in the woody regions of Ætna; but, notwithstanding this advantage they had over the dogs and hunters, the number of these is now greatly reduced. They have still, however, the wild boar, the roebuck, and a kind of wild goat; but the race of stags, which was much celebrated, as well as that of bears, is thought to be extinct. Several places of the mountain are still named from those animals. The horses and cattle of Mount Ætna were esteemed the best in Sicily. The cattle are still of a large size, and have horns of such a length, that they are preserved as curiosities in some museums.

The mountains in this island produce emeralds, jasper, agate, porphyry, lapis-lazuli, and a stone called catochite, of a greenish speckled colour, which becomes soft by the warmth of a person's hand, and is said to be an excellent antidote to the sting of scorpions, and some other poisonous insects. All the coasts afford good fisheries, especially for tunnies; the cattle in the island are very fine, and game of all kinds is found in great abundance. Considerable profits arise here from silk, the cultivation of which was first introduced, in 1130, by M. Roger; who, returning from an expedition into the Holy-Land, in which he had taken Athens, Corinth, and Thebes, brought back with him some persons well acquainted with the management of that article: hence the growth and manufacture of it have been encouraged in Naples, the Milanese, Spain, and the French provinces bordering on Italy. Abundance of coral is found upon the coast. Great quantities of the commodities of this island, and particularly of raw and manufactured silk, are exported from Messina, where a consul from almost every nation in Europe resides, to protect and regulate the trade of his country.

The rivers here have but a short course, and consequently few of them are navigable: they descend precipitately from the mountains. The principal of them are the Giaretta, anciently Symetus, the Salso, the Belicis, the Termini, the Ragusa, and the Nisi. Lake Biveri is the only piece of water entitled to that term: the Giaretta, says Mr. Brydone, was celebrated by the poets under the name of Symetus. The nymph Thalia, after her amour with Jupiter, is supposed to have been changed into this stream: and, to avoid the resentment of Juno, sunk under the ground near Mount Ætna, and continued her subterraneous course to the sea. This river takes its rise on the north side of Ætna, and, passing the west skirts of the mountain, falls into the sea near the ruins of the ancient Morgantio. It no longer sinks under the ground, as it did formerly.

Aborigines, Cyclops, Sicani, and Siculi, are names given to nations which occupied this country successively: then came the Phœni-

cians from Tyre and Sidon. Next came colonies from Greece, who seized upon the maritime parts of this fertile island, abounding in harbours: the luxuriant soil supplied them with rich articles of exportation; and by commerce, their numbers, wealth, and power, increased in rapid progression; while the old inhabitants, confined to the inner mountainous regions, remained in an uncivilised state. By degrees, their name, race, and character, became undistinguishably blended with that of their invaders. The Greeks were at length obliged to share this country with the Carthaginians: these were subdued or expelled by the Romans, who reduced it into the form of a province. It followed the fortune of Italy in its several revolutions, till the Sicilian Vespers in 1282, when the natives massacred the French, who had then the dominion of the island. The Spaniards afterwards got possession of it, and continued masters of it till 1707, when they were expelled by the Imperialists. At the peace of Utrecht, Sicily was ceded to Victor, Duke of Savoy; but the Emperor Charles VI. forced him to relinquish it, and take that of Sardinia as an equivalent. But, as the Spaniards had not had any concern in these bargains, they made a sudden attempt to recover this fine island; in which they failed, through the vigilance of the English admiral Byng. He destroyed their fleet in 1718, and compelled them, for a time, to lay aside their project. In 1734, the Spanish court resumed their design with success. The infant Don Carlos drove the Germans out, and was crowned king of the Two Sicilies at Palermo. When he passed into Spain, to take possession of that crown, he transferred the Sicilian diadem to his son Ferdinand III. of Sicily, and the Fourth of Naples.

This island, says Mr. Swinburne, is governed by a viceroy, in whose absence the Archbishop of Palermo is regent. The general assembly of parliament is composed of archbishops, bishops, abbots, and priors, to the number of sixty-six: these form the Bracchio or Ecclesiasto. Fifty-eight princes, twenty-seven dukes, thirty-seven marquises, twenty-seven counts, one viscount, and seventy-nine barons, form the militare, and the demaniale consists of forty-three representatives of free towns. Out of each bracchio four deputies are chosen to conduct public business: but the viceroy, the Prince of Butera, and the Prætor of Palermo, are always the three first. There are many titled persons, who have no seat in the assembly: of these there are sixty-two princes, fifty-five dukes, eighty-seven marquises, one count, and two hundred and eighty-two other feudatories.

The Roman Catholic is the established religion of the island, but the Jews are permitted to reside in it. The ecclesiastical government is composed of three bishops and seven archbishops. Here is a sovereign ecclesiastical tribunal, which judges of all matters and disputes in which the clergy are concerned. The number of churches, convents, and religious foundations, is very considerable; the buildings of which are handsome, and the revenues great. Here are a great number of curious antiquities.

We are informed by Mr. Swinburne, that the principal trade of the island is carried on at Palermo and Messina.

The environs of Girgenti abound with almonds, but other ports also furnish a considerable quantity. Lipari gives raisins and currants, but of a quality inferior to those of Calabria. Sicily alone produces pistachio

piſtachio nuts. Carob beans are alſo an article of trade. Two thouſand cheſts of oranges are ſhipped annually at Meſſina. A large quantity of barilla is exported from the ſouthern coaſt. The quantity ſent to England is near the half of the quantity ſent thither from Spain. Meſſina ſends off ſix thouſand cheſts of pickled lemons, and the reſt of the kingdom about as much more; two hundred and eighty barrels of lemon-juice, weighing ten ſalme each; and twenty-ſeven hundred-weight of bergamot juice.

There are many other objects of export trade, but theſe are the moſt conſiderable.

The Sicilians, ſays Mr. Brydone, are animated in converſation; and their action, for the moſt part, is ſo juſt and expreſſive of their ſentiments, that, without hearing what is ſaid, a perſon may comprehend the ſubject of their diſcourſe. We uſed to think the French and Neapolitans (ſays the ſame writer) great adepts in this art, but they are much outdone by the Sicilians, both in the variety and juſtice of their geſticulation. The origin of this cuſtom they carry ſo far back as the time of the earlieſt tyrants of Syracuſe, who, to prevent conſpiracies, had forbid their ſubjects, under the moſt ſevere penalties, to be ſeen in parties talking together. This obliged them to invent a method of communicating their ſentiments by dumb ſhow, which they pretend has been tranſmitted from generation to generation ever ſince.

The Sicilian ladies marry very young, and frequently live to ſee the fifth or ſixth generation. In general, they are ſprightly and agreeable; but a Piedmonteſe or an Engliſhman would declare them very ordinary. Nothing is ſo vague as our ideas of female beauty: they change in every climate; and the criterion is no where to be found. The ladies have remarkable fine hair, and they know how to dreſs and adorn it to the greateſt advantage.

The Sicilians have always had the character of being very amorous, and not without reaſon. The whole nation are poets, even the peaſants; and a man ſtands a poor chance for a miſtreſs, who is not capable of celebrating her praiſes. It is generally allowed, that the paſtoral poetry had its origin in this iſland; and Theocritus, after whom they ſtill copy, will ever be looked upon as the prince of paſtoral poets. And indeed in muſic too as well as poetry, the ſoft amorous pieces are generally ſtyled *Siciliani*: theſe they uſed to play all night under their miſtreſs's windows, to expreſs the delicacy of their paſſion; but ſeremading is not ſo much in faſhion as it was during the time of their more intimate connection with Spain, when it was ſaid by one of their authors, that no perſon could paſs for a man of gallantry who had not a cold, and was ſure never to ſucceed in making love unleſs he courted in a hoarſe voice.

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Continued from p. 185.

TO MAKE FIRE-PUMPS.

CASES for fire-pumps are made as thoſe for tourbillons; only they are paſted inſtead of being rolled dry. Having rolled and dried your caſes, fill them: firſt put in a little meal-powder, and then a ſtar; on which ram lightly a ladle or two of compoſition, then a little meal-powder, and on that a ſtar, then again compoſition; and ſo on till

till you have filled the case. Stars for fire-pumps; should not be round; but must be made either square, or flat and circular, with a hole through the middle: the quantity of powder for throwing the stars must increase as you come near the top of the case; for, if much powder be put at the bottom, it will burst the case. The stars must differ in size in this manner: Let the star which you put in first be about ¼ less than the bore of the case; but let the next star be a little larger, and the third star a little larger than the second, and so on: let them increase in diameter till within two of the top of the case, which two must fit in tight. As the loading of fire-pumps is somewhat difficult, it will be necessary to make two or three trials before you depend on their performance: when you fill a number of pumps, take care not to put in each an equal quantity of charge between the stars, so that, when they are fired, they may not throw up too many stars together. Cases for fire-pumps should be made very strong, and rolled on 4 or 8 oz. formers, 10 or 12 inches long each.

Vertical Scroll Wheel.—This wheel may be made of any diameter, but must be constructed in the following manner. Have a block made of a moderate size, in which fix four flat spokes, and on them fix a flat circular fell of wood; round the front of this fell place port-fires; then on the front of the spokes form a scroll, either with a hoop or strong iron wire; on this scroll tie cases of brilliant fire, in proportion to the wheel, head to tail. When you fire this wheel, light the first case near the fell; then, as the cases fire successively, you will see the circle of fire gradually diminish: but whether the illuminations on the fell begin with the scroll or not, is immaterial, that being left entirely to the maker. This wheel may be put in the front of a regulated piece, or fired by itself, occasionally.

Pin-Wheels.—First roll some paper pipes, about 14 inches long each; these pipes must not be made thick of paper, two or three rounds of elephant paper being sufficient. When your pipes are thoroughly dried, you must have a tin tube 12 inches long, to fit easy into the pipes; at one end of this tube fix a small conical cup, which cone is called a funnel; then bend one end of one of the pipes, and put the funnel in at the other as far as it will reach, and fill the cup with composition: then draw out the funnel by a little at time, shaking it up and down, and it will fill the pipe as it comes out. Having filled some pipes, have some small blocks made, about one inch diameter and half an inch thick: round one of these blocks wind and paste a pipe, and to the end of this pipe join another; this must be done by twisting the end of one pipe to a point, and putting it into the end of the other with a little paste: in this manner join four or five pipes, winding them one upon the other so as to form a spiral line. Having wound on your pipes, paste two slips of paper across them to hold them together: besides these slips of paper, the pipes must be pasted together.

There is another method of making these wheels, viz. by winding on the pipes without paste, and sticking them together with sealing-wax at every half turn; so that, when they are fired, the end will fall loose every time the fire passes the wax, by which means the circle of fire will be considerably increased. The formers for these pipes are made from 1½ to 4-16ths of an inch diameter; and the composition for them is as follows: Meal-powder 8 oz. saltpetre 2 oz. and sulphur 1: among these ingredients may be mixed a little steel-

filings

filings or the duſt of caſt iron: this compoſition ſhould be very dry, and not made too fine, or it will ſtick in the funnel. Theſe wheels may be fired on a large pin, and held in the hand with ſafety.

Fire-globes.—There are two ſorts of fire-globes; one with projected caſes; the other with the caſes concealed, thus: Have a globe made of wood, of any diameter you chooſe, and divide the ſurface of it into 14 equal parts, and at each diviſion bore a hole perpendicular to the centre: theſe holes muſt be in proportion to the caſes intended to be uſed; in every hole except one, put a caſe filled with brilliant or any other charge, and let the mouths of the caſes be even with the ſurface of the globe; then cut in the globe a groove, from the mouth of one caſe to the other, for leaders which muſt be carried from caſe to caſe, ſo that they may all be fired together; this done, cover the globe with a ſingle paper, and paint it. Theſe globes may be uſed to ornament a building.

Fire-globes with projected caſes are made thus: Your globe being made with 14 holes bored in it as uſual, fix in every hole except one, a caſe, and let each caſe project from the globe two-thirds of its length; then clothe all the caſes with leaders, ſo that they may all take fire at the ſame time. Fire-globes are ſupported by a pintle, made to fit the hole in which there is no caſe.

To thread and join Leaders, and place them on different Works.

Joining and placing leaders is a very eſſential part of fire-works, as it is on the leaders that the performance of all complex works depends; for which reaſon the method of conducting pipes of communication ſhall be here explained in as plain a manner as poſſible. Your works being ready to be clothed, proceed thus: Cut your pipes of a ſufficient length to reach from one caſe to the other; then put in the quick-match, which muſt always be made to go in very eaſy; when the match is in, cut it off within about an inch of the end of the pipe, and let it project as much at the other end; then faſten the pipe to the mouth of each caſe with a pin, and put the looſe ends of the match into the mouths of the caſes, with a little meal-powder: this done to all the caſes, paſte over the mouth of each two or three bits of paper. The preceding method is uſed for large caſes, and the following for ſmall, and for illuminations: Firſt thread a long pipe; then lay it on the tops of the caſes, and cut a bit of the under ſide, over the mouth of each caſe, ſo that the match may appear: then pin the pipe to every other caſe; but before you put on the pipes, put a little meal-powder in the mouth of each caſe. If the caſes thus clothed are port-fires on illuminated works, cover the mouth of each caſe with a ſingle paper; but if they are choaked caſes, ſituated ſo that a number of ſparks from other works may fall on them before they are fired, ſecure them with three or four papers, which muſt be paſted on very ſmooth, that there may be no creaſes for the ſparks to lodge in, which often ſet fire to the works before their time. Avoid as much as poſſible placing the leaders too near, or one acroſs the other ſo as to touch, as it may happen that the flaſh of one will fire the other; therefore if your works ſhould be ſo formed that the leaders muſt croſs or touch, be ſure to make them very ſtrong, and ſecure at the joints, and at every opening.

When a great length of pipe is required, it muſt be made by joining ſeveral pipes in this manner: Having put on one length of

 match

match as many pipes as it will hold, paste paper over every joint; but, if a still greater length is required, more pipes must be joined, by cutting about an inch off one side of each pipe near the end, and laying the quick-match together, and tying them fast with small twine; after which, cover the joining with pasted paper.

Placing Fire-works to be exhibited.

Nothing adds more to the appearance of fire-works than the placing them properly; though the manner of placing them chiefly depends on the judgment of the maker. The following are the rules generally observed, whether the works are to be fired on a building or on stands: If they are a double set, place one wheel of a sort on each side of the building; and next to each of them, towards the centre, place a fixed piece, then wheels, and so on; leaving a sufficient distance between them for the fire to play from one without burning the other. Having fixed some of your works thus in front, place the rest behind them, in the centre of their intervals. The largest piece, which is generally a regulated or transparent piece, must be placed in the centre of the building, and behind it a sun, which must always stand above all the other works. A little before the building, or stands, place your large gerbes; and at the back of the works fix your marron batteries, *pots des aigrettes*, *pots des brins*, *pots de saucissons*, air-ballons, and flights of rockets. The rocket stands may be fixed behind, or anywhere else, so as not to be in the way of the works. Single collections are fired on stands; which stands are made in the same manner as theodolite stands, only the top part must be long or short occasionally; these stands may be fixed up very soon without much trouble.

Order of Firing.

1. Two signal
2. Six sky
3. Two honorary
4. Four caduceus

} rockets

5.
6.
7.

} Two { vertical, spiral } wheels illuminated; transparent stars

8. A line rocket of five changes
9. Four tourbillons

10.
11.
12.
13.
14.

} Two { horizontal wheels; air balloons illuminated; Chinese fountains; regulating pieces of four mutations each; pots des aigrettes

15. Three large gerbes
16. A flight of rockets

17.
18.

} Two { balloon wheels; cascades of brilliant fire

19. Twelve sky-rockets

20.
21.

} Two { illuminated yew trees; air-balloons of serpents, and a compound

22. Four tourbillons.

23.
24.

} Two { Fruiloni wheels; illuminated globes with horizontal wheels

25. One

25. One pot des saucissons
26. Two plural wheels
27. Marron battery
28. Two chandeliers illuminated
29. Range of pots des brins
30. Twelve sky-rockets
31. Two yew-trees of fire
32. Nest of serpents
33. Two double cones illuminated
34. Regulating piece of seven mutations, viz.
    1. Vertical wheel illuminated
    2. Golden glory
    3. Octagon vertical wheel
    4. Porcupine's quills
    5. Cross fires
    6. Star-piece with brilliant rays
    7. Six vertical wheels
35. Brilliant sun
36. Large flight of rockets

When water-works are to be exhibited, divide them into several sets, and fire one set after every fifth or sixth change of land and air works. Observe this rule in firing a double set of works: Always begin with sky rockets, then two moveable pieces, then two fixed pieces, and so on; ending with a large flights of rockets, or a marron battery: if a single collection, fire a fixed piece after every wheel or two, and now and then some air and water-works.

Fountain of Sky rockets.—Procure a perpendicular post, 16 feet high from the ground, and 4 inches square. Let the rail, or cross piece, be 1 foot 6 inches long, 3 inches broad, and 1 thick. The rail at bottom must be 6 feet long, 1 foot broad, and 1 inch thick. The two sides, which serve to supply the rails, are 1 foot broad at bottom, and cut in the front with a regular slope, to 3 inches at top; but their back edges must be parallel with the front of the pots. The breadth of the rail, will be determined by the breadth of the sides: all the rails must be fixed at 2 feet distance from each other, and at right angles with the pots. Having placed the rails, bore in the bottom rail 10 holes at equal distances, large enough to receive the stick of a one-pound rocket: in the back edge of this rail cut a groove from one end to the other, fit to contain a quick-match; then cut a groove in the top of the rail, from the edge of each hole, into the groove in the back: in the same manner cut in the second rail 8 holes and grooves; in the third rail, 6 holes and grooves; in the fourth rail, 4 holes and grooves; and in the top rail, 2 holes and grooves. Place a rail with holes in it to guide the ends of the rocket-sticks: this rail must be fixed 6 feet from the rail at bottom. The fountain frame being thus made, prepare your rockets thus: Tie round the mouth of each a piece of thin paper, large enough to go twice round, and to project about 1½ inch from the mouth of the rocket, which must be rubbed with wet meal-powder; in the mouth of each rocket put a leader, which secure well with the paper that projects from the mouth of the case: these leaders must be carried into the grooves in the back of the rails, in which lay a quick-match from one end to the other, and cover it with pasted paper: holes must be made in the rail at bottom, to receive the ends of the sticks of the rockets, and so on to the fourth rail; so that the sticks of the rockets at top will go through all the rails. The rockets being so prepared, fix a gerbe, or white flower-pot, on each rail, before the post, with their mouths inclining a little forwards: these gerbes must be lighted all at once. Behind or before each gerbe, fix a case of brilliant or slow fire: these cases must be filled so that they may burn one four after the other, to regulate the fountain; which may be done by carrying a leader from the end of each slow or brilliant

fire, into the groove in the back of each rail. Different fixed rockets may be used in these fountains; but it will be best to fill the heads of the rockets on each rail with different sorts of things, in this manner; those at top with crackers, the next with rains, the third with serpents, the fourth with tailed stars, and the last flight with common or brilliant stars.

Palm Tree.—This piece, though made of common fires and of a simple construction, has a very pleasing effect; owing to the fires intersecting so often, that they resemble the branches of trees. Procure a perpendicular post, of any thickness, so that it is sufficiently strong to hold the cases; let the distance of the arms be 2 feet 6 inches, and let the length of each cross piece be 2 feet; on each end of each fix a five-pointed star: then fix, on pegs made on purpose, 12-inch half-pound cases of brilliant fire. All the cases and stars must be fired at once. This piece should be fixed high from the ground.

Illuminated Pyramid, with Archimedian Screws, a Globe, and vertical Sun,

May be of any height; the space between the rails must be 6 inches, and the rails as thin as possible: in all the rails stick port-fires at 4 inches distance. The Archimedian screws, are nothing more than double spiral wheels, with the cases placed on their wheels horizontally instead of obliquely. The vertical sun, need not consist of more than 12 rays, to form a single glory. The globe at top must be made in proportion to the pyramid; which being prepared according to the preceding directions, place your leaders so that all the illuminating port-fires, screws, globe, and sun, may take fire together. The pyramid must be supported by the two sides, and by a support brought from a pole, which must be placed two feet from the back of the pyramid, that the wheels may run free.

Rose-piece, and Sun.—A rose-piece may be used for a mutation of a regulated piece, or fired by itself: it makes the best appearance when made large; if its exterior diameter be 6 feet, it will be a good size. Let the exterior fell be made of wood, and supported by 4 wooden spokes: all the other parts, on which the illuminations are fixed, must be made of strong iron wire: on the exterior fell place as many half-pound cases of brilliant charge as you think proper, but the more the better; for the nearer the cases are placed, the stronger will be the rays of the sun: the illuminations should be placed within 3 inches of each other: they must be all fired together, and burn some time before the sun is lighted; which may be done by carrying a leader from the middle of one of the illuminations, to the mouth of one of the sun cases.

Transparent Stars with illuminated Rays.—First make a strong circular back or body of the star, 2 feet diameter, to which you fix the illuminated rays: in the centre of the front of the body fix a spindle, on which put a double triangular wheel, 6 inches diameter, clothed with 2-ounce cases of brilliant charge: the cases on this wheel must burn but one at a time. Round the edge of the body nail a hoop made of thin wood or tin: this hoop must project in front 6 or 7 inches: in this hoop cut three or four holes to let out the smoke from the wheel. The star and garter may be cut out of strong pasteboard or tin, made in this manner: Cut a round piece of pasteboard or tin, 2 feet diameter, on which draw a star, and cut it out; then over the vacancy paste Persian silk; paint the letters yellow; 4 of the

the rays yellow, and 4 red; the croſs in the middle may be painted half red and half yellow, or yellow and blue. This tranſparent ſtar muſt be faſtened to the wooden hoop by a ſcrew, to take off and on; the illuminated rays are made of thin wood, with tin ſockets fixed on their ſides within 4 inches of each other; in theſe ſockets ſtick illuminating port-fires; behind the point of each ray fix a half-pound caſe of grey, black, or Chineſe, fire. The illuminated rays are to be lighted at the ſame time as the triangular wheel, or after it is burnt out; which may be done by a tin-barrel being fixed to the wheel, after the manner of thoſe in the regulated pieces. Into this barrel carry a leader from the illuminated rays, through the back of the ſtar; which leader muſt be met by another, brought from the tail of the laſt caſe on the wheel.

Tranſparent Table Star illuminated.—The centre frame muſt be 4 feet ſquare; and in this ſquare fix a tranſparent ſtar. This ſtar may be painted blue, and its rays made as thoſe of the flaming ſtars deſcribed before. The wheel for this ſtar may be compoſed of different coloured fires, with a charge or two of ſlow fire; the wheels may be clothed with any number of caſes, ſo that the ſtar-wheel conſiſt of the ſame: the illuminating port-fires, which muſt be placed very near each other on the frames, muſt be ſo managed as to burn as long as the wheels, and lighted at the ſame time.

The regulated Spiral Piece, with a projected Star-wheel illuminated.—This piece may be thus made. Procure a block of 8 inches diameter; in this block ſcrew 6 iron ſpokes, which muſt ſerve for ſpindles for the ſpiral wheels: theſe wheels are made as uſual, each 1½ foot diameter, and 3 feet in height: the ſpindles muſt be long enough to keep the wheels 4 or 5 inches from one another; at the end of each ſpindle muſt be a ſcrew-nut, on which the wheels that hang downwards will run; and on the ſpindles which ſtand upwards muſt be a ſhoulder, for the blocks of the wheels to run on.

The projected ſtar-wheel muſt turn on the ſame ſpindle on which the large block is fixed; this ſpindle muſt be long enough to allow the ſtar-wheel to project a little before the ſpiral wheels: the exterior diameter of the ſtar-wheel muſt be 3 feet 5. On this wheel fix 3 circles of iron wire, and on them port-fires; on the block place a tranſparent ſtar, or a large 5-pointed brilliant ſtar. The caſes on this wheel may burn 4 at once, as it will contain near twice the number of one of the ſpiral wheels: the caſes on the ſpiral wheels muſt be placed parallel to their fells, and burn two at a time.

A Figure-piece illuminated with five-pointed Stars.—The conſtruction of this piece is very eaſy. The vertical wheel in the centre muſt be 1 foot diameter, and conſiſt of 6 four-ounce caſes of different coloured charge, which caſes muſt burn double: on the frames fix 5 pointed brilliant or blue ſtars, rammed 4 inches with compoſition: let the ſpace between each ſtar be 8 inches; at each point fix a gerbe, or caſe of Chineſe fire. When to be fired, let the gerbe, ſtars, and wheel, be lighted at the ſame time.

The Star-wheel illuminated.—This beautiful piece hath its exterior fell made of wood, 3 feet 6, or 4 feet, diameter; within this fell, form with iron wire 3 circles, one leſs than the other, ſo that the diameter of the leaſt may be about 10 inches: place the port-fires on theſe fells with their mouths inclining outwards, and the port-fires on the points of the ſtar with their mouths projecting in front: let the

the exterior fell be clothed with 4-ounce cases of grey charge: these cases must burn 4 at a time, and be lighted at the same time as the illuminations.

Pyramid of Flower-pots.—This curious piece must be made thus. Let the height be 6 feet; and from one rail to the other, 2: on the bottom rail fix 5 paper mortars, each 3½ inches diameter; these mortars load with serpents, crackers, stars, &c. In the centre of each mortar fix a case of spur-fire: on the second rail fix 4 mortars, so as to stand exactly in the middle of the intervals of them on the bottom rail; on the third rail place 3 mortars; on the fourth, 2; and on the top of the post, 1: the bottom rail must be 6 feet long: all the mortars must incline a little forwards, that they may easily discharge; and the spur-fires rammed exactly alike, that the mortars may all be fired at the same time. Having prepared your pyramid according to the preceding directions, carry pipes of communication from one spur-fire to the other.

The illuminating Regulating Piece.—Erect flat wooden spokes, each 5 feet long: at the end of each place a vertical wheel, 10 inches diameter, clothed with 6 four-ounce cases of brilliant fire: these cases must burn but 1 at a time: on two of the spokes of each wheel place 2 port-fires, which must be lighted with the first case of the wheel; on each spoke behind the wheels, place 6 cases of the same size with those on the wheels: these cases must be tied across the spokes with their mouths all one way, and be made to take fire successively one after the other, so that they may assist the whole pieces to turn round.

The diameter of the large wheel must be 2½ feet; and its fell made of wood, which must be fixed to the large spokes: on this wheel place 24 cases of the same sort with those on the small wheels; these cases must burn 4 at a time: in this wheel make 3 circles with iron wire, and on them place illuminating port-fires; the star-points on the large spokes may be made of thin ash-hoops; the diameter of these points close to the centre-wheel must be 11 inches: on these points place port-fires, at 3½ inches distance one from the other.

(To be concluded in our next.)

MEDITATIONS ON A NEWSPAPER.

EVERY man, when he wakes in the morning, finds that the reflections suggested by the preceding day have been, if not wholly obliterated, at least suspended by sleep; that new topics of conversation are wanting, and that surprise is a tip-toe for new calls; that he is unwilling to recur to the business of the preceding day, because it has been exhausted, or ashamed to recollect it because it has disappointed him. A family thus met together would drink the tea of Lethe, and eat the toast of taciturnity, were they not happily relieved from torpor of thought and immoveability of tongue, by the entrance of a newspaper. It is possible, indeed, that the weather might furnish a brief subject of debate; but the wind must blow a hurricane, and the rain descend in torrents, to be worth more than a moment's conversation. When the newspaper appears, however, all Europe is united to refresh the languid memory, to quicken the dull thought, and give expedition to the communicative tongue. Even the breakfast-table is indebted to the presence of this lively guest.

guest. The tea acquires a more odoriferous flavour; the toast is handed about with a quicker velocity; and the sugar and butter, though less white and sweet than could be wished, escape without censure in the multiplicity of reflections which the newspaper suggests.

No publication surely was ever contrived so fertile in sources of reflection to those who choose to think, or of conversation to those who prefer the humbler, though more noisy, business of talking. First, a long list of expensive amusements presents itself, fraught with every tempting inducement. Here it is important to observe how a play is cast, what great performers are concerned, and what farce or entertainment is to follow; if a concert, what pieces are to be performed, and by whom; if an opera, whether the divine Signor ——, or the more divine Signora ——, bears a part. From amusements there is a transition to works of charity, to subscriptions of names and sums of money for benevolent purposes; whether the arrangement here be judicious, or whether these ought not to precede amusements, I shall not stop to enquire. Perhaps the editor trusts to the good sense of his readers, that what he mixes heterogeneously, they will separate and arrange judiciously. Otherwise, there would appear to be a designed confusion in the advertisement-part of a paper, which would not be easily reconciled to common sense, and would serve rather to perplex our reflections than to call them forth to any useful purpose. With advertisements a paper usually begins and ends, and it is proper therefore that we consider them first. They deserve this preference, too, on another account. Attentively observed, they will be found a very correct picture of the times, and a very faithful record of the transfer of property, whether by sale or fraud.

I have hinted that their arrangement is apparently confused. We see books and pills, estates and lap-dogs, perfumery and charity sermons, crowded together by one of those accidents by which we may suppose chaos would be produced. Here a disconsolate widow advertises that she carries on business as usual for the benefit of her orphan family; and there a lady of quality offers five guineas for the recovery of a lap-dog which 'answers to Chloe.' A person wants to borrow five thousand pounds upon undeniable security; and a stable-keeper offers to sell a horse for a hundred guineas upon his bare word. Servants want places, in which "wages are no object," and a place under government may be heard of, where wages are the only object. Humphrey Jenkins lost his pocket-book in coming out of the playhouse; and Sarah Thomson has eloped from her husband, who will pay no debts of her contracting, "as witness his mark." In one place, we have notice of a main of cocks; and just by it, the candidates for a vacant chaplainship are desired to apply.

But of all persons "that on earth do dwell," the sick find the greatest relief in a newspaper. Why it is that diseases should prevail in spite of all the infallible medicines that are, in a manner, thrust down the throats of the sick, is to me astonishing. It would appear that the only disorder patients are troubled with, is an incurable obstinacy, which prevents them from taking medicines that have "cured thousands, who have been dismissed from the hospitals in a most deplorable state." Do we not find that, in some cases, one single box of pills will effect a cure, and in others, that the patient may be relieved by the smell only? Will not these medicines "keep good in all climates?" and is it not notorious that they perform their cures,

cures, "without loſs of time, or hindrance of buſineſs?" Why then do we hear of the ſick and the dying? Why are not our hoſpitals turned into almſhouſes for decayed phyſicians and apothecaries, who have no buſineſs?

Nor is our information reſpecting the preſervation of health leſs important than that for the cure of diſeaſe. If we turn our eyes to the ſales of houſes and eſtates, we ſhall find that they are all ſituated in counties remarkably healthy, with plenty of fine ſoft water, charmingly ſheltered, richly wooded, hill and dale, meadow and grove, where the eaſt wind is not permitted to chill, nor the thunder to roll. Theſe, it is true, are chiefly calculated for perſons who can afford to pay rather extravagantly for the preſervation of health; but this can be no object with thoſe who know that health is the greateſt of all bleſſings, and that in this way it may be handed down to the lateſt poſterity. The clergy, I muſt obſerve, are particularly intereſted in theſe advertiſements. The rectories are all ſituated "in remarkably healthy ſpots," and "the preſent incumbent is nearly eighty years old."—What greater encouragement to a man who wiſhes to do good extenſively, and to do it long, eſpecially where "it lies in the vicinity of a pack of hounds"—a circumſtance of which we are frequently reminded, although the connexion between the buſineſs of the pulpit and the ſports of the field is not quite ſo obvious as might be expected from the eloquence of our faſhionable auctioneers—a race of men to whoſe inventive genius we owe the converſion of horſe-ponds into beautiful ſheets of water, ditches into canals, and gibbets into hanging woods; but the ableſt men cannot do every thing. There are bounds, even in theſe times, to human genius.

Now, when all theſe ſubjects are introduced at the breakfaſt-table, what a copious ſource of converſation for the reſt of the day, eſpecially if any of thoſe ſhould create a deſire to be a bidder, or purchaſer. What hopes, what fears, what enquiries, what conſultations! But this is not neceſſary to the pleaſure a newſpaper affords. A man may give a very able account of an eſtate without the leaſt deſire of purchaſing it, and a whole family may diſpute on the merit of an entertainment, which not one of the party means to partake of. It is poſſible to compaſſionate the diſtreſſes of an orphan family, without contributing ſixpence to their relief; and even to read of the cures performed by a "famous ſyrup," without deſiring to taſte a drop of it. Converſation and action are two different things; and, if a newſpaper furniſhes the former, it is doing much.

Before quitting the advertiſements, it may be neceſſary to mention two deſcriptions of perſons, who never appear to meet, and yet who never ought to be ſeparate, namely, thoſe who "are deſirous to lend money," and thoſe who are equally "deſirous to borrow it." Why people that might be ſo mutually ſerviceable, ſhould ſtand in oppoſite columns in a newſpaper, is very extraordinary.—There muſt be ſome ſecret in this, which we, who neither want to borrow nor lend, are unacquainted with. That the party wiſhing to borrow ſhould conceal his name, is eaſily accounted for; prudential reaſons require that a man's temporary embarraſſments ſhould be concealed as much as poſſible; but that he who "would be happy to lend," or, as it is ſometimes called, "to accommodate," ſhould court obſcurity, is not ſo eaſily explained. If it be from a motive of modeſty, it is highly

highly praiſe-worthy, as modeſty always is, but it prevents us from handing down the names of theſe benevolent perſons to future ages, as they deſerve. Poſterity can only know that all the letters of the alphabet, from A. B. to X. Y. have been eminent for their benevolence in accommodating diſtreſſed perſons with 'ſums of money lying at their bankers from 500l. to 20,000l.' And thus I cloſe my meditations on the advertiſements. I might mention more, indeed; but, as the poet ſays,

> The reſt appears a wilderneſs of ſtrange
> But gay confuſion; roſes for the cheeks,
> And lilies for the brows of faded age,
> Teeth for the toothleſs, ringlets for the bald,
> Heaven, earth, and ocean, plunder'd of their ſweets,
> Nectareous eſſences, Olympian dews,
> Sermons, and city feaſts, and fav'rite airs,
> Ætherial journies, ſubmarine exploits,
> And Katterfelto, with his hair on end
> At his own wonders, wond'ring for his bread. COWPER.

But yet all theſe would probably fail of their effect, were they the only contents of a newſpaper. There are thouſands who are indifferent to a change of ſituation, who are confined to buſineſs and cannot leave it, who are gormandizing a breakfaſt and lothe medicine, who are blooming, and want no waſhes, who are cheerful, and want no amuſements, or who are charitable, and want no puffs and quackery to prompt their benevolence; yet who want all that the reſt of a newſpaper ſupplies, that dear and exquiſite food, news, the daily bread of curioſity, and the panacea of all the evils ariſing from dullneſs and ſilence, the ſovereign ſpecific that applies to every man's caſe.

This part of a paper, though I have conſidered it laſt, is generally conſulted firſt, and what can equal the gladſome inquiſitiveneſs that appears in the eye, when it firſt rolls gently over the columns of a freſh newſpaper! Such is the variety of this department, and ſuch the attachment of every man to his favourite purſuit, that a tolerable gueſs may be formed of what a man is, by attending to what he firſt reads in a paper. The ſturdy politician, indeed, is a general reader. He can find out a political alluſion in every paragraph. If a lady of quality makes a falſe ſtep, he can deſcant on the privileged orders; and, if the price of bread has riſen, he can cenſure parliament for the inſufficiency of the corn-laws. But others confine themſelves to their favourite articles; the court-news delight the man of faſhion, becauſe he knows the parties; the ladies are anxious for marriages and births, becauſe they may know the parties; the young and gay are for the faſhionable tattle of marriages, divorces, duels, new dreſſes, elopements, and other articles of the amuſing kind; while the grave citizen caſts a ſolemn glance at the price of ſtocks, wiſhes he had bought in, or hopes he ſoon may be able to ſell out. And there are a pretty numerous claſs to whom robberies, burglaries, murders, and picking of pockets, afford a conſiderable gratification—in the detail.

A newſpaper being thus peruſed, by every man according to his taſte, the day is begun with a proper fund for converſation. The wheels are again ſet a-going, and the dulleſt has ſomething to ſay, or

ſome remark to make on what he has read. If newſpapers, then, are undervalued, it is either becauſe they are common and cheap, and we know that things which are common and cheap are always undervalued. (But this, perhaps, may not always be the caſe.) In point of cheapneſs, the objection has been gradually removing for ſome time.)—Or perhaps the reaſon is, that they are expected as conſtantly as the returns of day and night, and therefore we ſet the leſs value upon them. To appreciate their true value, therefore, we have only to ſuppoſe that they were totally to be diſcontinued for a month, or even a week.—I turn with horror from the frightful idea! I deprecate ſuch a ſhock to the circulation of table-talk. It would operate more unfavourably than the gloom of November is ſaid by foreigners to operate on the nerves of Engliſhmen; and, after ſuch a ſuſpence of news, I am afraid the papers would contain nothing but accounts of the ſudden deaths which had happened in the interval, with the deliberate opinions of the coroner's jury, Died for want of intelligence!

CURIOUS CIRCUMSTANCES RESPECTING THE TWO ELEPHANTS BROUGHT TO PARIS FROM THE HAGUE.

THE place for their reception had been long prepared. It is a ſpacious hall in the Muſeum of Natural Hiſtory, well aired and lighted. A ſtove is placed in it to warm it during the winter, and it is divided into two apartments, which have a communication with each other by means of a large door reſembling a portcullis. The enclosure round theſe apartments conſiſts of rails made of ſtrong thick beams, and a ſecond enclosure, breaſt-high, runs round them, to keep the ſpectators at ſome diſtance, and preſerve them from accidents.

The morning after their arrival theſe two animals were put in poſſeſſion of their new habitation. The firſt conducted to it was the male, who iſſued from his cage with precaution, and ſeemed to enter his apartment with a degree of ſuſpicion. His firſt care was to reconnoitre the place. He examined each bar with his trunk, and tried their ſolidity by ſhaking them. Care had been taken to place on the outſide the large ſcrews by which they are held together. Theſe he ſought out, and, having found them, tried to turn them, but was not able. When he arrived at the portcullis, which ſeparates the two apartments, he obſerved that it was fixed only by an iron bar, which roſe in a perpendicular direction. He raiſed it with his trunk, puſhed up the door, and entered into the ſecond apartment, where he received his breakfaſt. He ate it quietly, and appeared to be perfectly eaſy.

During this time people were endeavouring to make the female enter. We ſtill recollect the mutual attachment of theſe two animals, and with what difficulty they were parted, and induced to travel ſeparately. From the time of their departure they had not ſeen each other; not even at Cambray, where they paſſed the winter. They had only been ſenſible that they were near neighbours. The male never lay down, but always ſtood upright or leaned againſt the bars of his cage, and kept watch for his female, who lay down and ſlept every night. On the leaſt noiſe, or the ſmalleſt alarm, he ſent forth a cry to give notice to his companion.

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The joy which they experienced on seeing each other after so long a separation may be readily imagined.

When the female entered, she sent forth a cry expressive only of the pleasure which she felt on finding herself at liberty. She did not at first observe the male, who was busy feeding in the second apartment. The latter also did not immediately discover that his companion was so near him; but the keeper having called him; he turned round, and immediately the two animals rushed towards each other, and sent forth cries of joy so animated and loud, that they shook the whole hall. They breathed also through their trunks with such violence, that the blast resembled an impetuous gust of wind. The joy of the female was the most lively: she expressed it by quickly flapping her ears, which she made to move with astonishing velocity. She drew her trunk over the body of the male with the utmost tenderness. She, in particular, applied it to his ear, where she kept it a long time, and, after having drawn it over the whole body of the male, she would often move it affectionately towards her own mouth. The male did the same thing over the body of the female, but his joy was more concentrated. He seemed to express it by his tears, which fell from his eyes in abundance.

Since that moment they have never been separated, and they occupy together the same apartment. The society of these two animals, their habits, their mutual tenderness, and their natural attachment, still excited by the privation of liberty, will furnish curious observations for the history of their species. These two elephants, which are natives of Ceylon, were brought to Holland when very young. Thay are about fifteen years of age. Their height is seven feet and some inches. Their tusks, which are very short, have been broken, but they will grow up again as they become older. The tail of the male hangs down to the ground; that of the female is much shorter.

MR. PARK'S JOURNEY INTO THE INTERIOR PARTS OF AFRICA.

THE account of the proceedings of the African Association, from which the following extract is taken, though it abounds with many curious particulars which we have been obliged to omit, contains but a small part of the information obtained by Mr. Park during the course of his peregrinations in the wild regions of Africa.

On the 2d of December, 1795, Mr. Park took his departure from the house of his friend Dr. Laidley, at Pisania, on the banks of the river Gambia, and directed his course easterly for the kingdom of Woolli. He was accompanied by two negro servants, natives of the country, one of whom spoke English tolerably well, and served him as interpreter; the other was a boy presented to him by Dr. Laidley. He had also a horse for himself, and two asses for his servants. His baggage consisted chiefly of provisions for two days, a small assortment of beads, amber, and tobacco, for the purchase of a fresh supply as he proceeded; a few changes of linen and other necessary apparel, an umbrella, a pocket sextant, a compass, and a thermometer, together with two fowling-pieces, two pair of pistols, and some other small articles.

Mr. Park reached Medina, the capital of Woolli, on third day, and was received by the sovereign or chief, name Jatta, with much kindness. The prince wished to persuade Mr. Park not to prosecute his journey any farther, by pointing out the dangers and difficulties he would have to encounter; but, finding his remonstrances had no effect, he furnished him with a guide to Bondou, and suffered him to depart.

Leaving Medina, Mr. Park proceeded onwards, and on the 21st of December reached Fatteconda, the capital of the kingdom of Bondou. The king of this country was a pagan, like that of Woolli; but he had adopted the Moorish name of Almami, and seems also to have imbibed somewhat of the Moorish disposition; for, though Mr. Park presented to him his umbrella and some other articles, he compelled him to strip in his presence and surrender his coat, which he said he should reserve for his own wearing on great and public festivals. In return, however, he gave our traveller five drachms (*minkallies*) of gold dust, and loaded him with provisions.

Departing from Fatteconda on the 23d of December, Mr. Park proceeded the two following days to a place called Joag in the kingdom of Kajaaga, a country bounded on the north by the Senegal river. The natives are called Sera-Woollies, and seem to be pure negroes. The appearance of a white man among them excited great curiosity. The king commanded that he should be brought before him; and it was with some difficulty that Mr. Park, who had been cautioned to avoid him, declined the interview, and got out of his dominions with the loss of about one half of his goods and apparel.

The name of this rapacious chief was Bacheri. He had recently fallen out with a neighbouring prince, the sovereign of Kasson, a country to the north-east; and it happened that the King of Kasson's nephew was in Bacheri's capital, endeavouring, but in vain, to effect a reconciliation at the time of Mr. Park's arrival at Joag. This young man, finding that our traveller proposed proceeding to Kasson, kindly offered to take him under his protection. They accordingly set out together, and, after a journey of two days, crossed the river Senegal at Kayee, the frontier village of the King of Kasson's dominions, near which that river ceases to be navigable. From Kayee Mr. Park was led by his friendly conductor to Teesee, the place of his abode, and the residence of the king's brother Tigetee-Sego, an old man of a venerable aspect, but of a selfish disposition. He had never seen, he said, but one white man before, and, on describing him, it was known to be Major Houghton. The circumstance of having a white man under his roof was highly gratifying to the vanity of Tigetee-Sego, on account of the great number of the natives who resorted to see him. He therefore compelled our traveller to remain with him twelve days, and afterwards to take a journey of two days more to present himself to the king at his capital of Koniakary, who detained him another fortnight, but in other respects behaved to him with great kindness and hospitality. Of this prince, whose name was Demba Sego Jalla, Mr. Park received the first certain account of Major Houghton's death.

Being permitted at length to leave the capital, Mr. Park prosecuted his journey eastward, and in five days arrived at Kemnoo, a large and populous town (since destroyed,) at that time the metropolis of Kaarta. The sovereign, whose name was Dayfi Koorabarri, received

Mr.

Mr. Park with great kindness. Major Houghton was the only European he had ever before seen, and he had conceived the highest idea of the superiority of the whites to the blacks in all possible respects. The language of the country seemed to Mr. Park to be a mixture of the Mandingo and Sera-Woolli: but the pure Mandingo, in the attainment of which Mr. Park by this time had made considerable proficiency, was very generally understood, and with very little assistance from his interpreter he found no difficulty in conveying his own sentiments, and comprehending others.

Having informed the king that he proposed going to Bambara in search of the Joliba river, which was believed to take its course through the centre of that extensive kingdom, he was told that, the Bambarans being at that time in a state of warfare with the Kaartans, he could not without extreme personal danger venture into the Bambaran country. His only safe route was a northerly course to Ludamar, a territory of the Moors in alliance with Mansong the King of Bambara; from whence, passing as a traveller from the Moorish country, he might venture, by a circuitous journey, to Bambara. To this advice being obliged to submit, or give up all thoughts of prosecuting his journey in search of the Niger, the king, as the last proof of his kindness, sent eight horsemen to convey him in safety to Jarra, the frontier town of the Moors, where he arrived on the 18th of February, 1796. In the course of his journey he passed through a village not far from Jarra, called Simbing, from whence Major Houghton wrote his last dispatch with a pencil.

The territories which our traveller had hitherto explored, being very generally clothed with native woods, presented to the eye the appearance of great uniformity. In his progress eastward the country rose into hills, and the soil varied to a considerable degree; but, wherever the land was cleared, great natural fertility was observed. Bondou in particular may literally be pronounced "a land flowing with milk and honey." But these articles, together with rice and Indian corn of two or three species, were to be obtained at a small expence. Of their honey, the Pagan natives make an intoxicating liquor, much like the mead of Europe. The price of a fowl in Bondou was a button, or a small bit of amber; goat's flesh and mutton were proportionably cheap; and for six or eight amber beads Mr. Park might at any time have purchased a bullock. The domestic animals are nearly the same as in Europe: the Guinea fowl and red partridge abound in the fields; and the woods furnish a small species of antelope, of which the venison is highly and deservedly prized.—Of the other wild animals in the Mandingo countries, the most common are, the hyæna, the panther, and the elephant. But the natives of Africa have not yet acquired the art of taming the last-mentioned animal, notwithstanding his strength and docility, so as to render him serviceable to man; and, when Mr. Park told some of them that this was actually done in the countries of the East, his auditors laughed, and exclaimed, *Tobaubo sonnio*,—"A white man's lie!"—The negroes frequently find means to destroy the wild elephant with fire-arms; they hunt it principally for the sake of its teeth, which they transfer in barter to those who sell them again to the Europeans.

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The pastures of Bondou furnish an excellent breed of horses, but the usual beast of burthen in all the negro territories is the ass. The application of animal labour to the purpose of agriculture is wholly unknown. The chief implement used in husbandry is the hoe, which varies in form in different districts; and the labour is universally performed by slaves. Besides the grains proper to tropical climates, the Mandingoes cultivate in considerable quantities ground-nuts, yams, and pompions. They likewise raise cotton and indigo, and have sufficient skill to convert these materials into tolerably fine cloth of a rich blue colour; and they make good soap from a mixture of ground-nuts and a ley of wood-ashes.

The town of Jarra, at which Mr. Park had now arrived, is situated in the kingdom of Ludamar, a Moorish country, of which it is not known that any account has ever been given in any of the languages of Europe. The town itself is extensive, and the houses are built of clay and stone intermixed; but the major part of the inhabitants are negroes from the borders of the Southern States, who prefer a precarious protection under the Moors, which they purchase by a tribute, to being continually exposed to their predatory hostilities.

During his stay at Jarra, Mr. Park resided at the house of a Slatee trader, named Daman, who was known to Dr. Laidley. By him Mr. Park was informed that he could proceed no farther on his way to Bambara, without leave from Ali, the Moorish chief or king of the country, who was then encamped at a place called Benowm; and that it was absolutely necessary that a present should accompany the application by which permission was to be obtained. Mr. Park therefore purchased five garments of country cloth, by the sale of one of his fowling-pieces. Daman undertook to nogotiate the business, and at the end of a fortnight permission arrived from Benowm.

This permission was brought by one of Ali's own slaves, who said he was ordered to serve Mr. Park as a guide to Bambara; and on the 27th of February he took his departure from Jarra, accompanied by this slave, his own faithful boy, and a negro belonging to Daman; the interpreter refusing to proceed any farther.

On the third day after his departure from Jarra they reached a large town called Deena; on entering which Mr. Park was surrounded by many of the Moorish inhabitants, who harassed him with shouts of insult, spit in his face, and seized his baggage, which they robbed of what things they fancied. He got refuge, at length, in the house of a negro; and, after experiencing much difficulty in persuading his attendants to proceed any farther, he set out on the second day for Sampaka. Here he procured lodging at the house of a negro, who understood the art of making gunpowder. The nitre was obtained in considerable quantities from the swamps or ponds, which are filled in the rainy season, and to which the cattle resort in the heat of the day for coolness. As the water of these ponds is slowly exhaled by the sun, the nitre appears in a white efflorescence on the mud, and is carefully scraped off in the form of small crystals. Sulphur is purchased of the Moors, and the several ingredients are blended together in such proportions as experience hath shewn will answer the purpose; though the powder thus made is far inferior to that of Europe.

On the morning of the 7th of March, Mr. Park had reached a small village called Sami, within two days journey of Goomba, the frontier

frontier town of Bambara; and was resting himself in the hut of a friendly negro, pleased with the hopes of being soon out of danger, when he was alarmed by the arrival of two Moors, who announced that they came by order of Ali to convey him to the camp at Benowm. They added, that, if he consented to go with them peaceably, he had nothing to fear; but that, if he refused, they had orders to carry him by force.

Finding entreaty and resistance equally fruitless, for the messengers were joined by others, all of them armed, our traveller, guarded by the Moors and accompanied by the negro boy (Daman's negro having made his escape on seeing the Moors, and the slave sent by Ali having previously left him on the road), set out on the evening of the same day for the camp at Benowm, which after a distressing journey they approached on the 12th. It presented to the eye a multitude of dirty-looking tents, scattered without order over a large space of ground; and among the tents were seen herds of camels, bullocks, and goats.

The arrival of a white man at the camp was no sooner made known, than all the people who were drawing water at the wells threw down their buckets, those in the tents mounted their horses, and men, women, and children, came running or galloping towards him. He soon found himself surrounded with such crowds that he could scarcely walk;—one pulled off his clothes—another took off his hat—a third stopped him to examine his waistcoat buttons—and a fourth called out *La illa ill Allahi, Mahomed rasowl Allahi*, "There is no god but God, and Mahomet is his prophet;" and signified in a threatening manner that he must repeat these words. He at length reached the tent of the king, whom he found sitting upon a black leather cushion, clipping a few hairs from his upper lip, while a female attendant held up a looking-glass before him: there were many other females in the tent. The king appeared to be an old man of the Arab cast, with a long white beard. He had a sullen and indignant aspect, and, looking at our traveller with attention, enquired of the Moors, if he could speak Arabic; but, being answered in the negative, he appeared much surprised, and continued silent.

The surrounding attendants, and particularly the ladies, were far more curious and inquisitive. They asked a thousand questions, inspected every part of Mr. Park's apparel, searched his pockets, and obliged him to unbutton his waistcoat and display the whiteness of his skin, &c. They even counted his toes and fingers, as if they doubted whether he was in truth a human being. When the curiosity of the ladies was in some measure satisfied, he was conducted to the tent of Ali's chief slave; into which however he was not permitted to enter, nor allowed to touch any thing belonging to it. He requested something to eat, and some boiled corn with salt and water was at length sent him in a wooden bowl; and a mat was spread out on the sand before the tent, on which he passed the night, surrounded by the curious multitude. A hut was afterwards erected, in which he was confined and strictly guarded.

Some time after a ludicrous circumstance took place, which would not deserve attention did it not tend to throw some light on the national manners of the people among whom our traveller resided. Hearing one morning the sound of drums, Mr. Park was informed that the noise was occasioned by the celebration of a wedding in one of

of the neighbouring tents. Soon after an old woman entered his hut with a bowl in her hand, and signified that she had brought him *a present from the bride*. Before he could recover from the surprise occasioned by this message, the woman discharged the contents of the bowl full in his face. Mr. Park finding that it was the same sort of *holy water* as that with which the priest among the Hottentots is said to besprinkle a new-married couple, he began to suspect that the old lady was actuated by mischief or malice; but she gave him seriously to understand that it was *a nuptial benediction from the bride's own person*, and which, on such occasions, is always received by the young unmarried Moors as a mark of distinguished favour.

The Moorish ladies seemed indeed to commiserate his condition, and one of them once privately sent him a small supply of meal and milk; but their kindness extended no farther. If they pitied his situation, it is probable that they dared not administer to his wants; and his distress at length became almost insurmountable. He was allowed a single meal of *kauscous*, a preparation of boiled corn, once in twenty-four hours. All his effects were taken from him, and he was not even indulged with a change of linen out of the few shirts he had brought in his portmanteau: oppressed at the same time with a burning fever, his situation was truly deplorable. "In this condition, from sun-rise to sun-set," says he, "was I obliged to suffer with an unruffled countenance the insults of the rudest savages on earth."

In eight or ten weeks, however, circumstances occurred, which, contrary to their first appearance, changed our traveller's situation for the better, and in the end produced his deliverance. In the war which prevailed between the kings of Bambara and Kaarta, the Moors at first took no active part; but, Ali having afterwards engaged to send 200 horse to the assistance of the fugitive Kaartans, he became panic-struck at the approach of the King of Bambara towards Benown; broke up his camp, and fixed his tent in a country to the north. Mr. Park was compelled to follow him, and, after a month's confinement at the new camp, was led by Ali to Jarra. At this place he had the mortification to see the poor boy who had attended him from the Gambia taken from him, by Ali's command, for the avowed purpose of being sold into slavery. After this cruel circumstance, and the certain information which he received from Ali's own son (a youth of ten years of age, who had conceived something like friendship for Park, or pity for his misfortunes), that it was in contemplation to deprive Park himself of his life, or put out his eyes, he determined rather to risk perishing in the woods, of hunger, or by the fury of the wild beasts, than to remain any longer with a horde of faithless barbarians, whose tenderest mercies were cruelty, and from whose caprice or fanaticism he was in hourly danger of destruction.

On the morning of the 1st of July 1796, Mr. Park was so fortunate as to break the bonds of his captivity. He had contrived to procure at his departure his own horse, saddle and bridle; a few articles of apparel, and also his pocket compass. This last he had concealed in the sand during his confinement. He rode forwards the first of the whole day without stopping. "I felt," said he, "like one recovered from sickness; I breathed freer; I found unusual lightness in my limbs. Even the desert looked pleasant; and I dreaded nothing but falling

falling in with some wandering parties of Moors, who might convey me back to the land of thieves and murderers from which I had just escaped."

The first emotions of his mind subsiding however into sober reflection, he soon found his condition to be very deplorable. His horse grew tired, and he experienced the torments of thirst raging beyond description. Whenever he came to a tree, he climbed it in hopes of discovering a watering-place, but in vain; he chewed the leaves, but found they were all bitter, and afforded no relief. In a vast wilderness of the African continent, without an attendant or guide, without food and water, or the prospect of procuring any; in a country where the lion and panther prowling for their prey are less to be apprehended than man; what situation could be more forlorn and dreadful? He proceeded onwards, however, directing his route nearly east-south-east, in the view of reaching by the shortest course possible a district that might afford him shelter. A heavy rain about midnight enabled him to quench his burning thirst, by spreading his clothes on the ground and sucking the moisture of them; and a muddy pool, which he found soon after, yielded relief to his horse. The rest of the night, and nearly the whole of the ensuing day, neither water nor food was to be found; and he must inevitably have perished, had he not fortunately towards evening lighted upon a few scattered huts of some Foulah shepherds. Perceiving an aged negro woman among those who gazed at him with great earnestness, he tendered her his pocket handkerchief, and requested in exchange a little corn to eat. She gave him a kind answer, invited him to her hut, and immediately produced a large wooden bowl of *kouscous* ready prepared. She procured likewise some corn and water for the horse. Those only who have suffered similar misery can judge of his sensibility at this unexpected deliverance. But, as the village belonged to the Moors, our traveller had only a short time to rest. As he approached the territories of the negroes, however, his apprehensions diminished, and his condition improved.

It is worthy of remark, and highly to the credit of the female sex, that Mr. Park seems invariably to have met with compassion and relief from women. This perfectly accords with the account given by another enterprising traveller, Mr. Ledyard, who expresses himself as follows: "I have always remarked that women in all countries are civil, obliging, tender, and humane; that they are ever inclined to be gay and cheerful, timorous and modest; and that they do not hesitate, like men, to perform a generous action. In wandering over the barren plains of inhospitable Denmark, through honest Sweden, and frozen Lapland, rude and churlish Finland, unprincipled Russia, and the wide-spread regions of the wandering Tartar, if hungry, dry, cold, wet or sick, the women have ever been friendly to me, and uniformly so; and to add to this virtue, so worthy the appellation of benevolence, these actions have been performed in so free and so kind a manner, that if I was dry I drank the sweetest draught, and if hungry I ate the coarse morsel with a double relish."

Procuring precarious support in this manner from the charity of the most wretched of human beings, Mr. Park wandered for the space of fifteen days, still however proceeding onwards in the accomplishment of his mission. At length, in the morning of the sixteenth day, having been joined by some Mandingo negroes, who were travelling

velling to Sego, he had the inexpressible satisfaction to behold the great object of his wishes—the long-sought majestic Niger glittering to the morning sun, as broad as the Thames at Westminster, and flowing majestically but slowly from west to east, through the middle of a very extensive town, which his fellow-travellers told him was Sego, the capital of the great kingdom of Bambara. His emotions at this sight were exquisite, and it were unjust not to give them in our traveller's own words: "I hastened," says he, "to the brink of the river; and, having drank of the water, lifted up my fervent thanks in prayer to the Great Ruler of all things, for having thus far crowned my endeavours with success."—Unhappily, he had yet to sustain many severe and bitter trials of his patience and fortitude.

Information of a considerable river flowing through the centre of Africa, between the latitudes of 15° and 20° north, had been received at very early periods from different quarters. At one time it was believed to be a part of the Senegal. The Gambia had the same honour ascribed to it at another. But sufficient proof was afterwards obtained that neither of these rivers was the Niger, and farther enquiries confirmed the ancient accounts of a stream that was not only of greater magnitude than either the Senegal or the Gambia, but which flowed in a contrary direction; running not to the westward into the Atlantic, but from west to east, to regions unknown. The Moors described it by the name of *Nil il Abeed*, or the River of Slaves: the negroes bestowed on it the appellation of *Joliba*, or the Great Waters.

Some doubt however still remained. It was urged that the Moors might possibly speak of one river, and the negroes of another; and the account of its direction towards the east was received by our ablest geographers with much difficulty and hesitation. On both these points Mr. Park's testimony is clear and decisive; the Moors, in his hearing, uniformly called it Nil il Abeed; the inhabitants of Sego, the Joliba; and that it flowed from west to east, he had ocular demonstration in a long and perilous ambulation of some hundred miles, which he afterwards made on its banks. Thus therefore is all farther question obviated concerning the existence and direction of this great river; but its termination still continues unknown.

PYROTECHNY; OR THE ART OF PREPARING ALL KINDS OF FIRE-WORKS.—Concluded from p. 206.

AQUATIC FIRE-WORKS.

WORKS that sport in the water are much esteemed by most admirers of fire-works, particularly water-rockets; and, as they seem of a very extraordinary nature to those who are unacquainted with this art, they merit a particular explanation.

Water-rockets, may be made from 4 oz. to 2lb. If larger, they are too heavy; so that it will be difficult to make them keep above water without a cork float, which must be tied to the neck of the case; but the rockets will not dive so well with as without floats. Cases for these are made in the same manner and proportion as sky-rockets, only a little thicker of paper. When you fill those which are drove solid, put in first 1 ladleful of slow fire, then 2 of the proper charge, and on that one or two ladles of sinking charge, then the proper charge, then

then the finking charge again, and fo on, till you have filled the cafe within 3 diameters; then drive on the compofition 1 ladleful of clay; through which make a fmall hole to the charge; then fill the cafe, within ½ a diameter, with corn-powder, on which turn down 2 or 3 rounds of the cafe in the infide; then pinch and tie the end very tight; having filled your rockets (according to the above directions), dip their ends in melted rofin or fealing wax, or elfe fecure them well with greafe. When you fire thefe rockets, throw in 6 or 8 at a time; but, if you would have them all fink, or fwim, at the fame time, you muft drive them with an equal quantity of compofition, and fire them all together.

To make Pipes of Communication, which may be ufed under Water.—Pipes for this purpofe muft be a little thicker of paper than thofe for land. Having rolled a fufficient number of pipes, and kept them till dry, wafh them over with drying oil, and fet them to dry; but, when you oil them, leave about 1½ inch at each end dry, for joints: if they were oiled all over, when you come to join them, the pafte would not ftick where the paper is greafy: after the leaders are joined, and the pafte dry, oil the joints. Thefe pipes will lie many hours under water, without receiving any damage.

Horizontal Wheels for the Water.—Firft get a large wooden bowl without a handle; then have an octagon wheel made of a flat board 18 inches diameter, fo that the length of each fide will be near feven inches: in all the fides cut a groove for the cafes to lie in. This wheel being made, nail it on the top of the bowl; then take 4 eight-oz. cafes, filled with a proper charge, each about 6 inches in length. Now, to clothe the wheel with thefe cafes, get fome whitifh-brown paper, and cut it into flips 4 or 5 inches broad and 7 or 8 long: thefe flips being pafted all over on one fide, take one of the cafes, and roll one of the flips of paper about 1½ inch on its end, fo that there will remain about 2½ inches of the paper hollow from the end of the cafe: this cafe tie on one of the fides of the wheel, near the corners of which muft be holes bored, through which you put the packthread to tie the cafes: having tied on the firft cafe at the neck and end, put a little meal-powder in the hollow paper; then pafte a flip of paper on the end of another cafe, the head of which put into the hollow paper on the firft, allowing a fufficient diftance from the tail of one to the head of the other for the pafted paper to bend without tearing: the fecond cafe tie on as you did the firft: and fo on with the reft, except the laft, which muft be clofed at the end, unlefs it is to communicate to any thing on the top of the wheel, fuch as fire-pumps or brilliant fires, fixed in holes cut in the wheel, and fired by the laft or fecond cafe, as the fancy directs: 6, 8, or any number, may be placed on the top of the wheel, provided they be not too heavy for the bowl.

Before you tie on the cafes, cut the upper part of all their ends, except the laft, a little fhelving, that the fire from one may play over the other, without being obftructed by the cafe. Wheel-cafes have no clay drove in their ends, nor pinched, but are always left open, only the laft, or thofe which are not to lead fire, which muft be well fecured.

Water Mines.—For thefe mines you muft have a bowl with a wheel on it, made in the fame manner as the water-wheel; only in its middle there muft be hole, of the fame diameter you defign to have

the mine. These mines are tin pots, with strong bottoms, and a little more than two diameters in length: your mine must be fixed in the hole in the wheel, with its bottom resting on the bowl; then loaded with serpents, crackers, stars, small water-rockets, &c. in the same manner as pots of aigrettes; but in their centre fix a case of Chinese fire, or a small gerbe, which must be lighted at the beginning of the last case on the wheel. These wheels are to be clothed as usual.

Fire-globes for the Water.—Bowls for water-globes must be very large, and the wheels on them of a decagon form: on each side of which nail a piece of wood 4 inches long; and on the outside of each piece cut a groove, wide enough to receive about ¼ of the thickness of a 4-oz. case: these pieces of wood must be nailed in the middle of each face of the wheel, and fixed in an oblique direction, so that the fire from the cases may incline upwards: the wheel being thus prepared, tie in each groove a 4-oz. case, filled with a grey charge; then carry a leader from the tail of one case to the mouth of the other.—Globes for these wheels are made of two tin hoops, with their edges outwards, fixed one within the other, at right angles. The diameter of these hoops must be somewhat less than that of the wheel. Having made a globe, drive in the centre of a wheel an iron spindle, which must stand perpendicular, and its length 4 or 6 inches more than the diameter of the globe.

This spindle serves for an axis, on which the globe is fixed, which, when done, must stand 4 or 6 inches from the wheel: round one side of each hoop must be soldered little bits of tin, 2½ inches distance from each other; which pieces must be two inches in length each, and only fastened at one end, the other ends being left loose, to turn round the small port-fires, and hold them on: these port-fires must be made of such a length as will last out the cases on the wheel. You are to observe, that there need not be any port-fires at the bottom of the globe within four inches of the spindle; for, if there were, they would have no effect, but only burn the wheel: all the port-fires must be placed perpendicular from the centre of the globe, with their mouths outwards; and must all be clothed with leaders, so as all to take fire with the second case of the wheel; which cases must burn two at a time, one opposite the other. When two cases of a wheel begin together, two will end together; therefore the two opposite end cases must have their ends pinched and secured from fire. The method of firing such wheels is, by carrying a leader from the mouth of one of the first cases to that of the other; which leader being burnt through the middle, will give fire to both at the same time.

Odoriferous Water Balloons.—These balloons are made in the same manner as air-balloons, but very thin of paper, and in diameter 1¾ inch, with a vent of ½ inch diameter. The shells being made, and quite dry, fill them with any of the following compositions, which must be rammed in tight: these balloons must be fired at the vent, and put into a bowl of water. Odoriferous works are generally fired in rooms.

Composition I. Saltpetre 2 oz. flour of sulphur 1 oz. camphor ½ oz. yellow amber ¼ oz. charcoal-dust ¾ oz. flour of benjamin or assa odorata ½ oz. all powdered very fine and well mixed.

II. Saltpetre 12 oz. meal-powder 3 oz. frankincense 1 oz. myrrh ½ oz. camphor ½ oz. charcoal 3 oz. all moistened with the oil of spike.

III. Saltpetre

III. Saltpetre 2 oz. sulphur ½ oz. antimony ½ oz. amber ½ oz. cedar raspings ½ oz. all mixed with the oil of roses and a few drops of bergamot.

IV. Saltpetre 4 oz. sulphur 1 oz. saw-dust of juniper ½ oz. saw-dust of cypress 1 oz. camphor ½ oz. myrrh 2 drams, dried rosemary ½ oz. cortex elaterii ½ oz. all moistened a little with the oil of roses. Water rockets may be made with any of the above compositions, with a little alteration, to make them weaker or stronger, according to the size of the cases.

Water Balloons.—Having made some thin paper shells, of what diameter you please, fill some with the composition for water balloons, and some after this manner: Having made the vent of the shells pretty large, fill them almost full with water rockets, marrons, squibs, &c. Then put in some blowing powder, sufficient to burst the shells; and afterwards fix in the vent a water-rocket, long enough to reach the bottom of the shell, and its neck to project a little out of the vent; this rocket must be open at the end, to fire the powder in the shell, which will burst the shell, and disperse the small rockets, &c. in the water. When you have well secured the large rocket in the vent of the shell, take a cork float with a hole in its middle, which fit over the head of the rocket, and fasten it to the shell: this float must be large enough to keep the balloon above water.

Water Squibs are generally made of 1-oz. serpent cases seven or eight inches long, filled two thirds with charge, and the remainder bounced. The common method of firing them is this: Take a a water-wheel, with a tin mortar in its centre, which load with squibs after the usual method; but the powder in the mortar must be no more than will just throw the squibs out easily into the water: you may place the cases on the wheel either obliquely or horizontally; and on the top of the wheel, round the mortar, fix fix cases of brilliant fire perpendicular to the wheel: these cases must be fired at the beginning of the last case of the wheel, and the mortar at the conclusion of the same.

A Sea-fight with small Ships, and to prepare a Fireship for it.—Having procured four or five small ships, of two or three feet in length, (or as many as you design to fight), make a number of small reports, which are to serve for guns. Of these range as many as you please on each side of the upper decks; then at the head and stern of each ship fix a two-ounce case, eight inches long, filled with a slow port-fire receipt; but take care to place it in such a manner that the fire may fall in the water, and not burn the rigging: in these cases bore holes at unequal distances from one another, but make as many in each case as half the number of reports, so that one case may fire the guns on one side, and the other those on the opposite. The method of firing the guns is, by carrying a leader from the holes in the cases to the reports on the decks; you must make these leaders very small, and be careful in calculating the burning of the slow-fire in the regulating cases, that more than two guns be not fired at a time. When you would have a broadside given, let a leader be carried to a cracker, placed on the outside of the ship; which cracker must be tied loose, or the reports will be too slow: in all the ships put artificial guns at the port-holes.

Having filled and bored holes in two port-fires for regulating the guns in one ship, make all the rest exactly the same; then, when you begin

begin the engagement, light one ship first, and set it a sailing, and so on with the rest, sending them out singly, which will make them fire regularly, at different times, without confusion; for the time between the firing of each gun will be equal to that of lighting the slow fires.

The fire-ship may be of any size; and need not be very good, for it is always lost in the action. To prepare a ship for this purpose, make a port-fire equal in size with those in the other ships, and place it at the stern; in every port place a large port-fire, filled with a very strong composition, and painted in imitation of a gun, and let them all be fired at once by a leader from the slow fire, within two or three diameters of its bottom; all along both sides, on the top of the upper deck, lay star-composition about half an inch thick and one broad, which must be wetted with thin size, then primed with meal-powder, and secured from fire by pasting paper over it; in the place where you lay this composition, drive some little tacks with flat heads, to hold it fast to the deck: this must be fired just after the sham guns, and when burning will shew a flame all round the ship: at the head take up the decks, and put in a tin mortar loaded with crackers, which mortar must be fired by a pipe from the end of the slow fire; the firing of this mortar will sink the ship, and make a pretty conclusion. The regulating port-fire of this ship must be lighted at the same time with the first fighting ship.

Having prepared all the ships for fighting, we shall next proceed with the management of them when on the water. At one end of the pond, just under the surface of the water, fix two running blocks, at what distance you choose the ships should fight; and at the other end of the pond, opposite to each of these blocks, under the water, fix a double block; then on the land, by each of the double blocks, place two small windlasses; round one of them turn one end of a small cord, and the other end put through one of the blocks; then carry it through the single one at the opposite end of the pond, and bring it back through the double block again, and round the other windlass: to this cord, near the double block, tie as many small strings as half the number of the ships, at what distance you think proper; but these strings must not be more than two feet each: make fast the loose end of each to a ship, just under her bowsprit; but if tied to the keel, or too near the water, it will overset the ship. Half the ships being thus prepared, near the other double block fix two more windlasses, to which fasten a cord, and to it tie the other half of the ships as before: when you fire the ships, pull in the cord with one of the windlasses, to get all ships together; and when you have set fire to the first, turn that windlass which draws them out, and so on with the rest, till they are all out in the middle of the pond; then, by turning the other windlass, you will draw them back again; by which method you may make them change sides, and tack about backwards and forwards at pleasure. For the fire-ship, fix the blocks and windlasses between the others; so that when she sails out, she will be between the other ships: you must not let this ship advance till the guns at her ports take fire.

To fire Sky-rockets under Water,—You must have stands made as usual, only the rails must be placed flat instead of edgewise, and have holes in them for the rocket-sticks to go through; for, if they were hung upon hooks, the motion of the water would throw them off;

off: the ſtands being made, if the pond is deep enough, ſink them at the ſides ſo deep, that, when the rockets are in, their heads may juſt appear above the ſurface of the water; to the mouth of each rocket fix a leader, which put through the hole with the ſtick; then a little above the water muſt be a board, ſupported by the ſtand, and placed along one ſide of the rockets; then the ends of the leaders are turned up through holes made in this board, exactly oppoſite the rockets. By this means you may fire them ſingly or all at once. Rockets may be fired by this method in the middle of a pond by a Neptune, a ſwan, a water-wheel, or any thing elſe you chooſe.

To repreſent Neptune in his Chariot.—To do this to perfection, you muſt have a Neptune (made of wood, or baſket work) as big as life, fixed on a float large enough to bear his weight; on which muſt be two horſes heads and necks, ſo as to ſeem ſwimming. For the wheels of the chariot, there muſt be two vertical wheels of black fire, and on Neptune's head a horizontal wheel of brilliant fire, with all its caſes, to play upwards. When this wheel is made, cover it with paper or paſteboard, cut and painted like Neptune's coronet; then let the trident be made without prongs, but inſtead of them, fix three caſes of a weak grey charge, and on each horſe's head put an eight-ounce caſe of brilliant fire, and on the mouth of each fix a ſhort caſe, of the ſame diameter, filled with the white-flame receipt, enough to laſt out all the caſes on the wheels: theſe ſhort caſes muſt be opened at bottom, that they may light the brilliant fires; for the horſes eyes put ſmall port-fires, and in each noſtril put a ſmall caſe filled half with grey charge, and the reſt with port-fire compoſition.

If Neptune is to give fire to any building on the water; at his firſt ſetting out, the wheels of the chariot, and that on his head, with the white flames on the horſes heads, and the port-fires in their eyes and noſtrils, muſt all be lighted at once; then from the bottom of the white flames carry a leader to the trident. As Neptune is to advance by the help of a block and cord, you muſt manage it ſo as not to let him turn about till the brilliant fires on the horſes and the trident begin; for it is by the fire from the horſes (which plays almoſt upright) that the building, or work, is lighted; which muſt be thus prepared. From the mouth of the caſe which is to be firſt fired, hang ſome looſe quick-match to receive the fire from the horſes. When Neptune is only to be ſhewn by himſelf, without ſetting fire to any other works, let the white flames on the horſes be very ſhort, and not to laſt longer than one caſe of each wheel, and let two caſes of each wheel burn at a time.

Swans and Ducks in Water.—If you will have any ſwans or ducks diſcharge rockets into the water, they muſt be made hollow, and of paper, and filled with ſmall water rockets, with ſome blowing powder to throw them out: but, if this is not done, they may be made of wood, which will laſt many times. Having made and painted ſome ſwans, fix them on floats: then in the places where their eyes ſhould be, bore holes two inches deep, inclining downwards, and wide enough to receive a ſmall port-fire; the port-fire caſes for this purpoſe muſt be made of braſs, two inches long, and filled with a ſlow bright charge. In the middle of one of theſe caſes make a little hole; then put the port-fire in the eye-hole of the ſwan, leaving about half an inch to project out; and in the other eye put another port-fire, with a hole made in it: then in the neck of the ſwan, within two inches

of one of the eyes, bore a hole flantwife, to meet that in the port-fire; in this hole put a leader, and carry it to a water-rocket, that muft be fixed under the tail with its mouth upwards. On the top of the head place two 1-oz. cafes, four inches long each, drove with brilliant fire; one of thefe cafes muft incline forwards, and the other backwards: thefe muft be lighted at the fame time as the water-rocket; to do which, bore a hole between them in the top of the fwan's head, down to the hole in the port-fire, to which carry a leader: if the fwan is filled with rockets, which muft be fired by a pipe from the end of the water-rocket under the tail. When you fet the fwan a fwimming, light the two eyes.

Water Fire-fountains.—To make a fire-fountain, you muft firft have a float made of wood, three feet diameter; then in the middle fix a round perpendicular poft, four feet high, and two inches diameter; round this poft fix three circular wheels made of thin wood, without any fpokes. The largeft of thefe wheels muft be placed within two or three inches of the float, and muft be nearly of the fame diameter.

The fecond wheel muft be 2 feet 2 inches diameter, and fixed at 2 feet diftance from the firft. The third wheel muft be 1 foot 4 inches diameter, and fixed within fix inches of the top of the poft: the wheels being fixed, take 18 four or eight oz. cafes of brilliant fire, and place them round the firft wheel with their mouths outwards, and inclining downwards; on the fecond wheel place 13 cafes of the fame, and in the fame manner as thofe on the firft; on the third, place 8 more of thefe cafes, in the fame manner as before, and on the top of the poft fix a gerbe; then clothe all the cafes with leaders, fo that both they and the gerbe may take fire at the fame time. Before you fire this work, try it in the water to fee if the float is properly made, fo as to keep the fountain upright.

ACCOUNT OF ALEXANDRIA IN EGYPT.

ALEXANDRIA, now Scanderia, is a city of Lower Egypt, and was for a long time its capital. This city was built by Alexander the Great, foon after the overthrow of Tyre, about 333 years before Chrift. It is fituated in the Mediterranean, twelve miles weft of that mouth of the Nile anciently called *Canopicum*; and lies in E. lon. 30. 19. N. lat. 31. 10. Alexander is faid to have been induced to build this city, on account of its being conveniently fituated for a fine port; and fo fudden was his refolution, that after he had directed where every public ftructure was to be placed, fixed the number of temples, and the deities to whom they fhould be dedicated, &c. there were no inftruments at hand proper for marking out the walls, according to the cuftom of thofe times. Upon this, a workman advifed the king to collect what meal was among the foldiers, and to fift it in lines upon the ground, whereby the circuit of the walls would be fufficiently marked out. This advice was followed; and the new method of marking out the walls was, by Ariftander, the king's foothfayer, interpreted as a prefage of the city's abounding with all the neceffaries of life. Nor was he deceived in his prediction; for Alexandria foon became the ftaple, not only for merchandife, but alfo for all the arts and fciences of the Greeks.

Alexandria

Alexandria was a league and a half long by one-third in breadth, which made the circumference of its walls about four leagues. Lake Mareotis bathed its walls on the south, and the Mediterranean on the north. It was intersected lengthwise by straight parallel streets. This direction left a free passage to the northerly wind, which alone conveys coolness and salubrity into Egypt. A street of 2000 feet wide began at the gate of the Sea, and terminated at the gate of Canopus. It was decorated by magnificent houses, by temples, and by public buildings. In this extensive range, the eye was never tired with admiring the marble, the porphyry, and the obelisks, which were destined at some future day to embellish Rome and Constantinople. This street, the handsomest in the universe, was intersected by another of the same breadth, which formed a square at their junction of half a league in circumference. From the middle of this great place, the two gates were to be seen at once, and vessels arriving under full sail from the north and from the south.

A mole of a mile in length stretched from the continent to the isle of Pharos, and divided the great harbour into two. That which is to the northward preserved its name. A dyke, drawn from the island to the rock whereon was built the Pharos, secured it from the westerly winds. The other was called *Eunostus*, or the Safe Return. The former is called at present the new, the latter the old, harbour: a bridge, that joins the mole to the city, served for a communication between them. It was raised on lofty pillars sunk into the sea, and left a free passage for ships. The palace, which advanced beyond the promontory of *Lochias*, extended as far as the dyke, and occupied more than a quarter of the city. Each of the Ptolemies added to its magnificence. It contained within its inclosure, the museum, an asylum for learned men, groves and buildings worthy of royal majesty, and a temple where the body of Alexander was deposited in a golden coffin. The infamous Seleucus Cibyosactes violated this monument, carried off the golden coffin, and put a glass one in its place. In the great harbour was the little island of Anti-Rhodes, where stood a theatre, and a royal place of residence. Within the harbour of Eunostus was a smaller one, called *Kibotos*, dug by the hand of man, which communicated with Lake Marcotis by a canal. Between this canal and the palace was the admirable temple of Serapis, and that of Neptune near the great place where the market was held. Alexandria extended likewise along the southern banks of the lake. Its eastern part presented to view the gymnasium, with its porticoes of more than 600 feet long, supported by several rows of marble pillars. Without the gate of Canopus was a spacious circus for the chariot races. Beyond that, the suburb of Nicopolis ran along the sea-shore, and seemed a second Alexandria. A superb amphitheatre was built there with a race-ground, for the celebration of the quinquennalia. Such is the description left us of Alexandria by the ancients, and above all by Strabo.

The architect employed by Alexander in this undertaking was the celebrated Dinocrates, who had acquired so much reputation by rebuilding the temple of Diana at Ephesus. The city was first rendered populous by Ptolemy Soter, one of Alexander's captains, who, after the death of the Macedonian monarch, being appointed governor of Egypt, soon assumed the title of king, and took up his residence at Alexandria, about 304 years before Christ.

In the thirtieth year of Ptolemy Soter's reign, he took his son Ptolemy Philadelphus partner with him in the empire; and by this prince the city of Alexandria was much embellished. In the first year of his reign the famous watch-tower of Pharos was finished. It had been begun several years before by Ptolemy Soter; and, when finished, was looked upon as one of the wonders of the world. The same year, the island of Pharos itself, originally seven furlongs distant from the continent, was joined to it by a causeway. This was the work of Dexiphanes, who completed it at the same time that his son put the last hand to the tower. The tower was a large square structure of white marble: on the top of which fires were kept constantly burning, for the direction of sailors. The building cost 800 talents; which, if Attic, amounted to 165,000l. if Alexandrian, to twice that sum. The contrivance of the architect to usurp the glory of this great work to himself is well known.

This year also was remarkable for the bringing of the image of Serapis from Pontus to Alexandria. It was set up in one of the suburbs of the city called *Rhacotis*, where a temple was afterwards erected to his honour, suitable to the greatness of that stately metropolis, and called, from the god worshipped there, *Serapeum*. This structure, according to Ammianus Marcellinus, surpassed in beauty and magnificence all others in the world, except the capitol at Rome. Within the verge of this temple was the famous Alexandrian library. It was founded by Ptolemy Soter, for the use of an academy he instituted in this city; and by continual additions by his successors, became at last the finest library in the world, containing no fewer than 700,000 volumes. The method followed in collecting books for this library, was, to seize all those which were brought into Egypt by Greeks or other foreigners. The books were transcribed in the museum by persons appointed for that purpose; the copies were then delivered to the proprietors, and the originals laid up in the library. Ptolemy Euergetes, having borrowed from the Athenians the works of Sophocles, Euripides, and Æschylus, returned them only the copies, which he caused to be transcribed in as beautiful a manner as possible; presenting the Athenians at the same time with fifteen talents (upwards of 3000l. sterling) for the exchange. As the museum was at first in that quarter of the city called *Bruchion*, near the royal palace, the library was placed there likewise; but, when it came to contain 400,000 volumes, another library, within the Serapeum, was erected by way of supplement to it, and on that account called the *daughter* of the former. In this second library 300,000 volumes, in process of time were deposited; and the two together contained the 700,000 volumes already mentioned. In the war carried on by Julius Cæsar against the inhabitants of this city, the library in the Bruchion, with the 400,000 volumes it contained, was reduced to ashes. The library in the Serapeum, however, still remained; and here Cleopatra deposited 200,000 volumes of the Pergamean library, which Marc Antony presented her with. These, and others added from time to time, rendered the new library at Alexandria more numerous and considerable than the former; and, though it was often plundered during the revolutions and troubles of the Roman empire, and yet it was again and again repaired, and filled with the same number of books. For 293 years

Alexandria

Alexandria was held in subjection by the Ptolemies. Here follows a list of these princes, with the dates of their respective reigns.

Ptolemy the son of Lagus, surnamed Soter, reigned thirty-nine years, and died in the year of the world 3720. Ptolemy Philadelphus reigned thirty-nine years, and died in 3758. Ptolemy Euergetes reigned twenty-five years, and died in 3783. Ptolemy Philopator reigned seventeen years, and died in 3800. Ptolemy Epiphanes reigned twenty-four years, and died in 3824. Ptolemy Philometor reigned thirty-seven years, and died in 3861. Ptolemy Energetes, or Physcon, reigned fifty-three years, part with his brother Philometor, and part alone. He died in 3888. Ptolemy Lathyrus reigned thirty-six years and six months. He died in 3923. Cleopatra, the daughter of Lathyrus and wife of Alexander I. reigned six months. Alexander I. the nephew of Lathyrus, was established in 3924, and died in 3943. Alexander II. the son of Alexander I. was dispossessed by the Alexandrians in 3949. Ptolemy Nothus, or Auletes, the son of Lathyrus, reigned thirteen years, and died in 3953. Ptolemy, surnamed *Dionysius* or *Bacchus*, reigned three years eight months, and died in 3957. Cleopatra reigned from 3957, and killed herself in 3974.

The city, as we have already observed, soon became extremely populous, and was embellished both by its own princes and the Romans; but, like most other noted cities of antiquity, hath been the seat of terrible massacres. About 141 years before Christ, it was almost totally depopulated by Ptolemy Physcon. That barbarous monster, without the least provocation, gave free liberty to his guards to plunder his metropolis and murder the inhabitants at their pleasure. The cruelties practised on this occasion cannot be expressed; and the few who escaped were so terrified that they fled into other countries. Upon this, Physcon, that he might not reign over empty houses, invited thither strangers from the neighbouring countries; by whom the city was re-peopled, and soon recovered its former splendour. On this occasion many learned men having been obliged to fly, proved the means of reviving learning in Greece, Asia Minor, the islands of the Archipelago, and other places, where it was almost totally lost.

The new inhabitants were not treated with much more kindness by Physcon than the old ones has been; for, on their complaining of his tyrannical behaviour, he resolved on a general massacre of the young men. Accordingly, when they were one day assembled in the gymnasium, or place of their public exercises, he ordered it to be set on fire; so that they all perished, either in the flames, or by the swords of his mercenaries, whom the tyrant had placed at all the avenues.

Though Julius Cæsar was obliged to carry on a war for some time against this city, it seems not to have suffered much damage, except the burning of the library already mentioned. Before Cæsar left Alexandria, in acknowledgment of the assistance he had received from the Jews, he confirmed all their privileges there, and even engraved his decree on a pillar of brass. This, however, did not prevent the massacre of 50,000 of them in this city about the year of Christ 67.

The city of Alexandria seems to have fallen into decay soon after this, and to have forfeited many of its ancient privileges, though for what offence is not known; but when Adrian visited Egypt, about the year 141, it was almost totally ruined. He repaired both the

public and private buildings, not only restoring the inhabitants to their ancient privileges, but heaping new favours upon them; for which they returned him their solemn thanks, and conferred upon him what honours they could while he was present; but, as soon as he was gone, they published the most bitter and virulent lampoons against him.

The fickle and satirical humour of the Alexandrians was highly disliked by Adrian, though he inflicted no punishment upon them for it; but, when they lampooned Caracalla, he did not let them escape so easily. That tyrant, in the year 215, when he visited their city, having become the subject of their foolish satires, ordered a general massacre by his numerous troops, who were dispersed all over the city. The inhuman orders being given, all were murdered, without distinction of age or sex; so that in one night's time the whole city floated in blood, and every house was filled with carcases. The monster who occasioned this had retired during the night to the temple of Serapis, to implore the protection of that deity; and, not yet satiated with slaughter, commanded the massacre to be continued all the next day; so that very few of the inhabitants remained. As if even this had not been sufficient, he stripped the city of all its ancient privileges; suppressed the academy; ordered all strangers who lived there to depart; and, that the few who remained might not have the satisfaction of seeing one another, he cut off all communication of one street with another, by walls built for that purpose, and guarded by troops left there.

Notwithstanding this terrible disaster, Alexandria soon recovered its former splendour, as Caracalla was murdered a short time after. It was long esteemed the first city in the world, next to Rome; and we may judge of its magnificence, and the multitude of people contained in it, from the account of Diodorus Siculus, who relates, that in his time (forty-four years before Christ) Alexandria had on its rolls 300,000 freemen. Towards the middle of the sixth century, Amrou *Ebn el Aas*, Omar's general, took it by storm, after a siege of fourteen months, and with the loss of 23,000 men. Heraclius, then Emperor of Constantinople, did not send a single ship to its assistance. This prince affords an example very rare in history; he had displayed some vigour in the first year of his reign, and then suffered himself to be lulled into idleness and effeminacy. Awakened suddenly from his lethargy by the noise of the conquests of Cosroes, that scourge of the the east, he put himself at the head of his armies, distinguished himself as a great captain from his very first campaign, laid waste Persia for seven years, and returned to his capital covered with laurels: he then became a theologian on the throne, lost all his energy, and amused himself the rest of his life with disputing upon monotheism, whilst the Arabs were robbing him of the finest provinces of his empire. Deaf to the cries of the unfortunate inhabitants of Alexandria, as he had been to those of the people of Jerusalem, who defended themselves for two years, he left them a sacrifice to the fortunate ascendant of the indefatigable Amrou. All their intrepid youth perished with their arms in their hands. The victor, astonished at his conquest, wrote to the caliph, "I have taken the city of the west. It is of an immense extent. I cannot describe to you how many wonders it contains. There are 4000 palaces, 4000 baths, 12,000 dealers in fresh oil, 12,000 gardeners, 40,000 Jews who pay tribute, 400 comedians,"

medians," &c. At this time according to the Arabian historians, Alexandria consisted of three cities, viz. Menna, or the port, which included Pharos, and the neighbouring parts; Alexandria, properly so called, where the modern Scanderia now stands; and Nekita, probably the Necropolis of Josephus and Strabo.

At that time John, surnamed the grammarian, a famous Peripatetic philosopher, being in the city, and in high favour with Amrou Ebn al Aas the Saracen general, begged of him the royal library. Amrou replied, that it was not in his power to grant such a request; but that he would write to the khalif on that head; since, without knowing his pleasure, he dared not to dispose of a single book. He accordingly wrote to Omar, who was then khalif, acquainting him with the request of his friend: to which the Mahometan prince replied, That, if these books contained the same doctrine with the koran, they could be of no use, since the koran contained all necessary truths; but, if they contained any thing contrary to that book, they ought not to be suffered; and therefore, whatever their contents were, he ordered them to be destroyed. Pursuant to this ridiculous order, they were distributed among the public baths; where, for the space of six months, they served to supply the fires of those places, of which there was an incredible number in Alexandria.

After the city was taken, Amrou thought proper to pursue the Greeks who had fled farther up the country; and therefore marched out of Alexandria, leaving but a very slender garrison in the place. The Greeks, who had before fled on-board their ships, being apprised of this, returned on a sudden, surprised the town, and put all the Arabs they found therein to the sword: but Amrou, receiving advice of what had happened, suddenly returned, and drove them out of it with great slaughter; after which the Greeks were so intimidated, that he had nothing farther to fear from them.—A few years after, however, Amrou being deprived of his government by the khalif Othman, the Egyptians were so much displeased with his dismission, that they inclined to a revolt; and Constantine the Greek emperor, having received intelligence of their disaffection, began to meditate the reduction of Alexandria. For this purpose, he sent one Manuel, an eunuch, and his general, with a powerful army, to retake the place; which, by the assistance of the Greeks in the city, who kept a secret correspondence with the imperial forces while at sea, and joined them as soon as they had made a descent, he effected without any considerable effusion of blood. The khalif, now perceiving his mistake, immediately restored Amrou to his former dignity. This step was very agreeable to the natives; who having had experience of the military skill and bravery of this renowned general, and apprehending that they should be called to an account by the Greeks for their former perfidious conduct, had petitioned Othman to send him again into Egypt.—Upon Amrou's arrival, therefore, at Alexandria, the Copts or natives, with the traitor Al-Mokawkas (who had formerly betrayed to Amrou the fortress of Mesr) at their head, not only joined him, but supplied him with all kinds of provisions, exciting him to attack the Greeks without delay. This he did; and, after a most obstinate dispute which lasted several days, drove them into the town, where, for some time, they defended themselves with great bravery, and repelled the utmost efforts of the besiegers. This so exasperated Amrou, that he swore, "If God enabled him to conquer

quer the Greeks, he would throw down the walls of the city, and make it as easy of access as a *bawdy-house*, which lies open to every body." Nor did he fail to execute this menace; for, having taken the town by storm, he quite dismantled it, entirely demolishing the walls and fortifications. The lives of the citizens, however, were spared, at least as far as lay in the general's power; but many of them were put to the sword by the soldiers on their first entrance. In one quarter particularly, Amrou found them butchering the Alexandrians with unrelenting barbarity; to which, by his seasonable interposition, he put a stop, and on that spot erected a mosque, which he called the *mosque of mercy*.

From this time Alexandria never recovered its former splendour. It continued under the dominion of the khalifs till the year 924, when it was taken by the Magrebians, two years after its great church had been destroyed by fire. This church was called by the Arabs, *Al Kaisaria, or Cæsarea*; and had formerly been a pagan temple, erected in honour of Saturn by the famous queen Cleopatra.

The city was soon after abandoned by the Magrebians; but in 928 they again made themselves masters of it; their fleet being afterwards defeated by that belonging to the khalif. *Abul Kasem* the Magrebian general retired from Alexandria, leaving there only a garrison of 300 men, of which *Thmaál*, the khalif's admiral, being apprised, he in a few days appeared before the town, and carried off the remainder of the inhabitants to an island in the Nile called *Abukair*. This was done to prevent Abul Kasem from meeting with any entertainment at Alexandria, in case he should think proper to return. According to Eutychius, about 200,000 of the miserable inhabitants perished this year.

What contributed to raise Alexandria to such a prodigious height of splendour as it enjoyed for a long time, was its being the centre of commerce between the eastern and western parts of the world. It was with the view of becoming master of this lucrative trade, that Alexander built this city, after having extirpated the Tyrians who formerly engrossed all the East-India traffic. Of the immense riches which that trade afforded, we may form an idea, from considering that the Romans accounted it a point of policy to oppress the Egyptians, especially the Alexandrians; and, after the defeat of Zenobia, there was a single merchant of Alexandria who undertook to raise and pay an army out of the profits of his trade. The Greek emperors drew prodigious tributes from Egypt, and yet the khalifs found their subjects in so good circumstances as to screw up their revenues to three hundred millions of crowns.

Though the revolutions which happened in the government of Egypt, after it fell into the hands of the Mahometans, frequently affected this city to a very great degree; yet still the excellence of its port, and the innumerable conveniencies resulting from the East-India trade, to whomsoever were masters of Egypt, preserved Alexandria from total destruction, even when in the hands of the most barbarous nations. Thus, in the thirteenth century, when the barbarism introduced by the Goths, &c. began to wear off from the European nations, and they acquired a taste for the elegancies of life, the old mart of Alexandria began to revive; and the port, though far from recovering its former magnificence, grew once more famous by becoming the centre of commerce: but having fallen under the dominion

dominion of the Turks, and the passage round the Cape of Good Hope being discovered by the *Portuguese in* 1499, a fatal blow was given to the Alexandrian commerce, and the city has since fallen into decay.

At present, the city of Alexandria is reckoned to have about 15,000 inhabitants; a strange colluvies of different nations, as well as from various parts of the Turkish empire. They are in general given to thieving and cheating; and (like their predecessors) seditious above all others, were they not kept in awe by the severity of their government. The British and French carry on a considerable commerce with them, and have each a consul residing here. Some Venetian ships also sail thither yearly, but mostly under French colours. The subjects of those kingdoms which keep no consul here are subjected to a tax by the Grand Signior: but the Jews have found out a method of indemnifying themselves for this disadvantage; namely, by selling their commodities cheaper than other foreigners can afford. They are also favoured by the farmers of the revenue; who know, that, if they do not pay some private regard to them, the Jews have it in their power to cause fewer merchandizes to come into their port during the two years that their farm lasts.

The present city is a kind of peninsula situated between the two ports. That to the westward was called by the ancients the *Portus Eunostus*, now the *Old Port*, and is by far the best; Turkish vessels only are allowed to anchor there: the other, called the *New Port*, is for the Christians; at the extremity of one of the arms of which stood the famous Pharos. The New Port, the only harbour for the Europeans, is clogged up with sand, insomuch that in stormy weather ships are liable to bilge; and, the bottom being also rocky, the cables soon chafe and part; so that one vessel driving against a second, and that against a third, they are perhaps all lost. Of this there was a fatal instance about twenty-five years ago, when forty-two vessels were dashed to pieces on the mole in a gale of wind from the north-west, and numbers have been since lost there at different times. If it be asked in Europe, Why do they not repair the New Port? the answer is, That in Turkey they destroy every thing, and repair nothing. The old harbour will be destroyed likewise, as the ballast of vessels has been continually thrown into it for the last 200 years. The spirit of the Turkish government is to ruin the labours of past ages, and destroy the hopes of future times, because the barbarity of ignorant despotism never considers to-morrow.

In time of war, Alexandria is of no importance; no fortification is to be seen; even the Farillon, with its lofty towers, cannot be defended. It has not four cannon fit for service, nor a gunner who knows how to point them. The 500 janisaries, who should form the garrison, reduced to half that number, know nothing but how to smoke a pipe. This made Buonaparte's landing and passage through it in August of the present year (1798) such an easy matter. But Alexandria is a place of which the conquest would be of no value. A foreign power could not maintain itself there, as the country is without water. This must be brought from the Nile by the kalidj, or canal of twelve leagues, which conveys it thither every year at the time of the inundation. It fills the vaults or reservoirs dug under the ancient city, and this provision must serve till the next year. It is this canal alone which connects Alexandria with

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Egypt; for from its ſituation without the Delta, and the nature of the ſoil, it really belongs to the deſerts of Africa. Its environs are ſandy, flat, and ſterile, without trees and without houſes; where we meet with nothing but the plant which yields the kali, and a row of palm-trees which follows the courſe of the kalidj or canal.

The city is governed like others in the ſame kingdom. It hath a ſmall garriſon of ſoldiers, part of which are janiſaries and aſſaffs; who are very haughty and inſolent, not only to ſtrangers, but to the mercantile and induſtrious part of the people, though ever ſo conſiderable and uſeful. The government is ſo remiſs in favour of theſe wretches, that Mr. Norden informs us, one of them did not heſitate to kill a farmer of the cuſtoms, for refuſing to take leſs of him than the duty impoſed, and went off unpuniſhed; it being a common ſalvo among them, that what is done cannot be undone.

The preſent condition of Alexandria is very deſpicable, being now ſo far ruined, that the rubbiſh in many places overtops the houſes. The famous tower of Pharos has long ſince been demoliſhed, and a caſtle, called Farillon, built in its place. The cauſeway which joined the iſland to the continent is broken down, and its place ſupplied by a ſtone bridge of ſeveral arches. Some parts of the old walls of the city are yet ſtanding, and preſent us with a maſterpiece of ancient maſonry. They are flanked with large towers, about two hundred paces diſtant from each other, with ſmall ones in the middle. Below are magnificent caſemates, which may ſerve for galleries to walk in. In the lower part of the towers is a large ſquare hall, whoſe roof is ſupported by thick columns of Thebaic ſtone. Above this are ſeveral rooms, over which there are platforms more than twenty paces ſquare. The ancient reſervoirs, vaulted with ſo much art, which extend under the whole town, are almoſt entire at the end of two thouſand years.

Of Cæſar's palace there remain a few porphyry pillars, and the front, which is almoſt entire, and looks very beautiful. The palace of Cleopatra was built upon the walls facing the port, having a gallery on the outſide, ſupported by ſeveral fine columns. Not far from this palace are two obeliſks called *Cleopatra's Needles*. They are of Thebaic ſtone, and covered with hieroglyphics. One is overturned, broken, and lying under the ſand; the other is on its pedeſtal. Theſe two obeliſks, each of them of a ſingle ſtone, are about ſixty feet high, by ſeven feet ſquare at the baſe. Towards the gate of Roſetta, are five columns of marble on the place formerly occupied by the porticoes of the gymnaſium. The reſt of the colonnade, the deſign of which was diſcoverable 100 years ago by Maillet, has ſince been deſtroyed by the barbariſm of the Turks.

But what moſt engages the attention of travellers is the pillar of Pompey, as it is commonly called, ſituated at a quarter of a league from the ſouthern gate. It is compoſed of red granite. The capital is Corinthian, with palm-leaves, and not indented. It is nine feet high. The ſhaft and the upper member of the baſe are of one piece of ninety feet long, and nine in diameter. The baſe is a ſquare of about fifteen feet on each ſide. This block of marble, ſixty feet in circumference, reſts on two layers of ſtone bound together with lead; which, however, has not prevented the Arabs from forcing out ſeveral of them, to ſearch for an imaginary treaſure. The whole column is 114 feet high. It is perfectly well poliſhed, and only a little

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shivered on the eastern side. Nothing can equal the majesty of this monument; seen from a distance, it overtops the town, and serves as a signal for vessels. Approaching it nearer, it produces an astonishment mixed with awe. One can never be tired with admiring the beauty of the capital, the length of the shaft, nor the extraordinary simplicity of the pedestal. This last has been somewhat damaged by the instruments of travellers, who are curious to possess a relic of this antiquity; and one of the volutes of the column was immaturely brought down about twelve years ago, by a prank of some English captains, which is thus related by Mr. Irwin.

These jolly sons of Neptune had been pushing about the can onboard one of the ships in the harbour, until a strange freak entered into one of their brains. The eccentricity of the thought occasioned it immediately to be adopted; and its apparent impossibility was but a spur for the putting of it into execution. The boat was ordered; and with proper implements for the attempt these enterprising heroes pushed ashore, to drink a bowl of punch on the top of Pompey's pillar! At the spot they arrived; and many contrivances were proposed to accomplish the desired point. But their labour was vain; and they began to despair of success, when the genius who struck out the frolic happily suggested the means of performing it. A man was dispatched to the city for a paper kite. The inhabitants were by this time apprized of what was going forward, and flocked in crowds to be witnesses of the address and boldness of the English. The governor of Alexandria was told that these seamen were about to pull down Pompey's pillar. But whether he gave them credit for their respect to the Roman warrior, or to the Turkish government, he left them to themselves; and politely answered, that the English were too great patriots to injure the remains of Pompey. He knew little, however, of the disposition of the people who were engaged in this undertaking. Had the Turkish empire rose in opposition, it would hardly have deterred them. The kite was brought, and flown so directly over the pillar, that, when it fell on the other side, the string lodged upon the capital. The chief obstacle was now overcome. A two-inch rope was tied to one end of the string, and drawn over the pillar by the end to which the kite was affixed. By this rope one of the seamen ascended to the top; and in less than an hour, a kind of shroud was constructed, by which the whole company went up, and drank their punch amid the shouts of the astonished multitude. To the eye below, the capital of the pillar does not appear capable of holding more than one man upon it; but our seamen found it could contain no less than eight persons very conveniently. It is astonishing that no accident befel these madcaps, in a situation so elevated, that would have turned a landman giddy in his sober senses. The only detriment which the pillar received, was the loss of the volute before mentioned; which came down with a thundering sound, and was carried to England by one of the captains, as a present to a lady who commissioned him for a piece of the pillar. The discovery which they made amply compensated for this mischief; as, without their evidence, the world would not have known at this hour, that there was originally a statue on this pillar, one foot and ancle of which are still remaining. The statue must have been of a gigantic size, to have appeared of a man's proportion at so great an height.

There are circumſtances in this ſtory which might give it an air of fiction, were it not demonſtrated beyond all doubt. Beſides the *teſtimonies of many eye-witneſſes*, the adventurers themſelves have left us a token of the fact, by the initials of their names, which are very legible in black paint juſt beneath the capital.

Learned men and travellers have made many fruitleſs attempts to diſcover in honour of what prince it was erected. The beſt informed have concluded, that it could not be in honour of Pompey, ſince neither Strabo nor Diodorus Siculus have ſpoken of it. The Arabian Abulfeda, in his deſcription of Egypt, calls it *the pillar of Severus*. And hiſtory informs us, that this emperor "viſited the city of Alexandria: That he granted a ſenate to its inhabitants, who until that time, under the ſubjection of a ſingle Roman magiſtrate, had lived without any national council, as under the reign of the Ptolemies, when the will of the prince was their only law: That he did not *confine his benefactions there; he changed ſeveral laws in their favour.*" This column, therefore, Mr. Savary concludes to have been erected by the inhabitants as a mark of their gratitude to Severus. And in a Greek inſcription, now half effaced, but viſible on the weſt ſide when the ſun ſhines upon it, and which probably was legible in the time of Abulfeda, he ſuppoſes the name of Severus to have been preſerved. He farther obſerves, that this was not the only monument erected to him by the gratitude of the Alexandrians: for there is ſtill ſeen in the ruins of Antinoe, built by Adrian, a magnificent pillar, the inſcription on which is ſtill remaining, dedicated to Alexander Severus.

On the ſouth-weſt ſide of the city, at a mile diſtant, are ſituated the catacombs, the ancient burial place of Alexandria: and although *they cannot be compared to thoſe of the ancient Memphis, which* the Arabs will not permit to be viſited, in order to make the better market of their mummies, it is probable that, the method of embalming being the ſame, the form of theſe catacombs can only differ in their proportions.—The Baron de Tott, in deſcribing theſe, obſerves, "that Nature not having furniſhed this part of Egypt with a ridge of rocks, like that which runs parallel with the Nile above Delta, the ancient inhabitants of Alexandria could only have an imitation by digging into a bed of ſolid rock; and thus they formed Necropolis, or 'City of the Dead.' The excavation is from thirty to forty feet wide, 200 long, and twenty-five deep, and is terminated by gentle declivities at each end. The two ſides, cut perpendicularly, contain ſeveral openings, about ten or twelve feet in width and height, hollowed horizontally; and which form, by their different branches, ſubterranean ſtreets. One of theſe, which curioſity has diſencumbered from the ruins and ſands that render the entrance of others difficult or impoſſible, contains no mummies, but only the places they occupied. The order in which they were ranged is ſtill to be ſeen. Niches, twenty inches ſquare, ſunk ſix feet horizontally, narrowed at the bottom, and ſeparated from each other by partitions in the rocks, ſeven or eight inches thick, divide into checkers the two walls of this ſubterranean vault. It is natural to ſuppoſe, from this diſpoſition, that each mummy was introduced with the feet foremoſt into the cell intended for its reception; and that new ſtreets were opened, in proportion as theſe dead inhabitants of Necropolis increaſed." This obſervation, he adds, which throws a light on

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the catacombs of Memphis, may perhaps likewise explain the vast size and multitude, as well as the different elevations, of the pyramids in the Higher and Lower Egypt.

About seventy paces from Pompey's pillar is the khalis, or the the canal of the Nile, which was dug by the ancient Egyptians, to convey the water of the Nile to Alexandria, and fill the cisterns under the city. On the side of the khalis are gardens full of orange and lemon trees, and the fields are full of caper and palm-trees. On the top of a hill is a tower, on which a centinel is always placed, to give notice, by means of a flag, of the ships that are coming into the port. From this hill may be seen the sea, the whole extent of the city, and the parts round it.

In going along the sea-coast, there is a large bason cut out of the rock that lines the shore. On the sides of this bason, two beautiful saloons are hewn out by the chisel, with benches that run across them. A canal made zig-zag, for the purpose of stopping the sand by its different windings, conveys into them the water of the sea, as pure and transparent as crystal. Seated on the stone bench, the water rises a little above the waist; while the feet softly repose on a fine sand. The waves of the sea are heard roaring against the rock, and foaming in the canal. The swell enters, raises you up, and leaves you; and thus, alternately entering and retiring, brings a continual fresh supply of water, and a coolness which is truly delicious under a burning sky. This place is vulgarly called the Bath of Cleopatra. Some ruins announce that it was formerly ornamented. Alexandria is about fifty leagues north of Cairo. Lat. 31. 12. N. lon. 31. 15. E.

AUGUST 22, 1798. Though the divan had been informed of the French intending to invade Egypt, yet by many of its members this report was deemed a mere fiction, invented to disturb the good understanding which subsisted between the Ottoman Porte and France. Their astonishment was therefore extreme, when they were officially acquainted with the French having actually effected a descent near Alexandria. The particulars of this unexpected event are as follow:

The Toulon fleet, after having for some time cruized in the Archipelago, appeared before Alexandria, and the French demanded to be received as friends. The Mussulman, who commanded in that city, made very strong remonstrances against their projected landing, endeavouring to convince them that any attempt of that kind would be considered as an attack on the right of sovereignty of the Grand Signior, on the privileges of the country, and on the tranquillity and safety of the inhabitants. But all his remonstrances proved fruitless; the French landed in different places about 22,000 men, notwithstanding the resistance made by the Egyptian troops, and the inhabitants of the country. Two days after, the French intending to occupy a post to the right of Alexandria towards Rosetta, they were surprised by a corps of about 6,000 Egyptian horse, and some thousand foot, commanded by a bey who enjoyed the reputation of a brave and gallant soldier. The engagement lasted a few hours, and the bey was forced to retreat with considerable loss, though the French suffered likewise considerably; and their loss was more severely felt, as they were unable to repair it. This action convinced Buonaparte of the sentiments of respect entertained for him by the Arabs, and by the Egyptian troops. He called a council of war, the

result of which was, to advance beyond Rosetta, and to entrench himself about ten or twelve leagues from that town on the banks of the canal which leads to Cairo. In this position, he issued a proclamation, and endeavoured to set on foot a negociation with the beys, who, however, peremptorily refused to treat with him, but insisted on his re-embarking his troops and quitting the dominions of the Grand Signior.

In this situation were the affairs of Egypt on the departure of the last accounts received from that county.

Within these few days a proclamation has been made public, which Buonaparte is said to have issued in the Arabic language, on his landing in Egypt. The following is a translation of it:

"In the name of God, gracious and merciful. There is no God but God; he has no son nor associate in his kingdom.

"The present moment, which is destined for the punishment of the beys, has been long anxiously expected. The beys, coming from the mountains of Georgia and Bajars, have desolated this beautiful country, long insulted and treated with contempt the French nation, and oppressed her merchants in various ways. Buonaparte, the general of the French republic, according to the principles of liberty, is now arrived, and the Almighty, the Lord of both worlds, has sealed the destruction of the beys.

"Inhabitants of Egypt, when the beys tell you the French are come to destroy your religion, believe them not: it is an absolute falsehood. Answer those deceivers, that they are only come to rescue the rights of the poor from the hands of their tyrants, and that the French adore the Supreme Being, and honour the Prophet and his Holy Koran.

"All men are equal in the eyes of God. Understanding, ingenuity, and science, alone, make a difference between them: as the beys, therefore, do not possess any of these qualities, they cannot be worthy to govern the country.

"Yet are they the only possessors of extensive tracts of land, beautiful female slaves, excellent horses, magnificent palaces! Have they then received an exclusive privilege from the Almighty? If so, let them produce it. But the Supreme Being, who is just and merciful towards all mankind, wills that, in future, none of the inhabitants of Egypt shall be prevented from attaining to the first employments, and the highest honours. The administration, which shall be conducted by persons of intelligence, talents, and foresight, will be productive of happiness and security. The tyranny and avarice of the beys have laid waste Egypt, which was formerly so populous and well cultivated.

"The French are true Mussulmen. Not long since they marched to Rome, and overthrew the throne of the pope, who excited the Christians against the professors of Islam (the Mahometan religion); afterwards they directed their course to Malta, and drove out the unbelievers, who imagined they were appointed by God to make war on the Mussulmen. The French have at all times been the true and sincere friends of the Ottoman emperors, and the enemies of their enemies. May the empire of the sultan, therefore, be eternal, but may the beys of Egypt, our opposers, whose insatiable avarice has continually excited disobedience and insubordination, be trodden in the dust and annihilated.

"Our

"Our friendſhip ſhall be extended to thoſe of the inhabitants of Egypt who ſhall join us; as alſo to thoſe who ſhall remain in their dwellings, and obſerve a ſtrict neutrality, and, when they have ſeen our conduct with their own eyes, haſten to ſubmit to us; but the dreadful puniſhment of death awaits thoſe who ſhall take up arms for the beys and againſt us. For them there ſhall be no deliverance, nor ſhall any trace of them remain.

"Art. I. All places which ſhall be three leagues diſtant from the route of the French army, ſhall ſend one of their principal inhabitants to the general to declare that they ſubmit, and will hoiſt the French flag, which is blue, white, and red.

II. Every village which ſhall oppoſe the French army ſhall be burned to the ground.

III. Every village which ſhall ſubmit to the French ſhall hoiſt the French flag, and that of the Sublime Porte, their ally, whoſe duration be eternal.

IV. The Sheiks and principal perſons of each town and village ſhall ſeal up the houſes and effects of the beys, and take care that not the ſmalleſt article ſhall be loſt.

V. The Sheiks, Cadis, and Imans, ſhall continue to exerciſe their reſpective functions; and put up their prayers, and perform the exerciſes of religious worſhip in the moſques and houſes of prayer. All the inhabitants of Egypt ſhall offer up thanks to the Supreme Being, and put up public prayers for the deſtruction of the beys.

May the Supreme God make the glory of the ſultan of the Ottomans eternal, pour forth his wrath on the Mamalouks, and render glorious the deſtiny of the Egyptian nation!"

BUONAPARTE'S EXPEDITION.

WHATEVER may be the ultimate views of this enterprizing general, it now ſeems to be certain that Egypt was the firſt object of his operations. If the French mean to make it a kind of colony and the channel of a great trade, it is, no doubt, very advantageouſly ſituated for that purpoſe. Without any reference to its ancient flouriſhing ſtate, it is now in poſſeſſion of a conſiderable trade with Arabia, by the Red Sea; with Abyſſinia and the interior of Africa, by the Nile; and with Turkey and Europe by the Mediterranean. It was aſcertained by the Cuſtom-houſe accounts of Cairo, in the year 1783, that buſineſs was carried on in that city to the amount of between ſix and ſeven millions ſterling. Its exports in rice, corn, flax, and coffee, are nearly two millions. Conſidering Egypt merely in a commercial point of view, it muſt, therefore, hold out vaſt attractions to a nation which has already formed the project of occupying excluſively the commerce of the Levant. A project, the the execution of which is ſingularly favoured by the poſſeſſion of the Venetian Iſlands, by the French influence over all Italy; and laſtly, by the capture of Malta. But the views of France probably extend much farther, and ſhe may entertain hopes of carrying on trade with the Eaſt Indies by a way much ſhorter than the preſent one, and which, if equally ſafe, would doubtleſs be preferred. This idea was in agitation long before the revolution; and a plan to that effect was actually preſented by Baron de Tott to the Marſhal de Caſtries.

A com-

A communication with the East Indies would be naturally opened by the Red Sea, the navigation of which cannot be dangerous, as it is at present carried on by the Turks, who are but indifferent seamen. The number of their vessels employed in it do not exceed 30, and they depart once a year from Djedda, and arrive with the southerly winds at Suez, where they land their cargoes of gums, perfumes, India stuffs, and particularly the coffee of Yemen in Arabia. If, however, Egypt were in the hands of the French, they would of course make themselves masters of the Streight of Babelmandel, construct a port at Berenice, and perhaps succeed in clearing and refitting that of Suez. These two towns would be the storehouses from which merchandize might be conveyed by canals to Cairo and Alexandria.

With respect to the project of cutting through the Isthmus of Suez, it is evidently impossible from the nature of the soil, without mentioning any other obstacle. But this difficulty might be in some degree obviated, by restoring some canals which formerly existed, such as the canal of Suez to the lake Amer, and that from the same lake to the Nile (the remains of which are still apparent), and by making another from Berenice towards Captos: vessels of considerable burden could not navigate these canals, but it would be a sufficient advantage to have the merchandize transported by small craft. The cities which we have mentioned would become magazines where all the merchants of Europe might draw the different articles of the East-India trade. Timber-yards, docks, and arsenals, might be formed at Berenice, for the purpose of establishing a naval force; for, though there are no forests or woods in that part, ships might be easily built at Toulon, constructed in such a way as to take in pieces, which, being properly numbered, might be conveyed by sea to Alexandria, and from thence by canals, or on the backs of camels, to the new port in the Red Sea. One ship would be capable of carrying seven others in this manner. This scheme of first building ships, and afterwards putting them on-board of others, may appear ridiculous to some persons, but a model of the kind has been recently executed at Toulon; a ship has been actually built there which divides into eight parts.

The conquest of Egypt may be effected in as easy a way as that of Malta. Although the Grand Signior be considered as sovereign of it, the Mamalucks are in fact the rulers; for the Pacha, appointed by the Porte, has no more power than the Doge of Genoa, and the tribute to what is called the supreme power is very ill paid. The military force of the Mamalucks consists of 10,000 horse, and the infantry is scarcely worthy of notice. It is commanded by 24 beys, who are occasionally in a state of hostility with each other. There are neither forts, redoubts, nor artillery, and the unlimited power exercised by a licentious soldiery over the people, would naturally make the latter eager to shake off the yoke of oppression, and assist the French in the execution of their designs. From these considerations, it follows, that *Buonaparte* may gather new laurels in Egypt, without exposing himself to danger or to the risk of a failure, provided his troops can overcome the heat of that climate as they have done that of Italy.

Cairo, which hath opened its gates to the conqueror of Italy, is said, by Mr. Norden and Dr. Pococke, to have risen from the ruins of the Egyptian Babylon; an assertion, however, which is contradicted

dicted by other authorities, which state, that the small town of Tinnah, twelve miles distant, stands upon the scite of that celebrated city. Cairo is called by the natives *Misir ul Kaira*, or *the City of Anguish*, from the frequent ravages which the plague occasions. It is situated on an artificial branch of the Nile, and is one of the largest and finest cities of the east. The hall where Joseph gave audience to his brethren, when they came to purchase corn in Egypt, still remains. But the city is incapable of much resistance, though there is a high rock in the center, with a castle upon it, which might make a vigorous defence, if the fortifications were not in a dismantled state.

The message of the directory on the capture of Cairo merely states, that Buonaparte, after the conquest of that capital, continued his march to his place of destination; but it leaves us uncertain as to the name of this place. This has given rise to a variety of opinions with respect to the ultimate object of the expedition of the French. While some contend that he is about to march seventy miles through the desert of Suez, to embark at that port, and to proceed to Babelmandel and the Malabar Coast; others send him up the Nile as far as Cophtos, to penetrate from thence through the desert as far as Cosseir by a march of forty leagues, with a view of embarking there for Babelmandel, and thus avoiding the Gulph of Suez, which is the most dangerous part of the Red Sea. Some again imagine, that Buonaparte intends to establish himself in Egypt, after having conquered that country, and to render himself independent of the French republic. All these projects are obstructed by great difficulties, and success alone can justify the extravagance of them.

The caravans require only three or four days to make the journey from Cairo to Suez; but they are protected by the government of the country, which is hostile to Buonaparte. This government, it is true, is but little formidable in itself, but supported by the fanaticism of the Arabs, and incited by the Turks, it may severely harrass and greatly obstruct his march. It keeps 9000 camels for the use of the caravans, which if they should be removed, as in all probability they are, it will be impossible for the French to proceed on their march to Suez. The army might find vessels at Suez ready for their reception; but we are justified in supposing that they have been either prevented from assembling, or have been since sent away by the Egyptian government. So much for the first project.

On ascending the Nile above Cairo, this river no longer branching out into different canals, as it does in the Delta, assumes a course the more rapid, as the northerly winds, which force the waters back at the mouth of the Nile, here lose their influence. From this cause it becomes more difficult, and requires more time, to work up the river to the distance of 100 leagues. Arrived at Cofou, or Cophtos, the army has then to march through a desert twice as long as that from Cairo to Suez, and this march becomes of course still more impossible if the French cannot make use of the camels designed for the caravans. Cophtos is separated from Cosseir by a deep and barren valley, the passage through which is however practicable, as it has very good springs, yet in some places it is so narrow, that scarce three animals can pass a-breast. The sands and rocks, constantly affected by the scorching rays of the sun, reflect a burning light, very hurtful to the eyes, and produce so intense a degree of heat, that it can hardly be supported. As the winds do not blow

during

during the night, the travellers are exposed to the suffocating exhalations of the burning sands. For these reasons, this road can only be passed in the winter seasons.

It is by the port of Cosseir that the Egyptian corn is exported to Gedda, for the consumption of Arabia. In order to ensure the success of the expedition, it is requisite that the vessels employed in that export trade be found in that harbour, and consequently they must not have been removed by order of the government of Egypt to the eastern coast of the Red Sea. Their number must also be sufficient to convey all the baggage of such a considerable army.

The execution of the second project is thus liable to great difficulties, nor is that of the third obstructed by obstacles less numerous and less formidable.

To subject to the power of a regular government a people like the Arabs, who have for ages been accustomed to acknowledge none; to rule men whose manners and customs are as little known as their language; to amalgamate the characters of two nations, which are the very reverse of each other, and which for this reason cannot fail to contract an insuperable antipathy against one another; to subject Mussulmen, and above all Arabs, the most fanatical of all the adherents of Mahomet, to conquerors, who must scandalize themselves by their drunkenness and irregularities, become offensive by their insolence towards the women, and disgusting by that vain and contemptuous tone, which renders the French odious to other nations; will be found a most arduous talk for Buonaparte. But the greatest obstacles arise from the climate.

It appears from numerous facts, that all hot countries prove extremely destructive to the French. They will carry along with them into Egypt their intemperance, their dissipation, and debauchery; they will wish to live there as there as they did in France, for it is a leading feature in the national character of the French, that with much levity in their taste they tenaciously adhere to their customs. Burning and putrid fevers, pleurisies, and dysenteries, will of course follow their excesses, and diminish their numbers. At the same time they are cut off from all means of recruiting their army by the late defeat of the French fleet, by our cruizers, and by those of other nations, which this extravagant expedition has excited against the French in the Levant.

They who reason on the obstacles which Buonaparte is likely to meet with, calculate only the forces which he has to oppose in Egypt; but to these forces should be added the troops which the Pachas of Syria and Palestine, who according to the last accounts are already marching against the French, will bring into the field. They also do not compute the difficulties arising from the want of the resources which the second armament, shut up in the port of Toulon by the *unexpected appearance of our fleet in the Mediterranean*, was to convey to Egypt. The want of these resources is so severely felt by Buonaparte's army, that, according to the last accounts from Malta, he had been obliged to drain that island of all kinds of provisions to such a degree, that the utmost scarcity prevails there at present.

Buonaparte must therefore rest his hopes of success on those means only, which he took with him on-board his fleet; nor can he on any just ground expect to be able to repair the numerous losses, and supply

supply the wants which in point of men, arms, ammunition, provisions, &c. his army must inevitably experience in its present detached and unsupported state.

On the farther design of Buonaparte's expedition, and the practicability of the voyage to India, the following Observations on the Moonsons, extracted from the *Bombay Calendar*, must be interesting:

"Our readers will not require to be told that our year is divided into two grand seasons, or, as they are called, the *South West* and *North East Monsoons*; that the first generally prevails from May to the middle of September inclusive, the other during the remaining months; yet we must premise this as an introduction to what follows.

"We need scarcely to observe, that during the *South West Monsoon*, all the ports and roadsteds on this side of India deny approach; so much so, that, between the 15th of May and the 1st of September, ships are precluded by their policies from touching upon the Malabar coast, or from lying in Surat Roads between the 1st of May and the 1st of September. Generally speaking, the monsoon is considered to extend from Dunderhead, the southern extremity of Ceylon, to the Persian Gulph; in order to attain which, they who should sail at this season would be obliged to make what is called a southern passage, that is, go first to the south of the Equator, before they could stretch over to the westward; a voyage that would occupy, for Muscat about 40 days, and to Bussorah about two months: the same objection exists against sailing at this season to any part of the Arabian coast; as for the Red Sea, it is considered in vain to attempt entering it at this season; nor can it be said to be favourable to sail now to the Cape, the Mauritius, or any port to the westward. To the other side of India, on the contrary, it is now the most advantageous period of departing. From the middle of April even to the middle of August, a voyage to Madras may be made in about twelve or fifteen days; to Bengal from fifteen to twenty days; after this time it becomes excessively tedious, from the necessity of keeping to the eastern side of the Bay to avoid the violent weather on the Coromandel coast: for the same reason the South West Monsoon is eligible to leave Bombay for any of the ports in the Gulph of Bengal, or the Straits of Malacca; hence also it is the season for sailing to China: after the 20th of August, however, what is called the direct passage to China becomes very precarious, with much probability of finding blowing weather in the China seas. With regard to the ports from which ships may be expected to arrive at Bombay during *this Monsoon, it may be laid down as a general rule*, that the quarters favourable to sail to during any season, are those that it is unfavourable to expect arrivals from, and *vice versa*; hence, from the Persian Gulph, the Red Sea, the Cape of Good Hope, and the westward in general, this is the most seasonable period to expect arrivals: from Muscat, a trip may now be made in ten or twelve days, from Mocha in twenty days, and Suez in about a month: it should be remarked, that after September the Red Sea admits of no egress; ships consequently remaining there beyond that time must continue there all the *North East Monsoon*, and are said to have lost their passage: on this account, the 25th of August is the latest day to which our cruizers are allowed to remain at Suez.—From the Cape a passage may be made in 5 or 6 weeks, from the Mauritius in three weeks or a month. The *South West Monsoon* is also the most favourable season in which a

passage may be made from Batavia or any ports to the eastward, through these southern straits: from Batavia to Bombay in particular, a passage may be made in about 35 days. From Madras and Bengal, during the South-west Monsoon, it is necessary to make the southern passage in order to reach Bombay: this will require, in a passage from Madras, from thirty to forty days, and from Bengal from forty-five to sixty days, from the necessity of working out of the river and beating down the Bay to clear Acheen head; from the Straits of Malacca it is an arduous task to sail for this port, or even to any one on the peninsula of India, owing to the difficulty of working round Acheen head.

"We have now to treat of the *North East Monsoon*, or the season which may be considered as included between the 15th of August and the 15th of April; in which the first circumstance that occurs to us to remark is, that our coast is rendered in a peculiar manner secure and favourable to navigation; it is now considered the most eligible period for sailing to the Persian Gulph, and in general to all ports to the westward; to Muscat the trip is generally fifteen, and to Bussorah twenty-eight, days. The time suitable for sailing to Mocha and Suez is, from the middle of February to the middle of March, when a passage may be made to the first in eighteen days, and to the second in twenty-five. If a ship be delayed till the latter end of March or the beginning of April, the passage becomes more tedious, being then obliged to make the land to the southward of the Island of Socatra, before the Gulph can be entered, on account of the southerly winds which prevail, and a current setting to the northward. After the 15th of April, a ship bound to the Red Sea would be very likely to lose her passage. Between the 15th of August and the 15th of September, it may be considered favourable to sail to Madras and Bengal, but after this time the season is suspended, owing to the setting in of the *North East Monsoon* on the other side of India, which closes the ports on the Coast of Coromandel, Golconda, and Orissa, between the 15th of October and the 15th of December; at least this period is excepted in common policies of insurance: after this time again a passage may be made to Madras in thirty, and Bengal in fifty, days. This season may be deemed unfavourable to the Coast of Pegne and the Straits of Malacca; but for the Straits of Sunda (Batavia, for example) it is the best adapted; a passage thither may be made in thirty-five days. With regard to the seasonable imports in this Monsoon, it is at no time more advantageous than now for coming from the Coromandel Coast, and in short the whole Bay: a passage may be made from Madras in twenty days, from Bengal in a month, and Penang a month. From the Persian Gulph it is no less favourable, the passage from Muscat being about ten days, and from Bussorah twenty-eight. The Red Sea is now closed; nor is it reasonable to expect arrivals from the Cape or the Straits of Sunda; from the latter in particular it is almost impossible at this season to make a tolerable passage."

The following is Buonaparte's own account of his expedition, as far as it has reached, in his letters to the executive directory, dated head-quarters, Cairo, 6th Thermidor, 6th year, (24th July, 1798.)

On the 19th Messidor the army set out for Alexandria. It arrived at Demonhour on the 20th, having suffered greatly in traversing this desert, from excessive heat and want of water.

BATTLE

BATTLE OF RHAMANIE.—On the 22d we met the Nile at Rhamanie, and joined the division of General Dugua, who had proceeded to Rosetta, by forced marches. The division of General Desaix was attacked by a body of seven or eight hundred Mamelukes, who, after, a brisk cannonade, and the loss of some men, retired.

BATTLE OF CHEBREISSA.—In the mean time I learnt that Murat Bey, at the head of his army, composed of a considerable force of cavalry, with eight or ten large cannon, and several batteries upon the Nile, was advancing. We waited near the village of Chebreissa. On the evening of the 24th we began to march towards it. The 25th, at day-break, we arrived there. We had only 200 cavalry, wearied and harrassed. The Mamelukes had a magnificent body of cavalry, covered with gold and silver; arms of the best kind; carbines and pistols of the manufacture of London, the best sabres of the east, and mounted on the best horses on the continent. The army was ranged—each division forming a battalion four-deep, their baggage in the centre, and the artillery in the spaces between the battalions. The battalions were ranked, the 2d and 4th division behind the 1st and 3d. The five divisions of the army were placed *en echelons*, flanking each other, and flanked by two villages which we occupied.

Citizen Perree, chief of the division of marine, with three armed sloops, a chebeck, and a galley, proceeded to the attack of the enemy's flotilla. The battle was extremely obstinate. Perree, the chief of division, was wounded in the arm with a cannon ball; but by his good dispositions and his intrepidity gained possession of three sloops and a galley which the Mamelukes had taken, and set fire to their admiral's ship. Citizens Monge and Berthollet, who were in the chebeck, evinced at the most difficult moment the utmost courage. General Andreossi, who commanded the troops, conducted himself perfectly to my satisfaction.

The cavalry of the Mamelukes soon inundated all the plain, surrounded all the wings of our army, and pressed us on all sides in flank and in the rear; but they every where found our line was equally formidable, and opposed them with a double fire from the flank and front. They many times endeavoured to charge, but without determination. Some more bold skirmished with us, but they were received by the balls of the carabineers placed before the battalions. In fine, after having remained a part of the day at about half cannon-shot distance, they commenced their retreat and disappeared. We may estimate their loss at about three hundred men killed and wounded.

We had marched during eight days in want of every thing; and in one of the hottest climates in the world. On the morning of the 2d Thermidor, we perceived the Pyramids. The evening of the 2d, we found ourselves within six miles of Cairo; and I learnt that the twenty-three beys, with all their forces, were entrenched at Lambabe; that they had covered their entrenchments with more than sixty pieces of cannon.

BATTLE OF THE PYRAMIDS.—On the 3d, at day-break, we met their advanced guard, which we pursued from village to village. At two in the afternoon, we found ourselves at the enemies entrenchments. I ordered the divisions of Generals Desaix and Reynier to take a position to the right, between Gizah and Lambabe, in order to

cut off the communication of the enemy with the Higher Egypt, their natural retreat. The army was ranged in the same manner as at the battle of Chebreissa.

The instant that Murat Bey perceived the movement of General Desaix, he resolved to charge. He sent one of the bravest of his beys with a chosen body of troops, who charged the troops with the rapidity of lightning. We let them approach within fifty paces, when we overwhelmed them with a shower of balls, which made vast numbers fall on the field of battle. They threw themselves between the spaces which formed the two divisions, where they were received by a double fire, which finished their defeat.

I seized the moment, and ordered the division of General Bon, who was upon the Nile, to proceed to the attack of the entrenchments; and General Vial, who commanded the division of General Menou, to proceed between the body of troops which had charged him and the entrenchments, in order to accomplish this triple object: to prevent the body of troops from re-entering the entrenchments; to cut off the retreat of those who occupied them; and, lastly, if it should be necessary, to attack the entrenchments on the left.—The instant Generals Vial and Bon advanced, they ordered the first and third divisions of each battalion to range in columns for the attack, while the second and third preserved the same position, forming always a battalion four deep, and advanced to maintain the columns of attack. The columns of attack of General Bon, commanded by the brave General Rampon, threw themselves into the entrenchments with their usual impetuosity, notwithstanding the fire of a great quantity of artillery when the Mamelukes charged them. They went out of their entrenchments at full gallop. Our columns had time to halt, and to form a front to oppose them on all sides, and receive them with the bayonet, and a shower of balls. At the same instant, the field of battle was strewed with the slain. Our troops soon carried the entrenchments. The Mamelukes, in their flight, precipitated themselves, in crowds, on our left, but General Vial was posted to receive them. A battalion of carabineers, under whose fire they were obliged to pass, made a dreadful slaughter of them. A great number threw themselves into the Nile and swam off.

More than 400 camels, loaded with baggage, and fifty pieces of artillery, fell into our power. I estimate the loss of the Mamelukes at 2000 men, the choice of their cavalry. Great part of the beys were killed or wounded. Murat Bey was wounded in the cheek. Our loss amounts to twenty or thirty killed, and one hundred and twenty wounded. During the night the city of Cairo was evacuated. All their armed sloops, corvettes, brigs, and even a frigate, were burnt. On the 4th our troops entered Cairo. In the night the populace burnt the houses of the beys, and committed many excesses. Cairo, which contains more than 300,000 inhabitants, has the most abandoned populace in the world.

After the great number of battles which the troops I command had gained over superior forces, I thought it not prudent to praise their continence and *sang froid* on this occasion; for truly this new kind of warfare required, on their part, a degree of patience, forming a strong contrast with French impetuosity. If they had abandoned themselves to their full ardour, they would not have gained a victory which was only to be obtained by the greatest coolness and patience.

patience. The cavalry of the Mamelukes ſhewed great bravery. They defended their fortunes; for there was not one of them on whom our ſoldiers did not find three, four, and 500 Louis d'ors.

All the luxury of theſe people conſiſted in their horſes and arms. Their houſes are wretched. It is difficult to find a country more fertile, or a people more miſerable, more ignorant, and more ſtupid. They prefer a button of our ſoldiers to a crown of ſix francs value. In the villages they do not even know the uſe of a pair of ſciſſars. They have no moveables but a ſtraw mat, and two or three earthen pots. In general they eat but few things. They do not know the uſe of windmills, ſo that we have conſtantly immenſe quantities of grain without any flour. The ſmall quantity of grain which they convert to flour, they bruiſe with ſtones; and in ſome of the large villages they have mills, which are turned by oxen.

We have been continually harraſſed by the Arabs, who are the greateſt robbers and the greateſt villains on earth, aſſaſſinating the Turks as well as the French, and all who fall into their hands. The general of brigade, Mureur, and ſeveral other aides-de-camp, and officers of the etat major, have been aſſaſſinated by theſe wretches. Concealed behind ditches, or in trenches, upon their excellent little horſes, unfortunate it is for him who ſtrays one hundred paces from the columns. General Mureur, notwithſtanding the repreſentations of the great precaution neceſſary to be obſerved, by a fatality which I have often remarked to accompany men arrived at their laſt hour, was deſirous to aſcend alone a little eminence, about two hundred paces from the camp. Behind it were three bedouins, who aſſaſſinated him: the republic has in him ſuſtained a real loſs; he was one of the braveſt generals I ever knew. There is in this country very little money, a great deal of corn, rice, vegetables, and cattle. The republic could not have a colony of more capacity, or richer ſoil. The climate is very healthy, owing to the freſhneſs of the nights. Notwithſtanding fifteen days of marching, fatigues of every kind, the abſolute want of wine, and every thing elſe to alleviate fatigue, we have had no ſickneſs. The ſoldiers have found great reſources in a kind of water-melons, which are in great abundance.

After giving an account of ſeveral ſkirmiſhes with the Arabs, the particulars of which are not very intereſting, he ſays:

On the 6th of July I wrote to the admiral to enter the port of Alexandria in twenty-four hours; and, if that was not practicable, to land immediately all the artillery and ſtores belonging to the army, and return to Corfu. I then left Alexandria, in the full aſſurance that, in three days, one of theſe meaſures would have been adopted. From that to the 24th of July, I received no intelligence whatever, either from Roſetta or Alexandria. A multitude of Arabs, collected from all parts of the deſert, kept conſtantly within five hundred toiſes of the camp.

On the 27th, at length, the report of our victories, and different poſitions, opened our communications. I received ſeveral letters from the admiral, when I learned, with aſtoniſhment, that he remained ſtill at Aboukir. I then wrote to him again, that he muſt not loſe an hour, but either enter the port of Alexandria, or return to Corfu. The admiral had written to me on the 20th of July, that ſeveral Engliſh frigates were come to reconnoitre, and that he was fortifying himſelf in expectation of the enemy at Aboukir. This

ſtrange

strange resolution filled me with the most lively alarms; but the time was lost; for the letter of the 20th did not reach me until the 30th of the same month. I dispatched Citizen Julien, my aide-de-camp, with orders not leave Aboukir until he had seen the squadron under sail. On the 26th the admiral wrote to me that the English had retired, which measure he attributed to want of provisions. I received this letter, the 30th, by the same courier. The 29th he wrote to me, that he had at length heard of the victory of the Pyramids, and the taking of Cairo, and found a passage for entering the port of Alexandria; that letter I received the 5th of August.

On the night of the 1st of August, the English attacked him. On the moment he perceived the English squadron, he dispatched an officer to apprise me of his dispositions and plans; this officer perished on the road. It seemed to me that Admiral Bruteys was unwilling to return to Corfu before he had ascertained the practicability of entering the port of Alexandria; and that the army, of which he had received no intelligence for a long time, was in a position in which it would not be obliged to retreat.—If in this calamitous event he was to blame, he has expiated his faults by a glorious death. The destinies have been desirous to prove, on this occasion, as on so many others, that, if they grant us a great preponderance on the continent, they have given the empire of the seas to our rivals; but, however great this reverse, it is not to be attributed to the ficklenefs of fortune. She has not yet abandoned us. Far from it; she has favoured us in the whole expedition in a degree surpassing all her former efforts. When I arrived before Alexandria, and learned that the English had been there a few days before with a superior force; notwithstanding the tempestuousness of the weather, I threw myself onshore at the risk of being wrecked. I remember, at the moment when preparations were making for landing, there was a signal in the offing of an enemy's sail.—I marched all night; at break of day I attacked Alexandria with 3000 harrassed men, without cannon, and nearly without cartridges; and in five days I became master of Rosetta, of Demenhour; that is to say, I am already established in Egypt.

For these five days was the squadron sheltered from the enemy, however great might be their number? far from it, it remained exposed during the remainder of the month of July. It received from Rosetta, about the 20th of that month, a supply of rice for two months. The English, in superior force, were for ten days in these parts. On the 29th of July it received intelligence of our entire possession of Egypt, and our entry into Cairo; and it was only after Fortune saw that all her favours were become of no farther use, that she abandoned our fleets to its destiny. BUONAPARTE.

To speak of the conquest of Egypt by Buonaparte, is perfectly ridiculous. The country which he has overrun does not exceed one hundred miles in length. The length of Upper Egypt, into which he has not penetrated, and which is incomparably a more difficult country, is four hundred miles. The most advanced post which he even intends to occupy on that side is Fayoum, a small distance beyond the pyramids, and about thirty miles beyond Cairo. On carefully examining the French dispatches, the beys seem to us to have conducted their defensive warfare with prudence and skill. They seem not to have hazarded a general action, but to have contented themselves with

with detaching bodies of Mameluke cavalry to harrass the enemy on their march. All the battles and victories of Buonaparte amount, in truth, only to skirmishes with such detachments.

There is no reason to doubt that Egypt, in a long course of tranquillity, and by the persevering exertions of industrious skill, might be made a productive and valuable colony. But a colony is not the work of a moment. Many years of quiet, good management, and good fortune, are necessary to produce a sensible improvement in a great country. Egypt might indeed be made of great value in half a century, but is of no value to a plundering invader. It does not, like Bengal or Peru, offer immediate booty to the spoiler. It only presents the hope of distant but permanent wealth, to be slowly earned by a just and wise administration.—It has no mines to be wrought, no private or public hoards to be seized, no merchants or manufacturers to be robbed, no opulent landholders to be plundered. It is at present poor, though it has a capacity of becoming rich. The cultivation of a country is not to be improved, nor the habits of a great people changed, in a few months, by an army of 20,000 men, detested by the inhabitants, strangers to their language, alien from their manners, occupied with the care of their own safety, and cut off from all hope of reinforcement or succour. It is even probable that Buonaparte's will be in danger of want, if their stay be long; for, fertile as the soil of Egypt is, yet so wretched is the cultivation, that few countries in the east have been more subject to frequent and terrible famines. This is a fact attested by all the Europeans who have visited Egypt, but especially by that intelligent traveller, Mr. Volney, whom we have already quoted. Far, therefore, from dreaming of a permanent establishment, we doubt whether the French army will find a temporary provision in the ancient granary of the world. It seems to us very probable, that it will moulder away under the vexatious hostility of the natives, and the still more effectual hostility of disease, of a sultry sun, and of scanty provisions. If shipping had been provided at Suez to transport Buonaparte to Mangalore, the Egyptian expedition might have been regarded as a daring and brilliant, though ambiguous and perilous, project. But the silence of the dispatches completely demonstrates that no preparations are made for an attack on India; and this we consider as by far the most important intelligence which these dispatches contain.

News, since received through the channel of the Turkish ambassador, states, that the beys of Egypt having assembled a strong force in the vicinity of Cairo, under the direction of English officers, a very sanguinary battle was fought on the 9th of October between them and Buonaparte. The beys met with a vigorous resistance, but at last succeeded in dislodging the French from the capital of Cairo and its environs, and forced them to fall back to Rosetta. The action lasted the whole day, and the loss in slain and wounded is very considerable on both sides. The divan is in daily expectation of receiving intelligence of the French having capitulated in Egypt, as they could neither advance nor retrograde, and as their supplies of provisions were entirely cut off.

If the accounts brought by the Hamburgh mail dated October 13, 1798, be confirmed, we may prepare ourselves to hear of an end being put to the short but brilliant career of the most celebrated adventurer since the days of Charles XII.

The following extract is taken from an intercepted letter of a principal officer in Buonaparte's army, to his parents at Paris.

"Leaving Alexandria to re-embark on the Nile, you pass a desert perfectly destitute of all herbage, on which, at the distance of every four or five leagues, you meet with a well of bad water. Imagine what must be the situation of an army obliged to cross these barren plains, which do not even offer the traveller shelter against the insupportable heat which prevails there. The soldier who is forced to carry with him five days provisions, laden with his knapsack and his water-skin, after having marched about an hour, finds himself overcome by the heat, and throws away his provisions and every thing that adds to his fatigue, regardless altogether of to-morrow. Hunger and thirst soon attack him, without his having the means of satisfying either; and thus, in the dreadful passage of this desert, we behold them dying under the pressure of these calamities, while their comrades, seeing how much they suffer, blow out their brains, or throw themselves into the Nile. Every day's march presented to our view some such spectacles as these; and, what will hardly be believed, the whole army, during a march of seventeen days, never tasted bread. They were fed during the whole of that time upon lemons and water melons, and pulse and some poultry which we found in the country. Such has been the food of all, from the general to the lowest soldier; and the general has often fasted from eighteen to twenty-four hours, because the private men, having arrived first in the villages, gave every thing up to pillage, and he was therefore reduced to the necessity of feeding on the refuse of what his troops' intemperance left him."

The writer gives the following account of Egypt and the Mamelukes.—France, by the different events of the war and the revolution, having lost her colonies and her factories, must be reduced to the necessity of seeing her commerce decline, and her industrious people obliged to obtain the most essential articles at second hand. Several considerations induce us to consider it as impossible for government to recover its colonies, or at least to derive from them the same advantages which it had been accustomed to do, particularly after the destruction and the horrors which have been committed there since the emancipation of the negroes in the islands. In order to indemnify themselves for this loss, the directory turned their eyes towards Egypt and Syria, countries which, from the goodness of their soil and their fertility, are capable of being of the utmost utility to the commerce of France, as an abundant granary, and, in process of time, the medium of its commerce in India. It cannot admit of a doubt that, after having made ourselves masters of this country, we may extend our views still farther, and in the end destroy the commerce of the English in the Indies, turn that commerce to our own advantage, and become masters of all the trade of Africa and Asia.

Such, it appears to me, are the considerations which have induced our government to attempt the present expedition against Egypt. This part of the Ottoman power has for several ages been governed by a species of men called Mamelukes, who, having a number of beys at their head, despise the authority of the Grand Seignor, and rule in a despotic and tyrannic manner over a country which, in the hands of a politic nation, must become a source of wealth. It is therefore

therefore with the Mamelukes that we muſt make war, in order to obtain poſſeſſion of Egypt. The number of theſe is about 12,000, all cavalry, and they are under the command of twenty-four beys. It may perhaps be proper to give you ſome idea of their ſoldiers, their manner of making war, and their arms, as well as of their origin.

Every Mameluke is originally a ſlave by purchaſe; they are chiefly from Mount Caucaſus, in Georgia; but there are among them Germans, Ruſſians, and even ſome French; their religion is that of Mahomet; being bred from their infancy to the art of war, they are particularly ſkilful in the management of horſes, in the uſe of the carbine, piſtol, and battle-axe, in throwing lances, and in the uſe of the ſabre. Every Mameluke has two or three ſervants, who always follow them on foot, even when they go to battle. The arms of a Mameluke on horſeback are two great muſkets, which a ſervant on each ſide of him carries; theſe he only diſcharges once; he then ſeize two pair of piſtols which he carries in his girdle, and afterwards eight arrows which he has in a quiver, and which he throws with his hand with great ſkill. After this he takes to the battle-axe, which he employs for the purpoſe of knocking down his enemy; and, if this fails, his laſt reſource is two ſabres. He takes the birdle of his horſe between his teeth, and, armed with a ſabre in each hand, he runs at his opponent, and cuts on every ſide of him.

The town of Roſetta, to which, according to the laſt German papers, Buonaparte has been compelled to retreat, is wholly devoid of fortifications on the land ſide. On that towards the ſea, Savary tells us, in his Letters on Egypt, "There is a caſtle built by the Mamelukes, to defend the paſſage of the river. It is a ſquare building, flanked with towers, and furniſhed with artillery. It ſtands a league north of the town, on the weſtern bank of the Nile. On the oppoſite ſide is a platform, provided alſo with cannon; and theſe two forts, inconſiderable as they are, would be ſufficient to impede the entrance of ſhips, if the Turks underſtood gunnery. Here, however, they are ſafe, as Nature has been careful to defend the mouth of the Nile, by throwing up a dangerous bar, which is the terror of mariners. The lands around Roſetta are remarkable for producing excellent rice."

DREADFUL HURRICANE AT HALIFAX IN AMERICA.

ON Tueſday the 25th of September in the forenoon, the atmoſphere appeared thick, the ſky louring, and every thing gave tokens of an approaching gale. The wind, nearly ſouth, about noon began to freſhen into a heavy breeze, and backened towards the eaſtern board to about S. E. Between four and five o'clock P. M. a ſmart ſhower of rain paſſed over, which ſeemed to have given additional force to the wind. The veſſels in the harbour exerted every means which might enable them to withſtand its fury, which by this time produced a conſiderable ſwell in the road. The firſt ſhip which began to drift, notwithſtanding all theſe neceſſary precautions, was the Penelope, an American veſſel, acquitted but a few days before by the admiralty; ſhe fell athwart the bows of a Daniſh veſſel, recently brought in for examination. The Dane's bowſprit carried away the Penelope's mizen-maſt: the latter then got clear, and ſoon after was driven up towards the navy-yard. The gale now encreaſed to a moſt tremendous

dous violence, veered from the eastward, and blew directly up the harbour. The sea ran dreadful, and dashed in pieces almost every thing which opposed it. The prize vessels lately sent in by the Prevoyante, the transports, with the troops on-board, nearly ready to sail for Bermuda, and many other vessels, were hurried before it, without being able to make the least resistance. The tide, which should have ceased rising by eight o'clock, continued to flow until near nine. The wharfs were nearly all under water; the timber began to give way, and the vessels fastened to them assisted in dragging them into the harbour. The moon, which occasionally broke through the clouds, disclosed a prospect which baffles all description: ships driving before the hurricane nearly on their beam ends, others actually upset, many with their masts torn by the board; wharfs and stores filled with valuable merchandize, dashed into atoms; and in short, one continued scene of devastation and ruin, the whole length of the town, from the king's lumber-wharf to the navy-yard.

The brig Betsey, nearly ready to sail for London with a valuable cargo of sugars, &c. drove from the Long-wharf, together with the ship Liberty (a large re-taken American vessel that had just landed her cargo); the head of the Liberty was towards the town, and in her passage up the harbour, she ran foul of and dragged many other vessels adrift, which might otherwise have sustained the tempest without much injury. The ship Matilda, belonging to Mr. Anderson, and a coasting sloop, were completely upset. A schooner belonging to Messrs. Pryors, drove from their wharf, and forced a passage through the next wharf, nearly thirty feet from its head. The stores occupied by Messrs. Lawsons, on Austin and Kidston's wharfs, were beat down by a brig which drove from Tremain's wharf; and sugars, rice, &c. to a considerable amount, almost entirely destroyed.—Many thousands will be expended, and much time elapse, before the front of the town will regain its appearance anterior to this destructive tornado.

On the morning following, the harbour exhibited an appearance truly melancholy; scarcely a single vessel continued to ride, except the king's ships, the packet, and the Earl Moira; the Matilda lying nearly bottom upwards on the beach leading to the navy-yard—the sloop before-mentioned a little distance from her—the ships Penelope, Liberty, a transport, and a schooner commanded by Capt. Elmslie, were driven quite up to the walls of the dock-yard: above it, high on the beach near the navy-hospital, lay two of the vessels lately sent in by the Prevoyante; on the Dartmouth side, at the entrance of the Narrows, a large ship laden with cocoa and tobacco, lately sent in by the Lynx, lay bilged; a little farther down the harbour, a Danish ship with a cargo of sugars, &c. the Ann transport, and the brig Betsey, were stranded. The vessels are now unlading, and it is thought will be saved, as will probably near the whole of their respective cargoes. One brig, the William, laden with sugar and molasses, prize to the Prevoyante, went on-shore near what is called the Black Rock, was entirely dashed to pieces, and the whole cargo lost—on-board the latter, perished an unfortunate young gentleman (Mr. Sutherland), belonging to the Prevoyante; but we are happy to learn, that amidst all this tumult and destruction, but few lives were lost.

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The damage is computed at fully 100,000l. The Lynx sloop of war had a most singular escape, after driving from her anchors, she ran foul of another man of war, and, in passing her, she fortunately hooked one to the other ship's anchors in her aftermost port, which she carried off with the cable to it, and by this she out-rode the whole gale with her stern to the wind, as the other man of war was luckily so well moored as to hold them both. The appearance of the country after the storm was singular, every tree and vegetable was blighted and withered as if they had been scorched with fire.

LIFE OF ZIMMERMAN.—Abridged from TISSOT.

JOHN George Zimmerman was born in December 1728, at Brug, a town in the German part of the canton of Bern. His father, the senator Zimmerman, was born of a family which had been distinguished, during several ages, for the merit and integrity with which they passed through the first offices of the government. His mother, of the name of Pache, was the daughter of a celebrated counsellor at Morges, in the French part of the same canton; which accounts for the circumstance of the two languages being equally familiar to him, though he had passed only a very short time in France. Young Zimmerman was educated at home till he reached the age of fourteen, when he was sent to study the *belles lettres* at Bern. After three years had been thus employed, he was transferred to the school of philosophy; where the prolix comments on the metaphysics of Wolf seem much more to have disgusted than enlightened him. The death of both parents leaving him at liberty to choose his destination in life, he determined to embrace the medical profession, and went to Gottingen in 1747. Here his countryman, the illustrious Haller, took him into his own house, directed his studies, and treated him as a son and a friend. Besides the proper medical professors, Zimmerman attended the mathematical and physical lectures, and gained a knowledge of English literature. He passed four years in this university; part of the last of which he employed in experiments on the doctrine of irritability, first proposed by the English anatomist Glisson, and afterwards pursued with so much success by Haller. Zimmerman made this principle the subject of his inaugural thesis, in 1751; and the clearness of style and method with which he explained the doctrine, with the strength of the experimental proofs by which he supported it, gained him great reputation. Our anatomical readers are doubtless acquainted with the controversies which this new system excited. Though Haller was generally considered as its author, several attacks were directed against Zimmerman in particular, which he was wise enough to disregard, leaving his facts to speak for themselves.

After a few months spent in a tour to Holland and France, he returned to Bern in 1752, where he was received with great cordiality. In this year he published an account of Haller, in a short letter to a friend, inserted in the journal of Neufchatel, and written in French. Though his only work in that language, it has much elegance of style; and it was the basis of his life of Haller which was published at Zurich in 1755, a large 8vo. in German. During his stay at Bern, he married a very amiable and cultivated lady, a relation of Haller, of the name of Meley, then widow of a M. Stek.

Shortly afterwards, the poſt of public phyſician to his native town of Brug becoming vacant, he received an invitation to occupy it, with which he complied. Here he earneſtly devoted himſelf to the ſtudies and duties of his profeſſion; not neglecting, however, thoſe literary purſuits which are neceſſary to fill up the time of a man of education, in a place which affords few of the reſources of ſuitable ſociety. He amuſed himſelf occaſionally with writing little pieces, which he ſent to a journal printed at Zurich under the title of the Monitor. As his pleaſures were almoſt excluſively confined to his family and his ſtudy, he here contracted that real or ſuppoſed love for ſolitude, which gave ſuch a colour to his writings, if not to his life. It ſeems, however, at firſt to have been rather forced than natural; and to have been the ſplenetic reſource of a man who was never well ſatisfied with the obſcurity of a ſituation, which was by no means adequate to his talents and reputation. In this place, his years paſſed on uſefully for the improvement of his mind: but, as it appears, not very happily. His natural ſenſibility, from a want of objects to divert it, preyed on itſelf; and he was rendered miſerable by a thouſand domeſtic cares and anxieties, which he would have felt much more lightly in the tumult of public life. He took, however, the beſt method in his power for relief, by employing his pen with aſſiduity on profeſſional and literary topics. In 1754, he ſent to the Phyſico-Medical ſociety of Baſil a very good caſe of ſpaſmodic quincy, together with ſome obſervations on the Hyſteric Tumours of Sydenham. In 1755 he compoſed a ſhort poem in German on the earthquake of Liſbon, which was much eſteemed by adequate judges, and placed him among the earlieſt improvers of that language. In 1756 appeared his firſt Eſſay on Solitude, a very ſhort performance. Two years afterwards, he began to enlarge its plan, and to collect materials for his more extended publication on this ſubject. He alſo formed the plan of his work on the Experience of Medicine, of which the firſt volume appeared in 1763. In 1758 he publiſhed his Eſſay on National Pride, which paſſed with rapidity through ſeveral editions, and was tranſlated into foreign languages, and much admired. In this performance is one of thoſe predictions of an approaching revolution in Europe, which are to be found in various works of literature, but, as his biographer M. Tiſſot thinks, no where with more ſagacity and exactneſs. "The univerſal ſpread of light and philoſophy, the vices demonſtrated in the exiſting mode of thinking, the attacks on received prejudices, all ſhew a boldneſs in opinion which announces a revolution; and this revolution will be happy if it be directed by political wiſdom, and ſubmiſſion to the laws of the ſtate: but, ſhould it degenerate into criminal audacity, it will coſt to ſome their property; to others, their liberty; to many, their life."

Notwithſtanding a copious medical practice, now extended by many foreign conſultations, and the literary employment of his leiſure, Zimmerman's diſcontent with his ſituation was ſuch, that his friends, and particularly M. Tiſſot, made various efforts to procure him a new eſtabliſhment; none of which were as yet ſucceſsful. It appears, indeed, that his own irreſolution, and a kind of timidity which always adhered to him, were the principal obſtacles in ſome inſtances. Meantime, however, he did not ceaſe to lay the ſolid foundations of more extenſive fame by profeſſional writings. An epidemic fever, which

which reigned in Switzerland in the years 1763, 4, and 5, and which in the latter year changed to a dysentery, furnished him with a copious store of observations, and produced his Treatise on the Dysentery, which gained him great reputation. This was the last considerable medical work that he composed, though he continued to write short pieces on occasional topics. It should not be omitted, that his cordial friend, M. Tissot, by addressing to him his own letters on the prevailing epidemic, contributed to extend his professional fame.—At length, the vacant post of physican to the King of England at Hanover, which had been offered to M. Tissot, was by his interest procured for Zimmerman; and being accepted, he removed to Hanover in 1768.

This new situation, however, was far from producing the accession of happiness which was expected from it.

"I hoped (says his biographer) that his departure would be the era of his entrance on a happier career, and I felicitated myself on having contributed to it: but I was in a short time sadly convinced of the contrary. A few days after his arrival, he lost the lord of the regency who was most attached to him. The disorder, of which I have mentioned the commencement while he resided at Brug, (a species of hernia,) constantly increased, and was accompanied with acute pains, which sometimes rendered irksome the execution of his duty. The jealousy of a colleague caused him a number of those slight irritations which he would not have felt when in health, but which the state of his nerves now rendered almost insupportable. Some persons thought that he would do any thing to conciliate their good will, and would have had him every moment with them. 'Women who drank coffee with George II. persuade themselves that I ought to be at their command, as I should have been at his.' They would have made him their slave, and this was a part not adapted for him. He knew that it was for the disease, not the patient, to regulate the number and the hours of a physician's visits; and he always acted on this principle: but the persons whose caprices he thwarted did not take pains to make his abode agreeable. The health of his wife, which always determined his own, declined rapidly; while that of his children, which had never been strong, did not become so. He often wrote to me from Hanover, as he had done from Brug, 'Save my wife, or rather save myself; save these children who are dearer to me than life;' and every one of his letters gave me real regret as having contributed to his removal. Luckily, the public confidence soon forced him to a continued occupation, which is the surest resource against uneasiness. His patients in Hanover, consultations from all the north, and patients who themselves came to consult him, at length dispelled his melancholy. He passed whole months in incessant occupation; and the greatest relaxations that he ever knew consisted in some visits to princes, who wished for his advice in cases of great importance, and whom he never quitted without having inspired them with as much regard as esteem; and in some journies to Pyrmont, where he passed part of the water-season."

In 1770, he had the misfortune of losing his wife; a deprivation which touched him most sensibly; and at the same time his own complaint grew worse. His friend Tissot advised him to seek the best chirurgical assistance, and persuaded him, in 1771, to go to Berlin and put himself under the care of the celebrated Meckel.

He was received into this surgeon's house, and an operation was performed which succeeded. The time of his convalescence was one of the most agreeable in his life. He made a number of acquaintances among distinguished characters at Berlin, was presented to the king, and was honoured with particular notice from him. His reception on his return to Hanover was equally pleasing. He now again plunged into business, and again domestic and professional cares brought on hypochondriacal complaints. In 1775, by way of vacation, he made a journey to Lausanne, where his daughter was placed for education, and passed five weeks with M. Tissot. As this was the first time that these intimate friends, of twenty years standing, had seen each other, we shall translate some of the biographer's observations:

"I had at length the pleasure of seeing him; I shall not say of knowing him. I found that I knew him already; the friend conversing reminded me every moment of the friend writing, and perfectly resembled the portrait which I had drawn of him. I saw the man of genius, who with promptitude seizes an object under all its relations, and whose imagination knows how to present it under the most agreeable forms: his conversation was instructive, brilliant, sprinkled with a number of interesting facts and pleasant narrations, and animated by an expressive countenance. He spoke of every thing with great precision. When medicine was our subject, as was frequently the case, I found his principles solid and his notions clear; when I took him to see patients under severe indispositions, or read to him consultations on the most difficult cases, I always found in him the greatest sagacity in discovering causes and explaining symptoms, great justness in forming indications, and an exquisite judgment in the choice of remedies, of which he employed few, but all efficacious. In fine, on every occasion, I saw the man of sincerity, rectitude, and virtue. His stay was much shorter than I could have wished."

Zimmerman was unhappy in the fate of his children. His amiable daughter, whom he most tenderly loved, fell into a lingering malady soon after she left Lausanne, which continued for five years, and then carried her off:—while his son, who was from infancy troubled with an acrid humour, after various vicissitudes of nervous affections, settled in perfect idiocy; in which state he remained. To alleviate these distresses, a second marriage properly occurred to the minds of his friends, and they chose for him a most suitable companion, in the daughter of M. de Berger, king's physician at Lunenburg. The union took place in 1782, and proved the greatest charm and support of all his remaining life. His lady was thirty years younger than him, but she perfectly accommodated herself to his taste, and induced him to cultivate society abroad and at home more than he had hitherto done. About this time, he employed himself in completing his favourite work on Solitude; which, at the distance of thirty years from the publication of the first essay on the subject, appeared in its new form in the year 1786, in 4 vols. His ideas of solitude had probably been softened by so long an intercourse with the world; and as he now defined it, "that state of the soul in which it abandons itself freely to its reflections," it was not necessary to become either a monk or an anchorite in order to partake of its benefits. Had it not been presented under so accommodating a form, a philosopher might have

have ſmiled at the circumſtance of a recommendation of ſolitude, from a court phyſician, becoming the favourite work of one of the moſt ſplendid and ambitious of crowned heads. The Empreſs of Ruſſia ſent her expreſs thanks to the author for the pleaſure which ſhe had derived from the work, accompanied with a magnificent preſent, and commenced with him a regular correſpondence, which ſubſiſted with great freedom on her part till 1792; when ſhe ſuddenly dropped it. She alſo gave him an invitation to ſettle at Peterſburgh as her firſt phyſician; and, on his declining the offer, ſhe requeſted his recommendation of medical practitioners for her towns and armies, and conferred on him the order of Wladomir.

One of the moſt diſtinguiſhed incidents of his life was the ſummons which he received to attend the great Frederic in his laſt illneſs, in 1786. It was at once evident that there was no room for the exerciſe of his medical ſkill; but he improved the opportunity which he thus enjoyed of confidential intercourſe with that illuſtrious character, whoſe mental faculties were pre-eminent to the laſt; and he derived from it the materials of an intereſting narrative, which he afterwards publiſhed. The partiality of this prince in his favour naturally diſpoſed him to a reciprocal good opinion of the monarch; and in 1788 he publiſhed "A Defence of Frederic the Great againſt the Count de Mirabeau;" which was followed by "Fragments on Frederic the Great," in 3 vols. 12mo. All his publications relative to this king gave offence to many individuals, and ſubjected him to ſevere criticiſm; which he felt with more ſenſibility than conſiſted with his peace of mind.—His religious and political opinions, likewiſe, in his latter years, began to be in wide contradiction with the principles that were aſſiduouſly propagated all over Europe; and this added perpetual fuel to his irritability. The ſociety of the Illuminated, coaleſced with that of Free-Maſons, roſe about this time in Germany, and excited the moſt violent commotions among men of letters and reflection. It was ſuppoſed to have in view nothing leſs than the abolition of Chriſtianity, and the ſubverſion of all conſtituted authorities; and, while its partizans expected from it the moſt beneficial reforms of every kind, its opponents dreaded from it every miſchief that could poſſibly happen to mankind. Zimmerman, who is repreſented by his friend as a *hunter of ſects*, was among the firſt who took alarm at this formidable aſſociation. His regard for religion and ſocial order, and perhaps his connexions with crowned heads, cauſed him to ſee in the moſt obnoxious light all the principles of theſe new philoſophers. He attacked them with vigour, formed counter-aſſociations with other men of letters, and at length took a ſtep which we leave his friends to juſtify,—that of addreſſing to the Emperor Leopold a memoir, painting in the ſtrongeſt colouring the pernicious maxims of the ſect, and ſuggeſting the means of ſuppreſſing it; means which we underſtand to have depended on the deciſive interference of civil authority. Leopold, who was well inclined to ſuch meaſures, received his memoir very graciouſly, and ſent him a letter and ſplendid preſent in return; but his death, ſoon afterwards, deprived the cauſe of its moſt powerful protector. Zimmerman, however, in conjunction with Hoffman of Vienna, who had inſtituted a periodical work on the old principles, did not relax in their zeal. They attacked and were attacked in turn; and Zimmerman, unfortunately, embroiled himſelf with the courts of law by a paper publiſhed

lished in Hoffman's Journal, intitled "The Baron de Knigge unmasked as an Illuminate, Democrat, and Seducer of the People." As this charge was in part founded on a work not openly avowed by the baron, a process was instituted against Zimmerman as a libeller, and he was unable to exculpate himself. This state of warfare may well be imagined to be extremely unfriendly to an irritable system of nerves; and the agitation of the doctor's mind was farther increased by his personal fears on the approach of the French towards the Electorate of Hanover, in 1794. The idea of becoming a poor emigrant perpetually haunted him, nor could the negociation that secured the country restore him to tranquillity. Its melancholy effects are thus described by his biographer:—

"From the month of November, he had lost sleep, appetite, strength, and flesh. This state of decline continually advanced. In January, he still paid some visits in his carriage, but often fainted at the top of the staircase. Writing a recipe was a labour to him: he complained sometimes of confusion in his head, and at length quitted all business. This was at first deemed an hypochondriac fancy, but it was soon perceived that a settled melancholy did not permit him long to follow the train of his ideas.—That happened to him which has happened to so many men of genius: one strong idea obtained the ascendancy over all the rest, and subdued the soul, which was unable to remove it out of sight. Preserving all his presence of mind, and the clearness of his conceptions, on all other objects, but no longer chusing to occupy himself with them, incapable of all labour, and not giving even his advice without difficulty, he continually saw the enemy plundering his house, as Paschal always saw a globe of fire at his side; Bonnet, an honest man robbing him; and Spinello, the devil standing opposite to him. He used some remedies, and took a journey, but all to no purpose. He re-entered his house with the same idea with which he quitted it; persuaded himself that he saw it pillaged; and fancied he was entirely ruined. This notion impressed him so strongly, that his abstinence from food at last was partly attributed to his fear of poverty. He was worn away to a skeleton, became decrepid, and at sixty-six died of old age. He expired October 7, 1795."

On BLINDNESS, and the SURPRISING FACULTY of BLIND PERSONS. From the *Encyclopædia Londinensis*.

THERE is not, perhaps, any sense or faculty of the corporeal frame, which affords so many resources of utility and entertainment as the power of vision; nor is there any loss or privation which can be productive of calamities so multiform or bitter as the want of sight. By no avenue of corporeal perception is knowledge in her full extent, and in all her forms, so accessible to the rational and inquiring mind, as by the glorious and delightful medium of light. For this not only reveals external things in all their beauties, but gives body, form, and colour, to intellectual ideas; so that the whole material and intelligent creation lie in open prospect, and the majestic frame of nature, in its whole extent, is, if we may so speak, perceived at a single glance. To the blind, on the contrary, the visible universe is totally annihilated; he is conscious of no space but that in which he stands, or to which his extremities can reach. Sound, indeed, gives him some

some ideas of distant objects; but those ideas are extremely obscure and indistinct. They are obscure, because they consist alone of the objects whose oscillations vibrate on his ear, and do not necessarily suppose any other bodies with which the intermediate space may be occupied, except that which gives the sound alone: they are indistinct, because sounds themselves are frequently ambiguous, and do not uniformly and exclusively indicate their real causes. And though by them the idea of distance in general, or even of some particular distances, may be obtained; yet they never fill the mind with those exalting ideas of extension which are inspired by ocular perception. For though thunder, or an explosion of cannon, may be distinctly heard, after they have traversed a great space, yet, when the distance is very extensive, it ceases to be indicated by sound; and therefore the ideas, acquired by auricular experiment, of extension and interval, are extremely confused and uncertain. The living and comprehensive eye darts its view over expansive valleys, lofty mountains, protracted rivers, illimitable oceans. It measures, in an instant, the mighty space from earth to heaven, or from one star to another. By the assistance of telescopes, its horizon is almost indefinitely extended, its objects multiplied, and the sphere of its observation infinitely enlarged. By these means, the imagination, inured to vast impressions of distance, is enabled, not only to recal them, in their greatest extent, with as much rapidity as they were at first imbibed; but can multiply them, and add one to another, till all particular boundaries and distances are lost in immensity. Thus nature, by profusely irradiating the face of things, and clothing objects in a robe of diversified splendour, not only invites the understanding to expatiate on a theatre so extensive, but entertains the imagination with every possible exhibition of the sublime and beautiful. The man of light beholds the objects of his attention and curiosity from far. Taught by experience, he measures their relative distances; distinguishes their qualities; determines their situations and attitudes; presages what these tokens may import; selects his favourites; traverses in security the space which divides them from him; stops at the point where they are placed; and either obtains them with ease, or perceives the means by which the obstacles that intercept his passage to them may be surmounted. The blind, on the contrary, not only may be, but really are, during a considerable period, apprehensive of danger in every motion towards any place, from whence their contracted powers of perception can give them no intelligence. All the various modes of delicate proportion, all the beautiful varieties of light and colours, whether exhibited in the works of nature or of art, are to them irretrievably lost. Dependent for every thing, but mere subsistence, on the good offices of others; obnoxious to injury from every point, which they are neither capacitated to perceive, nor qualified to resist; they are, during the present state of being, rather prisoners at large, than citizens of nature. The sedentary life, to which, by privation of sight, they are destined, relaxes their frame, and subjects them to the whole tribe of disagreeable sensations which arise from dejection of spirits. Hence the most feeble exertions create lassitude and uneasiness. Hence the native tone of the nervous system, which alone is compatible with health and pleasure, being destroyed by inactivity, exasperates and embitters every common difficulty in life. Natural evils, however, are always supportable; they not only arise

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from undesigning causes, but are either mild in their attacks, or short in their duration: it is the miseries which are inflicted by conscious and reflecting agents alone, that can deserve the name of evils. These excruciate the soul with ineffable poignancy, as expressive of indifference or malignity in those by whom such bitter portions are cruelly administered. The negligence or wantonness, therefore, with which the blind are too frequently treated, is an enormity which God alone has benevolence to feel, or justice to punish.

Those among the blind who have had sensibility to express the effects of their misfortunes, have described them in terms capable of penetrating the most unfeeling heart. Homer, the venerable father of epic poetry, who, in the person of Demodocus, the Phæatian bard, is said to have described his own situation, proceeds thus:

Τον περι Μυσ' επιλησε, διδε δ' αγαθον τε, κακον τε
Οφθαλμων μεν αμερσε, διδε δ' ηδειαν αοιδην. ODYS. θ.

Dear to the muse, who gave his days to flow
With mighty blessings, mix'd with mighty woe,
In clouds and darkness quench'd his visual ray,
Yet gave him pow'r to raise the lofty lay. *Pope.*

Milton, in his address to light, laments the misfortune of his being blind in the following passage:

Thus with the year
Seasons return; but not to me returns
Day, or the sweet approach of ev'n or morn,
Or light of vernal bloom, or summer's rose,
Or flocks, or herds, or human face divine;
But cloud instead, and ever-during dark,
Surrounds me, from the cheerful ways of men
Cut off, and for the book of knowledge fair
Presented with an universal blank,
Of nature's works to me expung'd and ras'd,
And wisdom at one entrance quite shut out. *Par. Lost*, b. iii.

The same inimitable author, in his tragedy of Sampson Agonistes, deplores the misfortunes of blindness with a pathos and energy sufficient to excite compassion in the most obdurate bread:

O loss of sight, of thee I most complain!
Blind among enemies, O worse than chains,
Dungeon, or beggary, decrepid age.
Light, the prime work of God, to me's extinct,
And all her various objects of delight
Annull'd, which might in part my grief have eas'd,
Inferior to the vilest now become
Of man or worm. The vilest here excel me:
They creep, yet see; I dark in light expos'd
To daily fraud, contempt, abuse, and wrong,
Within doors, or without, still as a fool,
In power of others, never in my own;
Scarce half I seem to live, dead more than half.
O dark, dark, dark, amid the blaze of noon,
Irrecoverably dark, total eclipse
Without all hope of day!
O first created Beam, and thou great Word,
Let there be light, and light was over all;
Why am I thus bereav'd thy prime decree?

Ossian,

Ossian, who in his old age participated the same calamity, has, in more than one passage of his works, described his situation in a manner so delicate, yet so pathetic, that it awakens the finest feelings of the heart:

"*O thou that rollest above, round as the shield of my fathers!* whence are thy beams, O sun! whence thy everlasting light? Thou comest forth in thy awful beauty, and the stars hide themselves in the sky; the moon, cold and pale, sinks in the western wave. But thou thyself movest alone: who can be a companion of thy course? The oaks of the mountains fall; the mountains themselves decay with years; the ocean shrinks and grows again; the moon herself is lost in heaven: but thou art for ever the same; rejoicing in the brightness of thy course. When the world is dark with tempests; when thunder rolls and lightning glances through the heavens; thou lookest in thy beauty from the clouds, and laughest at the storm. But to Ossian thou lookest in vain: for he beholds thy beams no more; whether thy yellow hair flows on the eastern clouds, or thou trembleest at the gates of the west. But thou art, perhaps, like me for a season; and thy years will have an end: thou shalt sleep in thy clouds, careless of the voice of the morning. Exult then, O sun, in the strength of thy youth! age is dark and unlovely; it is like the glimmering light of the moon, when it shines through broken clouds, and the mist is on the hills, the howling blast of the north is on the plain, the traveller shrinks in the midst of his journey."

Thus dependent on every creature, and passive to every accident on earth, can the uncharitable world be surprised to observe moments when the *blind* are at variance with themselves and every thing else around them? With the same instincts of self-preservation, the same irascible passions which are common to the species, and exasperated by a sense of inability either for retaliation or defence; can the blind be real objects of resentment or contempt, even when they seem peevish or vindictive? This, however, is not always their character. Their behaviour is often highly expressive, not only of resignation, but even of cheerfulness; and though they are often coldly, and even inhumanly, treated by men, yet are they rarely, if ever, forsaken of heaven. The common Parent of nature, whose benignity is permanent as his existence, and boundless as his empire, has neither left his afflicted creatures without consolation or resource. Even from their loss, however oppressive and irretrievable, they derive advantages; not, indeed, adequate to recompense, but, in some degree, sufficient to alleviate, their misery. The attention of the soul, confined to these avenues of perception which she can command, is neither dissipated nor confounded by the immense multiplicity, nor the rapid succession, of surrounding objects. Hence her contemplations are more uniformly fixed upon herself, and the revolutions of her own internal frame. Hence her perceptions of such external things as are contiguous and obvious to her observation, become more lively and exquisite. Hence even her instruments of corporeal sensation are more assiduously cultivated and improved, so that from them she derives such notices and presages of approaching pleasure or impending danger, as entirely escape the attention of those who depend for security on the reports of their eyes. A blind man, when walking swiftly, or running, is kindly and effectually checked by nature from rudely encountering such hard and extended objects as might hurt or bruise him. When he approaches bodies of this kind, he feels the

atmosphere more sensibly resist his progress; and, in proportion as his motion is accelerated, or his distance from the object diminished, the resistance is increased. He distinguishes the approach of his friend from far by the sound of his steps, by his manner of breathing, and almost by every audible token which he can exhibit. Prepared for the dangers which he may encounter from the surface of the ground upon which he walks, his step is habitually firm and cautious. Hence he not only avoids those falls which might be occasioned by its less formidable inequalities, but, from its general bias, he collects some ideas how far his safety is immediately concerned; and, though these conjectures may be sometimes fallacious, yet they are generally so true, as to preserve him from such accidents as are not incurred by his own temerity. The rapid torrent, and the deep cascade, not only warn him to keep a proper distance, but inform him in what direction he moves, and are a kind of audible synosures to regulate his course. In places to which he has been accustomed, he as it were recognises his latitude and longitude from every breath of varied fragrance that tinges the gale, from every ascent or declivity in the road, from every natural or artificial sound that strikes his ear; if these indications be stationary, and confined to particular places. Regulated by these signs, the *blind* have not only been known to perform long journeys themselves, but to conduct others through dangerous paths at the dark and silent hour of midnight, with the utmost security and exactness. We are told by Casaubon and Leo Africanus, of a very extraordinary blind guide, who used to conduct the merchants through the sands and deserts of Arabia; and in our own country we have a very remarkable instance of a blind guide in John Metcalf, of Manchester, who very lately followed the occupation of conducting strangers through intricate roads during the night, or when the tracks were covered with snow. And, strange as this may appear to those who can see, the employment of this man was afterwards that of a projector and surveyor of highways in difficult and mountainous parts. With the assistance only of a long staff, he has been several times seen traversing the roads, ascending precipices, exploring valleys, and investigating their several extents, forms, and situations, so as to answer his designs in the best manner. Most of the roads over the Peak in Derbyshire have been altered by his directions; particularly those in the vicinity of Buxton: and he has since constructed a new one betwixt Wilmslow and Congleton, with a view to open a communication to the great London road without being obliged to pass over the mountains. See the account by Dr. Bew, published in the Transactions of the Manchester Society.

It were endless to mention the various mechanical operations of which the blind are capable, by their nicety and accuracy of touch: In some, the tactile powers are said to have been so highly improved, as to perceive that texture and disposition of coloured surfaces by which some rays of light are reflected and others absorbed, and in this manner to distinguish colours. The testimonies, however, for this fact, appear too vague and general to deserve public credit. But that their acoustic perceptions are distinct and accurate, we may fairly conclude from the rapidity with which they ascertain the acuteness or gravity of different tones, as relative one to another; and from their exact discernment of the various kinds and modifications of sound, and of sonorous objects, if the sounds themselves be in any degree

significant

significant of their causes. From this accuracy of external sensation, and from the assiduous applications of a comprehensive and attentive mind, we are able to account for the rapid and astonishing progress which some of them have made in those departments of literature, which were most obvious to their senses and accessible to their understandings. What, for instance, can be more remote from the conceptions of a blind man than the abstract relations and properties of space and quantity? yet the incomprehensible attainments of Doctor Saunderson, of Cambridge, in all the branches of mathematics, are now fully known by the literary world, both from the testimony of his pupils, and the publication of his works. But, should the fact be still uncertain, it might be sufficiently verified by a living instance, in the person of Doctor Moyes, of Manchester, who, though blind from his infancy, by the ardour and assiduity of his application, and by the force of natural genius, has not only made great advances in mechanical operations, in music, and in the languages; but is likewise skilled in geometry, in optics, in algebra, in astronomy, in chemistry, and in most other branches of natural philosophy. His example alone is abundantly sufficient to do away the vulgar prejudice, which presumes to think blindness and learning incompatible; and that the cultivation of the talents of blind persons is a weary and unpromising task.

Many attempts have been made to investigate, both from reason *à priori*, and from experiment, what might be the primary effects of light and luminous objects upon such as have been born blind, or early deprived of sight, if at a maturer period they should instantaneously recover their visual powers. But upon this topic there is much reason to fear, that nothing satisfactory has yet been discovered. The fallacy of hypothesis and conjecture, when formed *à priori* with respect to any organ of corporeal sensation and its proper object, is too obvious to demand illustration. But from the nature of the eye, and the mediums of its perception, to attempt an investigation of the various and multiform phenomena of vision, would be a most romantic undertaking. Even the discoveries which are said to accrue from experiment, may be held as extremely doubtful and precarious; because in these experiments it does not appear to have been ascertained, that the organs to which visible objects were presented immediately after chirurgical operations, could be in a proper state to perceive them. Yet, after all, it is extremely probable, that figure, distance, and magnitude, are not immediate objects of ocular sensation, but acquired and adjusted by long and reiterated experience. The gentleman couched by Mr. Cheselden had no idea of distance; but thought that all the objects he saw touched his eyes, as what he felt did his skin. It was also a considerable time before he could remember which was the cat, and which the dog, without feeling them. There are many desiderata, which the perceptions of a man born blind might considerably illustrate, if his instruments of vision were in a right state, and assisted by a proper medium. Such a person might perhaps give a clearer account, why objects, whose pictures are inverted upon the retina of the eye, should appear to the mind in their real positions; or why, though each particular object is painted upon the retina of both our eyes, it should only be perceived as single. Perhaps, too, this new spectator of visible nature might equally amuse our curiosity and improve our theory, by attempting

tempting to describe his earliest sensations of colour, and its original effects upon his organ and his fancy. It is far from being certain, however, that trials of this kind have ever been fairly made. For a more minute detail of these points, the reader may consult M. Diderot's Lettre sur les Aveugles, à l'usage de ceux qui voyent; also Mr. Cheselden's Anatomy, and Locke's Essay on the Human Understanding.

When we reflect on the numberless advantages derived from the use of sight, and its immense importance in extending the human capacity, we might be tempted to doubt the fidelity of those reports concerning such persons as, without the assistance of light, have arrived at high degrees of eminence even in those sciences which appear absolutely unattainable but by the interposition of external mediums. It has, however, been demonstrated by Dr. Reid, in his Inquiry into the Human Mind, that blind men, by proper instructions, are susceptible almost of every idea and of every truth which can be impressed on the mind by the mediation of light and colours, except the sensations of light and colours themselves. Yet there is one phenomenon of this kind which seems to have escaped the attention of that great philosopher, and of which no author has hitherto been able to offer any tolerable solution. Although we should admit, that the blind can understand with great perspicacity all the phenomena of light and colours; though it were allowed, that in these subjects they might extend their speculations beyond their instructions, and investigate the mechanical principles of optics by the mere force of genius and application, from the data which they had already obtained; yet it will be difficult, if not impossible, to assign any reason why these objects should be more interesting to a blind man than any other abstract truths whatever. It is possible for the blind, by a retentive memory, to tell you, That the sky is an azure; that the sun, moon, and stars, are bright; that the rose is red, the lily white or yellow, and the tulip variegated. By continually hearing these substantives and adjectives joined, he may be mechanically taught to join them in the same manner: but, as he never had any sensation of colour, however accurately he may speak of coloured objects, his language must be like that of a parrot; without meaning, or without ideas. Homer, Milton, and Ossian, had been long acquainted with the visible world before they became blind, and might still retain the warm and pleasing impressions of what they had seen. Their descriptions might be animated with all the rapture and enthusiasm which originally fired their bosoms when the grand or delightful objects which they delineated were immediately beheld. Nay, that enthusiasm might still be heightened by a striking sense of their loss, and by that regret which a situation so dismal might naturally inspire. But how shall we account for the same energy, the same transport of description, exhibited by those on whose minds visible objects were either never impressed, or have been entirely obliterated? Yet, as unaccountable as this fact may appear, it is no less certain than extraordinary. We mention it as one amongst the few resources for entertainment, and avenues to reputation, which are still reserved for the blind; and, if an example be wanting to enforce the remark, we need only refer to the ingenious Dr. Blacklock.

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With respect to the education of the blind, it is impossible to enter into minute particulars. These must be determined by the genius, the capacity, and the circumstances, of those to whom the general rules which may be given should be applied. It will easily occur to the reader, that, if the pupil should not be placed in easy circumstances, music is his readiest and most probable resource. Civil and and ecclesiastical employments have either something in their own nature, or in the invincible prejudices of mankind, which renders them almost entirely inaccessible to those who have lost the use of sight. No liberal and cultivated mind however can entertain the least hesitation in concluding, that there is nothing, either in the nature of things, or even in the positive institutions of genuine religion, repugnant to the idea of a blind clergyman. But the novelty of the phenomenon probably has hitherto prevented its being put in practice, though in itself so evidently suitable. Dr. Nicholas Bacon, a descendant of the celebrated Lord Verulam, who, in the city of Brussels, was created doctor of laws, was deprived of sight at nine years of age by an arrow from a cross-bow. Yet, notwithstanding this accident, he pursued the same plan of education in which he had been engaged; and having heard that one Nicasius de Vourde, born blind, who lived towards the end of the fifteenth century, after having distinguished himself by his studies in the university of Louvain, took his degree as doctor of divinity in the university of Cologne, he resolved to make the same attempt. The professors were disposed to treat his plan with contempt, and admitted him into their schools, rather from an impression that it might amuse than become of any use to him. However, contrary to their expectations, he obtained the first places among his condisciples. It was then said, that such rapid advances might be made in the preliminary branches of his education; but would soon be effectually checked by studies of a more profound and abstracted nature. This, it seems, was repeated from school to school, through the whole climax of his pursuits; and when, in the course of academical learning, it became necessary to study poetry, it was the general voice that all was over, and that at length he had reached his *ne plus ultra*. But here he likewise foiled their prepossessions, and taught them the immense difference between blindness of body and blindness of soul. After continuing his studies for two years more, he applied himself to the law, took his degree in that science, commenced advocate in the council of Brabant, and had the pleasure of terminating almost every suit in which he was engaged to the satisfaction of his clients.

Had it not been for a fact so striking and so well authenticated, though there could have been no doubt that a blind man might discharge the office of a chamber counsel with success; yet, as a barrister, his difficulties must have appeared more formidable, if not absolutely insuperable. For he should remember all the sources, whether in natural equity or positive institutions, whether in common or statute law, from whence his argument ought to be drawn. He must be able to specify, and to arrange in their proper order, all the material objections of his antagonists: these he must likewise answer as they were proposed, *extempore*. When, therefore, it is considered how difficult it is to temper the natural association of memory with the artificial arrangements of judgment, the desultory flights of imagination with the calm and regular deductions of reason,

ſon, the energy and perturbation of paſſion with the coolneſs and tranquillity of deliberation; ſome idea may be formed of the arduous taſk which every blind man muſt achieve, who undertakes to purſue the law as a profeſſion. Perhaps aſſiſtances might be drawn from Cicero's Treatiſe on Topics and on Invention; which, if happily applied, might leſſen the diſparity of a blind man to others, but could ſcarcely place him on an equal footing with his brethren.

In ſpeaking of the learned profeſſions, we have, for obvious reaſons omitted phyſic, as unattainable to blind perſons. The moſt important view we can entertain in the education of a perſon deprived of ſight, is to redreſs as effectually as poſſible the natural diſadvantages with which he is encumbered; or, in other words, to enlarge as far as poſſible the ſphere of his knowledge and activity. This can only be done by the improvement of his intellectual, imaginative, or mechanical, powers; and which of theſe ought to be moſt aſſiduouſly cultivated, the genius of every individual alone can determine. From the original dawning, however, of reaſon and ſpirit, the parents and tutors of the blind ought to inculcate this maxim, That it is their indiſpenſible duty to excel, and that it is abſolutely in their power to attain a high degree of eminence. To impreſs this notion on their minds, the firſt objects preſented to their obſervation, and the firſt methods of improvement applied to their underſtanding, ought, with no great difficulty, to be comprehenſible by thoſe internal powers and external ſenſes which they poſſeſs. Not that improvement ſhould be rendered quite eaſy to them, if ſuch a plan were poſſible: for all difficulties, which are not really or apparently inſuperable, heighten the charms and enhance the value of thoſe acquiſitions which they ſeem to retard. But care ſhould be taken that theſe difficulties be not magnified or exaggerated by imagination; for, in fact, the blind have a painful ſenſe of their own incapacity, and conſequently a ſtrong propenſity to deſpair. For this reaſon, parents and relations ought never to be too ready in offering their aſſiſtance to the blind in any office which they can perform, or in any acquiſition which they can procure for themſelves, whether they are prompted by amuſement or neceſſity. If he has a mechanical turn, let him not be denied the uſe of edge-tools; for it is better that he ſhould loſe a little blood, or even break a bone, than be perpetually confined to the ſame place, debilitated in his frame, and depreſſed in his mind. Such a being can have no employment but to feel his own weakneſs, and become his own tormentor; or to transfer to others all the malignity and peeviſhneſs ariſing from the natural, adventitious, or imaginary, evils which he feels. Scars, fractures, and diſlocations, are trivial miſfortunes compared with imbecility, timidity, or fretfulneſs of mind. Theſe impreſſions, which, even in his moſt improved ſtate, will be too deeply felt by every blind man, are redoubled by that utter incapacity of action which muſt reſult from the officious humanity of thoſe who would anticipate or ſupply all his wants, who would prevent all his motions, who would do or procure every thing for him without his own endeavours. It is poſſible they may ſurvive thoſe who, by the ties of blood and nature, are more immediately intereſted in their happineſs than the reſt of mankind; and, when this happens, their diſappointments may be many; their petitions will often be refuſed, ſeldom fully gratified; and, even when granted, the conceſſion will be ſo ungraceful as to render its

want

want much more tolerable than its fruition. For all these reasons, in the education of a blind man, it is infinitely better to direct than superfede his own exertions. From the time that he can move and feel, let him be taught to supply his own exigencies; to dress and feed himself; to run from place to place, either for exercise, or in pursuit of what he wants. In these excursions, however, it will be highly proper for some one to superintend his motions at a distance, without seeming to watch over him. A vigilance too apparent, may impress him with a suspicion as to the true motive. When dangers are obvious, such as rivers, precipices, &c. those who are entrusted with the blind will find it neither necessary nor expedient to make their vigilance a secret. They ought then to acquaint their pupil, that they are present with him; and to interpose for his preservation. But objects less dangerous, which may give him pain without any permanent injury, may with design be thrown in his way; for his own experience of these bad effects will be an infinitely more eloquent monitor than the counsels of any adviser whatever.

At proper intervals exercise will be found highly requisite, rather to preserve health, and facilitate the vital functions, than merely for recreation. Of all the different kinds of exercise, riding on horse-back is far the most productive of its end. In these excursions his attendant ought constantly to be with him; and the horse should always either be taught to follow its guide, or be conducted by a leading-rein, besides the bridle which he himself holds. The present Lord Deerhurst, though he lost his sight by falling from his horse in attempting to leap a gate, yet still prefers the active exercise of riding on horseback to lounging in a carriage. He is frequently seen riding very swift through the crowd in the vicinity of London, conducted by his servant with a leading-rein.

There are few sciences in which the blind have not occasionally distinguished themselves: even those whose acquisition seemed essentially to depend upon vision, have at last yielded to genius and industry, though deprived of that advantage. Dr. Saunderson has left behind him the most striking evidences of astonishing proficiency in those retired and abstract branches of mathematics which appeared least accessible to persons of his infirmity. Sculpture is not, perhaps, the most practicable of the arts for a blind man; yet he is not wholly excluded from that pleasing employment. There are instances of persons who have been enabled to take the figure and idea of a face by the touch, and mould it in wax with the utmost exactness; as was the case of the blind sculptor mentioned by de Piles, who thus took the likeness of the Duke de Bracciano in a dark cellar, and made a marble statue of Charles I. with great elegance and justness. However unaccountable it may appear to the abstract philosopher, yet nothing is more certain in fact, than that a blind man may also, by the efforts of a cultivated genius, exhibit in poetry the most natural images and animated descriptions, even of visible objects, without incurring the imputation of plagiarism.

In the sister art of music, there are many astonishing proofs, how far the blind may proceed. If we look into former periods, we shall find them pregnant with examples, how amply nature has capacitated the blind to excel both in the scientific and practical departments of music. In the sixteenth century, when the progress of improvement both in melody and harmony was rapid and con-

ſpicuous, Franciſcus Salinas was eminently diſtinguiſhed. Though afflicted with incurable blindneſs, he was profoundly ſkilled both in the theory and practice of muſic. As a performer, he is celebrated by his cotemporaries with the higheſt encomiums. As a theoriſt, his book, if we may believe Sir John Hawkins, is equal in value to any now extant in any language. Though this unfortunate perſon was deprived of ſight in his earlieſt infancy, he did not content himſelf with delineating the various phenomena in muſic, but the principles from whence they reſult, the relations of ſound, the nature of arithmetical, geometrical, and harmonical, ratios, which then were eſteemed eſſential to the theory of muſic, with a degree of intelligence which would have deſerved admiration though he had been in full poſſeſſion of every ſenſe requiſite for theſe diſquiſitions. In the ſame period flouriſhed Caſpar Crumbhorn, blind from the third year of his age: yet he compoſed ſeveral pieces in many parts with ſo much ſucceſs, and performed both upon the flute and violin ſo exquiſitely, that he was diſtinguiſhed by Auguſtus elector of Saxony. To theſe might be added Martini Peſenti of Venice, a compoſer of vocal and inſtrumental muſic almoſt of all kinds, though blind from his nativity; with other examples equally worthy of public attention.

That arithmetical and algebraical calculations ſhould be expeditiouſly performed by the blind, ſeems on the firſt view an utter impoſſibility; yet it is ſurpriſing to find what proficiency has been made herein, particularly by Dr. Saunderſon and Dr. Moyes, whoſe methods are extremely ingenious and comprehenſive. M. Diderot, in his Letters concerning the blind, has explained Dr. Saunderſon's numerical table in the moſt circumſtantial manner; we ſhall therefore give the deſcription in his words. "Imagine to yourſelf a ſquare, divided into four equal parts by perpendicular lines at the ſides, in ſuch a manner, that it may preſent you the nine points, 1, 2, 3, 4, 5, 6, 7, 8, 9. Suppoſe this ſquare pierced with nine holes capable of receiving pins of two kinds, all of equal length and thickneſs, but ſome with heads a little larger than the others. The pins with the large heads are never placed any where elſe but in the centre of each ſquare; and thoſe with the ſmaller heads are never placed any where but at the ſides, except in one ſingle caſe, which is that of making the figure 1, where none are placed at the ſides. The ſign of 0 is made by placing a pin with a large head in the centre of the little ſquare, without putting any other pin at the ſides. The number 1 is repreſented by a pin with a ſmall head placed in the centre of the ſquare, without putting any other pin at the ſides: the number 2, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 1: the number 3, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 2: the number 4, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 3: the number 5, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 4: the number 6, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 5: the number 7, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of

of the ſides at the point 6: the number 8, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 7: the number 9, by a pin with a large head placed in the centre of the ſquare, and by a pin with a ſmall head placed on one of the ſides at the point 8. Here are plainly ten different expreſſions obvious to the touch, of which every one anſwers to one of our ten arithmetical characters. Imagine now a table as large as you pleaſe, divided into ſmall ſquares, horizontally ranged, and ſeparated one from the other at ſimilar diſtances. Thus you will have the inſtrument of Saunderſon. You may eaſily conceive that there is not any number which one cannot expreſs upon this table; and, by conſequence, no arithmetical operation which one cannot execute upon it. Let it be propoſed, for inſtance, to find the ſum, or to work the addition, of the nine numbers following:

1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	0
7	8	9	0	1
8	9	0	1	2
9	0	1	2	3

"I expreſs them on the table in the order as they are dictated to me: the firſt figure at the left of the firſt number, upon the firſt ſquare to the left of the firſt line; the ſecond figure, to the left of the firſt number, upon the ſecond ſquare to the left of the ſame line; and ſo of the reſt. I place the ſecond number upon the ſecond row of ſquares, units beneath units, and tens beneath tens, &c. I place the third number upon the third row of ſquares, and ſo of the reſt. Then with my fingers running over each of the rows vertically from the bottom to the top, beginning with that which is neareſt to my right, I work the addition of the numbers which are expreſſed, and mark the ſurplus of the tens at the foot of that column. I then paſs to the ſecond column, advancing towards the left: upon which I operate in the ſame manner; from thence to the third; and thus in ſucceſſion I finiſh my addition.

"We may ſee how the ſame table ſerved him for demonſtrating the properties of rectilineal figures. Let us ſuppoſe this propoſition to be demonſtrated, That parallelograms which have the ſame baſis and the ſame height are equal in their ſurfaces. He placed his pins accordingly, and gave names to the angular points, and finiſhed his demonſtration with his fingers. If we ſuppoſe that Saunderſon only employed pins with large heads to mark the limits of his figures, around theſe he might arrange his pins with ſmall heads in nine different manners, all of which were familiar to him. Thus he ſcarcely found any embarraſſment but in thoſe caſes where the great number of angular points which he was under a neceſſity of naming in his demonſtration obliged him to recur to the letters of the alphabet. We are not informed how he employed them. We only know, that his fingers ran over the board with aſtoniſhing agility; that he undertook with ſucceſs the longeſt calculations; that he could interrupt the ſeries, and diſcover his miſtakes; that he proved them with the

greatest ease; and that his labours required infinitely less time than one could have imagined, by the exactness and promptitude with which he prepared his instruments and disposed his table.

"This preparation consisted in placing pins with large heads in the centres of all the squares: having done this, no more remained to him but to fix their values by pins of smaller heads, except in cases where it was necessary to mark an unit; then he placed in the centre of a square a pin with a small head, in the place of a pin with a large head with which it had been occupied. Sometimes, instead of forming an entire line with these pins, he contented himself with placing some of them at all the angular points, or points of intersection; around which he tied silk threads, which finished the formation of the limits of his figures." It may be added by way of improvement, that for the division of one series of numbers from another, a thin piece of timber in the form of a ruler with which lines are drawn, having a pin at each end for the holes in the squares, might be interposed between the two series to be distinguished.

By the notation here exhibited every modification of numbers may be expressed, and of consequence every arithmetical operation successfully performed; but we shall now describe another form of palpable arithmetic, equally comprehensive and much more simple than that of Saunderson, the invention of Dr. Moyes. He speaks of it in the following terms:

"The following palpable notation I have generally used for these twenty years to assist my memory in numerical computations. When I began to study the principles of arithmetic, which I did at an early period of life, I soon discovered, to my mortification, that a person entirely deprived of sight could scarcely proceed in that useful science without the aid of palpable symbols representing the ten numerical characters. Being at that time unacquainted with the writings of Saunderson, in which a palpable notation is described, I embraced the obvious, though, as I afterwards found, imperfect, expedient of cutting into the form of the numerical characters thin pieces of wood or metal. By arranging these on the surface of a board, I could readily represent any given number, not only to the touch, but also to the eye; and, by covering the board with a lamina of wax, my symbols were prevented from changing their places, they adhering to the board from the slightest pressure. By this contrivance, I could solve, though slowly, any problem in the science of numbers: but it soon occurred to me, that my notation, consisting of ten species of symbols or characters, was much more complicated than was absolutely necessary, and that any given number might be distinctly expressed by three species of pegs alone. To illustrate my meaning, imagine a square piece of mahogany a foot broad, and an inch in thickness; let the sides be each divided into twenty-four equal parts; let every two opposite divisions be joined by a groove cut in the board sufficiently deep to be felt with the finger, and let the board be perforated at each intersection with an instrument a tenth of an inch in diameter. The surface of the board being thus divided into 576 little squares, with a small perforation at each of their angles, let three sets of pegs or pins be so fitted to the holes in the board, that when struck into them they may keep their positions like those of a fiddle, and require some force to turn them round. The head of each peg belonging to the first

first set is a right-angled triangle about one-tenth of an inch in thickness; the head of each peg belonging to the second set differs only from the former in having a small notch in its sloping side or hypothenuse; and the head of each peg belonging to the third set is a square of which the breadth should be equal to the base of the triangle of the other two. These pegs should be kept in a case consisting of three boxes or cells, each cell being allotted to a set, and the case must be placed close by the board previous to the commencement of every operation. Each set should consist of sixty or seventy pegs (at least when employed in long calculations); and, when the work is finished, they should be collected from the board, and carefully restored to their respective boxes.

"Things being thus prepared, let a peg of the first set be fixed into the board, and it will acquire four different values according to its position respecting the calculator. When its sloping side is turned towards the left, it denotes one, or the first digit; when turned upwards, or from the calculator, it denotes two, or the second digit; when turned to the right, it represents three; and when turned downwards, or towards the calculator, it denotes four, or the fourth digit. Five is denoted by a peg of the second set, having its sloping side or hypothenuse turned to the left; six, by the same turned upwards; seven, by the same turned to the right; and eight, by the same turned directly down, or towards the body of the calculator. Nine is expressed by a peg of the third set when its edges are directed to right and left; and the same peg expresses the cypher when its edges are directed up and down. By three different pegs the relative values of the ten digits may therefore be distinctly expressed with facility; and by a sufficient number of each set the steps and result of the longest calculation may be clearly represented to the sense of feeling. It seems unnecessary to illustrate this by an example; suffice it to express in our characters, the present year of the Christian æra 1798:—Take a peg of the first set, and fix it the board with its sloping side turned towards the left, equal to one; take now a peg of the second set, and fix it in the next hole in the same groove, proceeding as usual from left to right, with its sloping side turned to the right, equal to 7; next take a peg of the third set, and fix it the third hole, with its edges directed to right and left, denoting 9; lastly, take a peg of the second set, and place it in the next hole, with its sloping side turned downwards, equal to 8; and the whole will express the number required.

"When it is necessary to express a vulgar fraction, I place the numerator in the groove immediately above, and the denominator in that immediately below, the groove in which the integers stand; and in decimal arithmetic an empty hole in the integer groove represents the comma or decimal point. By similar breaks I also denote pounds, shillings, pence, &c. and by the same expedient I separate in division the divisor and quotient from the dividend. This notation, which supplies me completely with coefficients and indices in algebra and fluxions, seems much superior to any of the kind hitherto made public in the west of Europe. That invented and described by Mr. Grenville, having no less than ten sets of pegs, is by much too complicated for general practice; and that which we owe to the celebrated Saunderson is apt to puzzle and embarrass the calculator, as the pegs representing the numerical digits can seldom or never be in the same straight line."

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In the higher parts of mathematics, such as conic sections, the same solid figures which are mediums of perception to those who see, may perform the same useful office to the blind. But, for the structure of superficial figures, we should imagine, that a kind of matter might be found, soft enough to be easily susceptible of impressions, yet hard enough to retain them till effaced by an equal pressure. Suppose, for instance, a table were formed, four feet broad and eight in length; for the figures, that they may be the more sensible to the touch, ought to be larger than ordinary. Suppose this table had brims or a moulding round it, rising an inch above the surface: let the whole expanse, then, be filled with beeswax, and the surface above pressed extremely even with a polished board, formed exactly to fit the space within the mouldings. This board will always be necessary to efface the figures employed in former propositions, and prepare the surface for new ones. We think we have imagined the minutest inconvenience that can arise from this method of delineating and conceiving geometrical truths; and, after all, the table appears to us the best and the least troublesome apparatus which a blind man can use. We can see no reason why general ideas of geography or topography might not be conveyed to him in the same manner, by spheres composed of or covered with the same impressible matter.

But although the extensive view we have taken of this subject has led us to notice the different inventions for the improvement of the blind, which have had their origin in our own country, we should by no means omit a plan published at Paris under the title of An Essay on the Education of the Blind, which supersedes every former attempt to facilitate their improvement. The invention of a plan so arduous in its appearance, and so practicable in its execution, demanded the highest exertions of the noblest genius to produce it, and the most strenuous efforts of indefatigable humanity to render it effectual. Its object is to teach them, by palpable characters impressed on paper, not only the liberal arts and sciences, but likewise the principles of mechanical operation, in such a manner. that those who have no genius for literary improvement may yet become respectable, useful, and independent, members of society, in the capacity of common artisans. By these tangible signatures they are taught to read, to write, and to print; they are likewise instructed in geometry, in algebra, geography, and, in short, in every branch of natural philosophy. Nor are their efforts circumscribed by mere utility; a taste for the fine arts has likewise been cultivated among them. They have been taught to read music with their fingers as others do with their eyes; and, though they cannot at once feel the notes and perform them upon an instrument, yet they are capable of acquiring any lesson with as much exactness and rapidity as those who enjoy all the advantages of sight. In his first chapter the author discovers the end proposed by that delineation of culture which he offers to the blind; it is to enlarge their sphere of knowledge, and of consequence to increase their capacities and improve their powers of action, so that they may become happy and independent in themselves, and useful and agreeable to others. The second chapter contains an answer to the objections urged against the general utility of this institution. These objections are candidly stated, and answered in the most satisfactory manner. The third chapter treats of reading

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as adapted to the practice of the blind. The fourth consists of answers to various objections against the method of reading proposed for the blind. In the fifth is shown the art of printing as practised by the blind for their peculiar use. In the sixth is described the manner of teaching the blind the art of printing for those that see. In the seventh is represented the manner of teaching the blind to write. The eighth explains the method of teaching the blind arithmetic; the ninth, geography; the tenth, music. The eleventh contains an account of the mechanic arts in which the blind are employed, and of the way by which they are formed for such occupations. The twelfth shows in general the proper manner of instructing the blind, and draws a parallel between their education and that of the deaf and dumb. The thirteenth treats of the method of instructing them in the languages, mathematics, history, &c. What remains of the book is taken up with notes which illustrate each particular chapter; a short historical account of the rise, the progress, and the present state, of the academy for the formation of the blind; an ode on the cultivation of the blind, by one that laboured under that affliction; an extract from the register of the royal academy of sciences; opinion of the printers; models of the various pieces which blind children are capable of printing; and an account of the exercises performed by blind children during the Christmas solemnities in 1786.

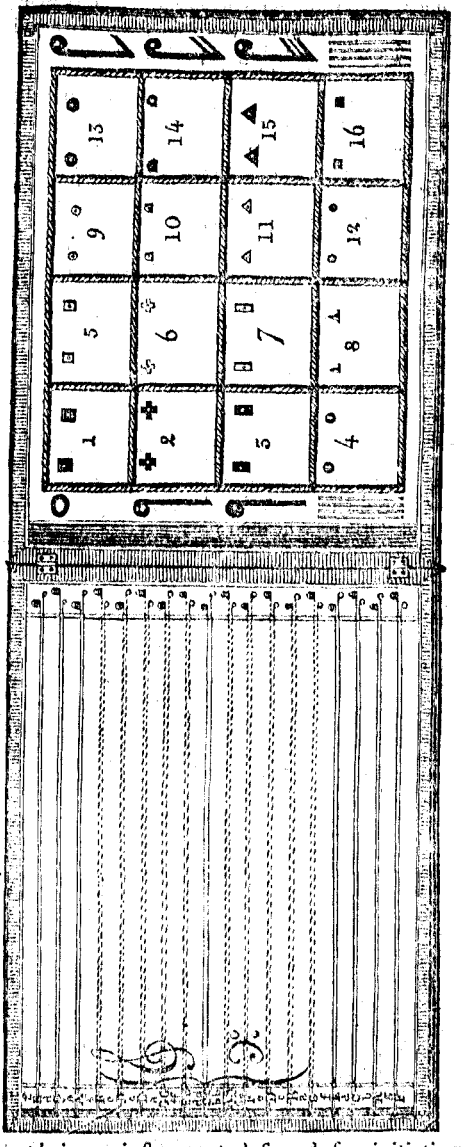
Having thus given a cursory view of the various topics contained the Essay, we proceed to give some account of the manner in which the blind print and write. The blind compositor has a box for every alphabetical character in use; on the outside of these boxes are palpably marked the peculiar character belonging to each; they are filled with types, which he chooses and sets as they are called for, but not in the position in which they are to be read; on the contrary, they are inverted as objects are seen painted on the retina of an eye by an optician. Having thus fixed and arranged his types, he chooses a page of the strongest paper that can be found, which he gently moistens in a degree sufficient to render it more easily susceptible of impressions, without being dilacerated or worn by the shock which it must afterwards undergo. He then lays it upon the types; and by the cautious operation of the press, or by the easy strokes of a little hammer, which are frequently repeated over the whole expanse, he causes the impression of the type to rise on the opposite side of the paper, where, when dry, it continues not only obvious to the sight but the touch, and is far from being easily effaced. On the upper side of the paper the letters appear in their proper position, and by their sensible elevation above the common surface render it practicable for the blind to read them with their fingers. Their manner of writing is analogous to this operation: the pupil, by repeated experiments, having familiarised himself to the forms of the letters, both in their inverted and in their proper position, gradually learns to delineate them upon paper, moistened as before, with the point of an iron pen, which has no split, and which is just sharp enough to impress without piercing the paper: thus, on the side next to the writer's hand, the letters are formed sunk and inverted; but when the paper is turned they appear right and *in relievo*. Thus the blind are enabled to form and decypher, not only the characters required in common language, but also mathematical diagrams,

arithmetical and geographical processes, and all the characters used in the written language of music. That these are not idle pretences, or intended to impose on the credulous, many undeniable facts might be adduced to prove. And in fact, the blind themselves are made to exhibit at their own academy every Wednesday and Saturday to crowds of charitable admirers, by whose liberal donations the institution is now chiefly supported.

There is little doubt but that the blind are capable of being taught astronomy, natural and moral philosophy, theology, grammar, logic, history, and the belles lettres; but above all music, which is, perhaps, of all other sciences, the most attainable, the most practicable, and the most consolatory to the mind. If the pupil, however, be not endowed with natural talents for the latter, suffer him by no means to be initiated in it. If his natural genius favours the attempt, the harpsichord, harp, or organ, are the most proper instruments for him to begin with; because by these instruments he may be made more easily acquainted with the extent of musical scales, with the powers of harmony, with the relations of which it is constituted, and of course with the theory of his art. It would be not only unnecessary, but impracticable, to carry him deep into the theory, before he has attained some facility in the practice. Let, therefore, his head and his hands (if we may use the expression) be taught to go *pari passu*. Let the one be instructed in the simplest elements, and the others conducted in the easiest operations first; contemplation and exercise will produce light in the one, and promptitude in the other. But, as his capacity of speculation and powers of action become more and more mature, discoveries more abstract and retired, tasks more arduous and difficult, may be assigned him. He should be taught the names and gradations of the diatonic scale, the nature and use of time, the diversity of its modes whether simple or mixed. He should be taught the quantity or value of notes, not only with respect to their pitch, but to their duration. Yet, let him be instructed not to consider these durations as absolutely fixed, but variable according to the velocity of the movements in which they are placed. He should never be habituated to take a piece of music either from the sound of a voice or an instrument. His companion ought to read the music by the names and values of its characters, with the same exactness as the words in any other language. When he becomes a considerable adept in the art, tangible signs may be invented, by which he may not only be enabled to read, but even to set, music for himself. Such exercises will render him infinitely more accurate, both in his principles and practice, than he would otherwise be.

There is a hint of such tangible signs given in Tansure's Musical Grammar; and Mr. Cheese has invented an instrument for teaching music to people deprived of sight, after they have been sufficiently instructed in its theoretical and practical principles. But the best contrivance of this kind at present known in England, seems to be an invention of Mr. Christie, teacher at the asylum for the blind in Liverpool, which he calls a *theograph*; an exact representation of which is here delineated, and the following explanation of it has been transmitted to us by the inventor himself, and is as follows:

Plan



Plan of Mr. CHRISTIE's THEOGRAHP, for teaching MUSIC to the BLIND.

"The *theograph* is an instrument designed for initiating young pupils in the art of music, and to enable them not only to read, but, if they have a taste for composition, to set their own music in tangible characters. In form it resembles a music-book; and is to the blind

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what a book is to those who have sight. The first side consists of a cushion, on which the music is to be set. It is divided by eighteen parallel lines, each line being represented by two brass strings, between which the pin should pass when a note is to be placed on a line, to prevent mistakes, which would frequently happen if the lines were single. Some of these lines are plain, others twisted. The four lowest, F A C E, are plain, and represent the ledger lines in the brass. The next five, G B D F A, are twisted, and correspond with the five lines or stave in the bass. The line above is plain, and denotes the middle, C, of the instrument. The next five, E G B D F, are twisted, and answer to the five lines or stave in the treble. The next three, A C E, are plain, and represent the ledger lines in alt. The space above is F, which completes the scale, and provides a line or space for each key of the harpsichord, as appears by the letters on the margin. Additional keys may be provided for by changing the cliff. When the student is become familiar with the scale, he may proceed to acquire the names, properties, and feel, of the characters.—The second side represents the cushion, divided into sixteen squares, in which are placed the characters: six made of cork or leather; six of card-paper, a little smaller; and four pins headed with sealing-wax. The notes are represented by characters made of cork; the marks chiefly by wax-headed pins, and their combinations with corks; and the terms by the card-paper characters, and their combinations with wax-headed pins.

No. 1. are semibreves; 2. minims; 3. crotchets; 13. quavers; 14. semiquavers; 15. demi-semiquavers.

MARKS. No. 16. The square wax-headed pin passing through any one of the six cork notes, signifies a rest equal in time to the note on which it is placed. No. 4. A round wax-head placed in like manner, makes that note an appoggiatura. No. 8. A sharp wax-head so placed, signifies a shake. No. 12. A circular flat wax-head placed in the same manner, signifies a pause. No. 8. A sharp wax-head placed before a note, makes that note sharp. No. 12. A circular flat wax-head makes it flat. No. 4. A round wax-head makes it natural. A *direct*, is noted by No. 16, the square wax-head. No. 16, placed on No. 5, denotes the bass cliff. On No. 6, the tenor ditto. On No. 7, the treble. A *tie*, is denoted by common pins placed in a semicircle. A pin after any note, serves for a dot. A pin above a note, points out *staccato*. A pin under a note, *legato*. Two on each side of a double bar signify a repeat; and the repeat which is known by the letter S, is signified by three pins placed one above another over the note on which it begins. Bars are denoted by wire staples, made so as to embrace the stave, as found in the lower part of the margins of this compartment or side of the figure. No. 10 placed on any cork note, the pin passing thro' both, shews that the right-hand crosses into the bass. No. 11 placed in like manner, shews that the left-hand crosses into the treble.

TERMS. No. 5, when placed above the stave near the beginning, signifies *grave*; No. 6, when placed in the same situation, signifies *adagio*; No. 7, *largo*; No. 9, *vivace*; No. 10, *allegro*; No. 11, *presto*. A pin placed before any of the last six characters implies *più*, or a little quicker; placed after, signifies *poco*, or a little slower. No. 1, a wax flat head on No. 5, signifies *forte*; on No. 6, *crescendo*; on No. 7, *tutti*; on No. 9, *piano*; on No. 10, *diminuendo*; on No. 11, *solo*.

solo. A pin before *piano* makes it a little softer; and after, a little louder: before *forte*, a little louder; and after, a little softer. No. 4, a wax round head on No. 5, signifies *obligato*; on No. 6, *ripieno*; on No. 7, *harpeggio*; on No. 2, *da capo*; on No. 10, *tremando*; on No. 11, *calando*. No. 9, a wax sharp head on No. 5, signifies *symphony*; on No. 6, *song*; on No. 7, *moderato*; on No. 9, *da camera*; on No. 10, *da capello*; on No. 11, *da teatro*. Thus upwards of sixty of the most essential notes, marks, and terms, used in harpsichord music, are provided for; and, if more be wanted, they may readily be supplied by the student's own invention, as these are capable of a much more extensive combination. In organ music, the names of the stops, with all the various modes of expression, may be signified.

To enable the student to obtain a more general and comprehensive idea of musical notes, a set of semibreves, minims, crotches, &c. are made of tin, resembling in shape these characters as they appear in print, and are placed above the bars in the margins of the second side. The names, properties, and form, of each being accurately acquired, will not only enlarge his knowledge of the art, but render him more expert in communicating that knowledge to others, particularly to those who have sight. The portable size of this machine excludes the possibility of setting whole tunes thereon, the intention of it being only to enable the student to acquire a theoretical and practical knowledge of its principles, for which the compass of a few bars is sufficient. But, when as much music is set as the length of the stave will admit, the characters may be withdrawn, and replaced in their respective squares, ready to begin a new passage.

When the student has acquired a thorough knowledge of the principles of this machine, and is desirous to set movements at length, one or more frames may be provided with cushions, each a yard long, six inches broad, and one inch thick, having strings on both sides alike, so that when one side is full he may proceed on the other, covering the first side with a thin board; for which purpose the frames may be made to rise on each side a quarter of an inch above the cushions, and thus he will be enabled to retain his compositions till transcribed."

It is certain, that when playing concertos, or when performing in *score*, the blind must depend upon memory, and upon memory alone: but happily their retentive powers are remarkably strong; and there are few pieces of music which will be found either too intricate to be acquired, or too long to be remembered, by a person deprived of sight. Mr. Stanley, the celebrated blind leader of his majesty's band, and organist of St. Andrew's Holborn, performed what is still more astonishing; for it is said, he accompanied any lesson with a thorough bass, though he never had heard it before. When the pupil becomes a more profound theorist, if he has adopted the notion that music and geometry are congenial and inseparable, he may have read to him Malcolm's Essay on Music, and Treydell's Theory and Practice of Music. But, if he chooses to hear the same principles delivered without that unnecessary parade, let him be instructed by d'Alembert; by Rameau, in the principles of composition; and by Rousseau's Musical Dictionary. It is true, that the forms and proportions of instruments, the thickness, length, and tension, of musical strings, may be mathematically adjusted; their

relations one to another may be determined by the coincidence of their vibrations, or by the number and velocity of these vibrations when dissonant; but experience and a good ear are amply sufficient for these purposes. Yet, if the necessity of geometry in music should still remain an indelible article in his creed, he may consider Dr. Smith's Philosophical Principles of Harmony. There has also been published, an explication of Tartini's theory, intitled The Principles and Power of Harmony; which, after he has made considerable progress, may be read to him with sensible advantage.

To elucidate farther the extraordinary faculty of blind persons, we shall here subjoin the following extraordinary particulars of two blind ladies.—The first of these ladies became blind in consequence of the confluent small-pox. In the course of this disease, in which she was attended by the late Sir Hans Sloane, several threatening symptoms appeared, which however were at length overcome: and the patient, being thought out of danger, took several doses of such purgative medicines as are usually administered in the decline of the disease, without any bad consequence. But, in the evening of the day on which she had taken the last dose that was intended to be given her on that occasion, she was suddenly seized with pains and convulsions in the bowels; the pain and other symptoms became gradually less violent as the force of the medicine abated, and, by such remedies as were thought best adapted to the case, they seemed at length to be entirely subdued. They were, however, subdued only in appearance; for at eleven o'clock of the forenoon of the next day they returned with great violence, and continued some hours; when they went off, they left the muscles of the lower jaw so much relaxed, that it fell down, and the chin was supported on the breast. The strength of the patient was so much exhausted during this paroxysm, that she lay near two hours with no other signs of life than a very feeble respiration, which was often so difficult to be discerned, that those about her concluded she was dead.

From this time the fits returned periodically every day, at about the same hour. At first they seemed to affect her nearly in the same degree; but at length all the symptoms were aggravated, the convulsions became more general, and her arms were sometimes convulsed alternately; it also frequently happened, that the arm which was last convulsed remained extended and inflexible some hours after the struggles were over. Her neck was often twisted with such violence, that the face looked directly backwards, and the back part of the head was over the breast; the muscles of the countenance were also so contracted and writhed by the spasms, that the features were totally changed, and it was impossible to find any resemblance of her natural aspect by which she could be known. Her feet were not less distorted than her head; for they were twisted almost to dislocation at the instep, so that she could not walk but upon her ancles.

To remove or mitigate these deplorable symptoms, many remedies were tried; and, among others, the cold bath: but either by the natural effect of the bath, or by some mismanagement in the bathing, the unhappy patient first became blind, and soon afterwards deaf and dumb. It is not easy to conceive what could increase the misery of deafness, dumbness, blindness, and frequent paroxysms of excruciating pain: yet a very considerable aggravation was added; for the loss of her sight, her hearing, and her speech, was followed by such a stricture of the muscles of her throat, that she could not

swallow any kind of aliment either solid or liquid. It might reasonably be supposed that this circumstance, though it added to the degree of her misery, would have shortened its duration; yet in this condition she continued near three quarters of a year; and during that time was supported in a very uncommon manner, by chewing her food only; which having turned often, and kept long in her mouth, she was obliged at last to spit out. Liquors were likewise gargled about in her mouth for some time; and then returned in the same manner, no part of them having passed the throat by an act of deglutition: so that whatever was conveyed into the stomach, either of the juices of the solid food, or of liquids, was either gradually imbibed by the sponginess of the parts, which they moistened, or trickled down in a very small quantity along the sides of the vessels.

But there were other peculiarities in the case of this lady, yet more extraordinary. During the privation of sight and hearing, her touch and her smell became so exquisite, that she could distinguish different colours of silk and flowers, and was sensible when any stranger was in the room with her. After she became blind, and deaf, and dumb, it was not easy to contrive any method by which a question could be asked her, and an answer received. This, however, was at last effected, by talking with the fingers, at which she was uncommonly ready. But those who conversed with her in this manner, were obliged to express themselves by touching her hand and fingers instead of their own. A lady who was nearly related to her, having an apron on, that was embroidered with silk of different colours, asked her, in the manner which has been described, if she could tell what colour it was? and after applying her fingers attentively to the figures of the embroidery, she replied, that it was red, and blue, and green; which was true. The same lady having a pink-coloured ribbon on her head, and being willing still farther to satisfy her curiosity and her doubts, asked what colour that was? her cousin, after feeling some time, answered that it was pink colour: this answer was yet more astonishing, because it showed not only a power of distinguishing different colours, but different kinds of the same colour; the ribbon was not only discovered to be red, but the red was discovered to be of the pale kind called a *pink*.

"This unhappy lady, conscious of her own uncommon infirmities, was extremely unwilling to be seen by strangers, and therefore generally retired to her chamber, where none but those of the family were likely to come. The same relation, who had by the experiment of the apron and ribbon discovered the exquisite sensibility of her *touch*, was soon after convinced by an accident, that her power of *smelling* was acute and refined in the same astonishing degree. Being one day visiting the family, she went up to her cousin's chamber, and, after making herself known, she intreated her to go down, and sit with her among the rest of the family, assuring her, that there was no other person present: to this she at length consented, and went down to the parlour door; but the moment the door was opened, she turned back, and retired to her chamber much displeased; alleging, that there were strangers in the room, and that an attempt had been made to deceive her: it happened indeed that there were strangers in the room; but they had come in while the lady was above stairs, so that she did not know they were there. When she had satisfied her cousin of this particular, she was pacified; and

and being afterwards asked how she knew there were strangers in the room, she answered, by the smell.

But though she could by this sense distinguish in general between persons with whom she was well acquainted and strangers, yet she could not so easily distinguish one of her acquaintance from another without other assistance. She generally distinguished her friends by feeling their hands; and when they came in, they used to present their hands to her, as a mean of making themselves known: the make and warmth of the hand produced in general the differences that she distinguished; but sometimes she used to span the wrist, and measure the fingers. A lady, with whom she was very well acquainted, coming in one very hot day, after having walked a mile, presented her hand as usual; she felt it longer than ordinary, and seemed to doubt whose it was; but after spanning the wrist, and measuring the fingers, she said, 'It is Mrs. M. but she is warmer to-day than ever I felt her before.'

To amuse herself in the mournful and perpetual solitude and darkness to which her disorder had reduced her, she used to work much at her needle; and it is remarkable, that her needle-work was uncommonly neat and exact: among many other pieces of her work that are preserved in the family, is a pin-cushion, which can scarcely be equalled. She used also sometimes to write; and her writing was yet more extraordinary than her needle-work: it was executed with the same regularity and exactness; the character was very pretty, the lines were all even, and the letters placed at equal distances from each other: but the most astonishing particular of all, with respect to her writing, is, that she could by some means discover when a letter had by some mistake been omitted, and would place it over that part of the word where it should have have been inserted, with a caret under it. It was her custom to sit up in bed at any hour of the night, either to write or to work, when her pain or any other cause kept her awake.

These circumstances were so very extraordinary, that it was long doubted whether she had not some faint remains both of hearing and sight, and many experiments were made to ascertain the matter; some of these experiments she accidentally discovered, and the discovery always threw her into violent convulsions. The thought of being suspected of insincerity, or supposed capable of acting so wicked a part as to feign infirmities that were not inflicted, was an addition to her misery which she could not bear, and which never failed to produce an agony of mind not less visible than those of her body. A clergyman, who found her one evening at work by a table with a candle upon it, put his hat between her eyes and the candle, in such a manner that it was impossible she could receive any benefit from the light of it if she had not been blind. She continued still at her work with great tranquillity; till putting up her hand suddenly to rub her forehead, she struck it against the hat, and discovered what was doing; upon which she was thrown into violent convulsions, and was not without great difficulty recovered. The family were by these experiments, and by several accidental circumstances, fully convinced that she was totally deaf and blind; particularly by sitting unconcerned at her work during a dreadful storm of thunder and lightning, though she was then facing the window, and always used to be much terrified in such circumstances. But Sir Hans Sloane,

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her physician, being still doubtful of the truth of facts which were scarcely less than miraculous, he was permitted to satisfy himself by such experiments and observations as he thought proper; the issue of which was, that he pronounced her to be absolutely deaf and blind.

She was at length sent to Bath, where she was in some measure relieved; her convulsions being less frequent, and her pains less acute: but she never recovered her speech, her sight, or her hearing, in the least degree. Many of her letters dated at Bath, in some of which there are instances of interlineations with a caret, are now in the custody of the widow of one of her brothers, who, with many other persons, can support the facts here related, however wonderful, with such evidence as it would not only be injustice, but folly, to disbelieve.

Account of a French Lady, blind from her Infancy, who can read, write, and play at Cards, &c.

A young gentlewoman of a good family in France, lost her sight when only two years old, her mother having been advised to lay some pigeons blood on her eyes, to preserve them in the small pox; whereas, so far from answering the end, it ate into them. Nature, however, may be said to have compensated for the unhappy mistake, by beauty of person, sweetness of temper, vivacity of genius, quickness of conception, and many talents which certainly must alleviate her misfortune.

She plays at cards with the same readiness as others of the party. She first prepares the packs allotted to her, by pricking them in several parts; yet so imperceptibly, that the closest inspection can scarcely discern her indexes. She sorts the suits, and arranges the cards in their proper sequence, with the same precision, and nearly the same facility, as they who have their sight. All she requires of those who play with her, is to name every card as it is played; and these she retains so exactly, that she frequently performs some notable strokes, such as shew a great combination and strong memory.

The most wonderful circumstance is, that she should have learned to read and write; but even this is readily believed on knowing her method. In writing to her, no ink is used, but the letters are pricked down on the paper; and by the delicacy of her touch, feeling each letter she follows them successively, and reads every word with her finger ends. She herself in writing makes use of a pencil, as she could not know when her pen was dry; her guide on the paper is a small thin ruler and of the breadth of her writing. On finishing a letter, she wets it, so as to fix the traces of her pencil, that they are not obscured or effaced; then proceeds to fold and seal it, and write the direction: all by her own address and without the assistance of any other person. Her writing is very straight, well cut, and the spelling no less correct. To reach this singular mechanism, the indefatigable cares of her affectionate mother were long employed, who accustomed her daughter to feel letters cut in cards or paste-board, brought her to distinguish an A from a B, and thus the whole alphabet, and afterwards to spell words; then, by the remembrance of the shape of the letters, to delineate them on paper; and lastly, to arrange them so as to form words and sentences.

She has learned to play on the guittar, and has even contrived a way of pricking down the tunes as an assistance to her memory. So delicate are her organs, that in singing a tune, though new to her, she

she is able to name the notes. In figured dances she acquits herself extremely well, and in a minuet with inimitable ease and gracefulness. As for the works of her sex, she has a masterly hand; she sews and hems perfectly well; and in all her works she threads the needle for herself, however small. By the watch her touch never fails telling her exactly the hour and minute.

From this account, however, it would appear, that, except reading and writing, the French lady has nothing to boast of in which she was not excelled by Mr. Stanley above mentioned, if we may credit all that is reported of him. The works peculiar to her sex are gained mechanically; but the distinguishing colours, telling the precise time by a watch, naming the notes in music, and many other things depending upon the ear and touch, are said to have been so familiar to him, that his friends ceased to think them extraordinary. Attainments still more wonderful are ascribed to him; as, the naming the number of persons in a room on entering it; the directing his voice to each person in particular, even to strangers when they had once spoken; the missing any person absent, and telling who that person was; and, lastly, his ability to form just conceptions of youth, beauty, symmetry, and shape.

Behaviour of a Person born blind, on receiving his Sight at twenty Years of Age by the Operation of an Oculist.

The operator, Mr. Grant, having observed the eyes of his patient, and declared to his friends and relations that it was highly probable he should be able to remove the obstacle which prevented the use of his sight; all his acquaintance, either out of regard or curiosity, assembled on the occasion. The Rev. Mr. Caswell, minister of the place, desired the company, in case the operation should succeed, to keep quiet, and suffer the young man to make his own observations, without the direction of any thing he had received by his other senses, or the opportunity of discovering his friends by their voices.—Among others, his mother, his brothers and sisters, and a young lady for whom he had a passion, were present.

The operation had the wished-for success. When the patient first received the dawn of light, there appeared such an extacy in his action, that he seemed ready to swoon away in the surprize of joy and wonder. The surgeon stood before him with his instruments in his hands. The young man observed him from head to foot; after which he surveyed himself as carefully, and seemed to compare him to himself; and, observing both their hands, seemed to think they were exactly alike, except the instruments, which he took for parts of his hands. When he had continued in this amazement some time, his mother could no longer bear the agitations of so many passions as thronged upon her, but fell upon his neck, crying out, My son! my son! The youth knew her voice, and could speak no more than, Oh me! are you my mother? and fainted. The whole room, you will easily conceive, were very affectionately employed in recovering him; but above all, the young gentlewoman who loved him, and whom he loved, shrieked in the loudest manner. That voice seemed to have a sudden effect upon him as he recovered, and he shewed a double curiosity in observing her as she spoke and called to him; till at last he broke out, What has been done to me? Whither am I carried? Is all this about me the thing I have so often

often heard of? Is this the light? Is this seeing? Were you always thus happy, when you said you were glad to see each other? Where is Tom, who used to lead me? But I could now, methinks, go any where without him. He offered to move, but seemed afraid of every thing around him. When they saw his difficulty, they told him, till he became better acquainted with his new being, he must let the servant still lead him. The boy was called for, and presented to him. Mr. Caswell asked him, what sort of thing he took Tom to be, before he had seen him. He answered, he believed there was not so much of him as of himself; but he fancied him the same sort of creature. The noise of this sudden change made all the neighbourhood throng to the place where he was. As he saw the croud thickening, he desired Mr. Caswell to tell him how many there were in all to be seen. The gentleman, smiling, answered him, That it would be very proper for him to return to his late condition, and suffer his eyes to be covered, till they had received strength; for he might remember well enough that by degrees he had from little and little come to the strength he had at present in his ability of walking and moving; and that it was the same thing with his eyes, which, he said, would lose the power of continuing to him that wonderful transport he was now in, except he would be contented to lay aside the use of them, till they were strong enough to bear the light without so much feeling as he knew he underwent at present. With much reluctance he was prevailed on to have his eyes bound, in which condition they kept him in a dark room, till it was proper to let the organ receive its objects without farther precaution. After some days it was thought fit to unbind his head, and the young lady whom he loved was instructed to open his eyes accordingly, as well to endear herself to him by such a circumstance, as to moderate his extacies by the persuasion of a voice, which had so much power over him as her's ever had. When this beloved young woman began to take the binding off his eyes, she talked to him as follows:

"Mr. ——, I am now taking the binding off; though, when I consider what I am doing, I tremble with the apprehension, that (though I have from my very childhood loved you, dark as you were, and though you had conceived so strong a love for me) you will find there is such a thing as beauty, which may ensnare you into a thousand passions of which you are now ignorant, and take you from me for ever. But, before I put myself to that hazard, tell me in what manner that love, you always professed to me, entered into your heart; for its usual admission is at the eyes."

The lover answered, "Dear Lydia, if I am to lose by sight the soft pantings which I have always felt when I heard your voice; if I am no more to distinguish the step of her I love, when she approaches me, but to change that sweet and frequent pleasure for such an amazement as I knew the little time I lately saw; or if I am to have any thing besides, which may take from me the sense I have of what appeared most pleasing to me at that time, (which apparition it seems was you,) pull out these eyes, before they lead me to be ungrateful to you, or undo myself. I wished for them but to see you; pull them out, if they are to make me forget you."

We have the satisfaction of being informed, that the Asylum for the Blind, some time since established at Liverpool, bids fair to

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anſwer every benevolent purpoſe, for which it was founded. The following Stanzas, written in praiſe of this inſtitution, are ſo excellent, that we ſhall conclude this article with them.

On the Aſylum for the Blind at Liverpool.

Stranger, pauſe :—for thee the day,
Smiling pours its cheerful ray,
Spreads the lawn and rears the bower,
Lights the ſtream and paints the flower.

Stranger, pauſe :—with ſoften'd mind
Learn the ſorrows of the blind.
Earth and ſeas, and varying ſkies
Viſit not their cheerleſs eyes.

Not for them the bliſs to trace
The chiſſel's animating grace ;
Nor on the glowing canvaſs find
The poet's ſoul, the ſage's mind.

Not for them the heart is ſeen,
Speaking thro' the expreſſive mien ;
Not for them are pictur'd there
Friendſhip, pity, love ſincere.

Helpleſs as they ſlowly ſtray,
Childhood points their cheerleſs way ;
Or the wand exploring guides
Fault'ring ſteps, where fear preſides.

Yet for them has genius kind
Humble pleaſures here aſſign'd :
Here with unexpected ray,
Reach'd the ſoul that felt no day.

Lonely blindneſs here can meet
Kindred woes, and converſe ſweet ;
Torpid once, can learn to ſmile
Proudly o'er its uſeful toil.

He, who deign'd for man to die,
Op'd on day the darken'd eye ;
Humbly copy—thou canſt feel—
Give thine alms—thou canſt not heal.

NAVIGATION OF THE RED SEA.

THE Red Sea, or Arabian Gulph, ſo renowned in ſacred hiſtory, and ſo much the object of preſent curioſity, ſeparates Arabia from part of Egypt, and from Upper Ethiopia. It is nearly 350 leagues in length, and at an average about forty in breadth. Its tides differ little from thoſe of the Indian Ocean, with which it communicates by the Streights of Babelmandel ; but it is not much expoſed to tempeſts ; the winds uſually blow from north to ſouth, and being periodical, like the monſoons of India, determine the ſeaſon for ſailing in or out of this ſea.

Mr. Bruce deſcribes all its weſtern ſhore to be bold, [ſtanding out to view, or ſtriking to the eye,] and to have more depth of water than

than the eaſt; but on the former there is neither anchoring-ground nor ſhoals. It is rocky, with a conſiderable depth of water; and the rocks, though not viſible, are yet ſufficiently near the ſurface to deſtroy a large ſhip: the cauſe is ſuppoſed to be, that the mountains on the ſide of Abyſſinia and Egypt are all of hard ſtone, porphyry, many different kinds of marble, granite, alabaſter, and baſaltes.

Theſe, being all compoſed of ſolid materials, can therefore part with very little duſt or ſand, which might otherwiſe be blown from them into the ſea. On the oppoſite ſide, the whole conſiſts of moving ſands, a large quantity of which is blown from the ſouth-eaſt by the dry winter monſoons, which, being lodged among the rocks on that ſide, and confined there by the north-eaſt or ſummer monſoons, are prevented from coming over to the Egyptian ſide. Hence the weſt coaſt is full of ſunken rocks, for want of ſand to cover them, with which they would otherwiſe become iſlands: they are naked and bare all round, with ſharp points like ſpears; while, on the eaſt ſide, every rock becomes an iſland, and every two or three iſlands become a harbour.—On the ends of the principal of theſe harbours are piled great heaps of ſtones, to ſerve as ſignals; 'and it is there,' ſays Bruce, 'that the large veſſels from Cairo to Jidda, equal in ſize to a 74-gun ſhip, (but, from the ciſtern of maſon-work built within for holding water, nearly double its weight,) after navigating their portion of the channel in the day-time, come ſafely and quietly to anchor at four o'clock in the afternoon, and in theſe little harbours paſs the night, to ſail again next morning into the channel.'

From the obſervations made by Mr. Bruce on the navigation of the Red Sea, he undertakes to point out a ſafe paſſage for large ſhips to the Gulph of Suez, ſo that they may be able to judge of the propriety of their own courſe themſelves, without truſting implicitly to the pilots they meet with, who are often ignorant of their buſineſs. This ſea, according to Mr. B. may be divided into four parts, of which the channel occupies two, till near the latitude of 26 degrees, or that of Coſſeir; on the weſt is deep water, with many rocks; and on the eaſt it is full of iſlands, as we have already ſtated. Between theſe iſlands there are channels and harbours of deep water, where ſhips may be protected in any wind; but a pilot is neceſſary in ſailing among thoſe from Mocha to Suez, and the voyage, beſides, can be continued only during part of the day. Ships bound to Suez without the conſent of the xeriffe of Mecca, that is, without any intention of ſelling their cargo at Jidda, or paying cuſtom there, ought to take in freſh water at Mocha; or, if there be any reaſon againſt this, a few hours will carry them to Azab, or Saba, on the Abyſſinian coaſt, where they may be plentifully ſupplied; but it muſt be remembered, 'that the people here are Galla, the moſt treacherous and villainous wretches upon earth.' Here not only water may be procured, but plenty of ſheep and goats, with myrrh and incenſe in the proper ſeaſon. Great caution, however, muſt be uſed in dealing with the people, as even thoſe of Mocha, who are abſolutely neceſſary to them in their commercial dealings, cannot truſt them without ſurety or hoſtages. Some years ago, the ſurgeon and mate of the Elgin Eaſt-Indiaman, with ſeveral ſailors, were murdered by thoſe ſavages as they went on-ſhore to purchaſe myrrh, though they had a letter of ſafe conduct from the ſheik.

WOOLLEN MANUFACTURES OF NORTH WALES.

THE webs are diſtinguiſhed by the trade into two ſorts: 1. what they call ſtrong cloth, or high-country cloth; 2. ſmall cloth, or low-country cloth.

1. Strong cloth is made in Merionethſhire, and principally in the neighbourhood of Dolgelly and Machynlleth: at this latter place a manufactory on a ſmall ſcale has been lately [1796] eſtabliſhed, a circumſtance only worth notice as marking the commencement of a change in preparing the wool which will probably ſoon become general. Almoſt every little farmer makes webs, and few cottages in theſe parts are without a loom: all kind of wool is uſed indiſcriminately, and a conſiderable quantity of refuſe from the wool-ſtaplers and ſkinners is collected from the different quarters to be worked up here. During peace much Kentiſh wool uſed to be imported: many farmers, however, employ wool of their own growth, and this produces by far the beſt kind of cloth. The ſtandard width of this article is ⅞ of a yard; the length of the piece, or what is emphatically ſtiled a web, is about two hundred yards, conſiſting of two ends of one hundred yards each, being thus divided for the convenience of carriage. The quality is neceſſarily of various degrees. The price has been rapidly advancing, and has added from three to five pence per yard to the former value of the article. In its rough ſtate it may at preſent be purchaſed of the manufacturer at every price between 11d. and 20d. a yard. The market for this cloth is Shrewſbury: it was actually the market a few years ago, but is now little more than nominally ſo; a market however is regularly holden every Thurſday, in a great room belonging to the drapers' company, into which none but the members of that corporation are admitted; and to this monopoly is aſcribed the removal of the market from Shrewſbury, as perſons not of the fraternity, but who purſued the ſame trade, intercepted the cloth in its way to the town; ſo that even the drapers themſelves, whenever trade is briſk, are obliged to 'go up into the country,' as the phraſe is, and buy goods wherever they can find them,—at Dolgelly, at Machynlleth, at the villages, farm-houſes, cottages, fulling-mills, &c. In conſequence of this, it is now become a cuſtom with the principal drapers to keep ſervants the greater part of the year at Dolgelly or its neighbourhood, who get acquainted with the perſons who make cloth; aſſiſt the poorer ones probably with ſmall ſums of money to buy wool; and, in fact, ſuperintend the making and dreſſing of the goods.

The following is the whole proceſs undergone by this article before exportation: The wool is firſt prepared by hand in the uſual manner for the loom; when woven into cloth, it is ſent to the fulling-mill, where it undergoes the operations of ſcouring, bleaching, and milling; and is then fit for the market. When purchaſed by the drapers, it is treated in various ways: either it is merely committed to the ſheermen, who raiſe the wool on one ſide with cards, which is called *rowing*; or it is ſent again to the mill, where it is ſometimes thickened to a ſurpriſing ſubſtance, which adds greatly to the price, on account of the loſs in ſhrinking; or it is ſtretched, and thus made three or four inches wider, an operation which likewiſe enhances the value; or, laſtly, it is converted into a frieze or

napped cloth. It is then put under the packing-press. Being formed into bales of different sizes, containing from five hundred up to two thousand yards, it is usually sent either to London or Liverpool, and thence exported to Germany and America. A quantity comparatively inconsiderable is used at home for workmen's jackets, ironing-cloths, blankets, &c.

2. Small cloth is the produce of Denbighshire: it is entirely manufactured in the parish of the Glynn, a large tract of country including Llangollen and Corwen. There is no established factory for this article.—Small cloth is about $\frac{1}{4}$ of a yard narrower than strong cloth; its length is the same. The best was purchased in 1795 at 16 or 17 pence a-yard; but this was thought a most extravagant price, 14d. having been formerly deemed its full value. This cloth is used chiefly for dying; some quantity is indeed sent off in its native or white state; but all that is dyed is, or ought to be, of this kind; the reason of which is, that the coarser sort of the high-country cloth abounds with long white hairs incapable of taking the dye, called *kemps*. This fabric is made of the coarser part of the very long wool that grows round Oswestry. Of this wool the finer part is converted into a sort of flannel called Oswestry flannel, in substance between a common Welsh flannel and a web; its breadth is $\frac{3}{4}$ of a yard; its value from ten to fifteen pence at Oswestry, which is the market for this article, as well as for small cloth. There is no hall or other building at Oswestry appropriated for the sale of woollens; but the cloths are conveyed by the venders into any garret, stable, parlour, or kitchen, they can procure, and the purchasers hunt them out as well as they are able: the market is however generally confined to one or two streets, and there is little doubt but a proper warehouse of exposure will shortly be built.

The purposes to which webs are applied abroad are many and various. The clothing of the slaves in the West Indies and South America creates a large demand; stockings are said to be made of them in Germany and other parts of the continent; and the Empress of Russia at one time clothed part of her troops with them.

But flannels constitute the grand and most important of the Welsh manufactures. The texture and uses of this comfortable commodity it is unnecessary to point out. Though chiefly the produce of Montgomeryshire, it is by no means confined to that county, being made in various places within a circle of about twenty miles round Welsh Pool. There is only one manufactory of note in this line in Wales; it is at Dolobran, near Pool, and is said to be a parish-concern; it was established about the year 1790. There are a few other infant factories, at Newtown, Machynlleth, &c. but these as yet are of little consequence. The adjoining county of Shropshire partakes with Wales in this capital manufacture, and, being more wealthy, has in general substituted machinery to manual labour. Several individuals in Shrewsbury and its neighbourhood employ themselves successfully in this business; but by far the greatest undertaking of the kind is a factory about four or five miles from Shrewsbury, at a place called the Isle, belonging to Messrs. Cooke and Mason, erected in 1792. The mill is situated on the neck of a horseshoe-like winding of the Severn whose diameter is about three hundred yards, whereas the river makes a serpentine course of nearly three miles before it arrives from the upper part of the isthmus at the lower; a

tunnel

tunnel five feet in diameter is worked through the neck, opening into the bed of the upper part of the river, and a great wheel is placed at the other extremity; this wheel gives motion to a vast series of machinery for spinning, fulling, and many other operations. The power that works the wheel is immense, being a solid cylinder of water five feet in diameter, with a fall more than seventeen times greater than the Severn, which is itself a rapid river. Various were the apparent difficulties, and numerous the unforeseen accidents, which combined to baffle the design, arising from floods, and a bed of loose sand lying in the direction of the tunnel: all these however have been at length overcome by the perseverance and great mechanical skill of Mr. Mason; and the success of the undertaking bids fair to be as complete as in its execution it was arduous.

As yet by far the greater part of the thousands of pieces of flannel which are sold at Pool is the produce of manual labour; but the use of machinery increases, and will speedily become general. Formerly, the Welsh bestowed no pains in sorting the wool: a fleece was broken into two parts, never into more than three: they have now however learnt the economy of a little more trouble, and can make distinctions of sorts to the number of seven or eight; and the consequence is a great variation in the texture of flannels, so that some have been sold so low as sixpence, while others have been disposed of at four shillings, per yard.—Coarse goods are at present very scarce, and extravagantly dear, none being to be had under eleven or twelve pence per yard. The market at Pool is once a fortnight, on Monday. Each manufacturer used to bring his own goods; but of late a set of middle men has sprung up, called Welsh drapers, a sort of jobbers or forestallers, who go about the country to the different cottages, and buy all the flannel that they can lay their hands upon. Their number increases, and with it the price of flannel, so that shortly the whole trade of selling at the market will be in their hands. These men generally have large lots of cloth, from eight to twenty pieces, each one hundred yards on an average, out of which they will not sell a single piece but at an advanced price, by which means they get rid of many ordinary and damaged articles. At this market nothing is bought upon credit, every piece being paid for as soon as measured, in hard cash, or bank notes: it is the same with webs, and the rest of the Welsh woollen manufactures; whoever purchases must deposit the value in ready money, and pay the carriage home of the goods bought. No calculation has been made of the number of yards manufactured, nor indeed is it conjecturable. Very little flannel is immediately exported by the Shrewsbury drapers, who, for the most part, sell their goods to the London merchants: by these, flannels, as well as other woollens, are sent to the continent, to America, and to the West Indies: the chief demand however is, inland. It is impossible to tell the number of pieces exported, except by inquiries at the ports; for, though each draper may know the proportion exported of his own goods, yet no one is acquainted with what his neighbour exports.

Flannels, and cloths, i. e. webs, are dyed of various colours; but not in Wales, except what is consumed at home; and indeed it is seldom that a Welshman (among the lower classes) wears a coat that is not made in the principality: the usual colours are blue, drab, brown, or mixed.—Considerable quantities are dyed at Shrewsbury; and

and there is a dye-house at Le Botwood, near Dorrington, chiefly for this purpose.—Some flannels also have been sent into Lancashire, or the borders of Yorkshire, to be dyed; but this is by no means a common practice. More webs than flannels are dyed; but of the webs, far more are sent off in the white than in colours.

As to the fulling-mills, there is nothing peculiar in their construction; it may however be remarked that the stocks or hammers are not so heavy for flannels as webs.

Stockings, wigs, socks, gloves, and other small knit articles, are sold chiefly at Bala, being made in the town and neighbourhood: they are generally purchased by Welsh hosiers, who travel through the adjoining English counties, and supply the shops and warehouses; from the latter they are dispersed through the island. Stockings are of all colours, greys of a thousand shades, white, blue, red, &c. *from six to nine shillings per dozen.*

BUONAPARTE's EXPEDITION.—Continued from p. 249.

BUONAPARTE still remains at Cairo; and seems to have laid aside the design of penetrating to India, at least for the present season.—The following retrospect, and details of what has happened since our last, are taken from the most authentic Paris accounts.

Buonaparte did not make himself master of Egypt before the end of the summer. He found at Suez but a few vessels, and those in a bad condition. The monsoon being against him at the autumnal equinox, he found that he had not time to caulk those vessels, or to put to sea. He immediately abandoned his plan of going to India, and his army began to consider itself as fixed in Egypt. The loss of the fleet ensued; and this was followed by the declaration of war on the part of Turkey, their threats of invasion, &c. The French, finding themselves thus shut up, immediately turned their thoughts to defending themselves and their conquests.

The month of Fructidor (August) was rather distressing, on account of the extreme heat, the calms, and the exhalations which followed the retreat of the Nile; but in the month of Vendemaire (September) the ground was covered with trefoil: milk, beer, flesh, fish, and vegetables, were all abundant. The army recovered from its fatigues: it is about to pass the winter there, and inure itself to the climate.—In the mean time Buonaparte, ever vigilant, devotes himself to the administration and improvement of this important conquest: he descends to Damietta and Rosetta, and puts the coast in a state of defence at every point; he orders the necessary forts on the confines of the desert near Suez, and in the Higher Egypt. He keeps his troops in exercise, raises recruits in the country; and makes use rather of art than of force to form a party amongst the natives. He avails himself of the distinctions, civil and religious, to attach to him the Copts, the Bedouins, and the peasantry. He flatters their self-love by adopting several of their customs, in order that they may more easily accommodate themselves to his. He found them melancholy, choleric, and fretful, through the influence of tyranny: he has rendered them gay, good, and amiable, by the means of *games, feasts, and music.* He turns the most useful labours into amusement, and repairs the highways, the bridges, and the canals. He found the peasants slaves, and he has endowed them with property.

The

The Grand Signor inherited every ſucceſſion: Buonaparte has conſecrated the right of inheritance in every family; he beſtows on every child an equal ſhare; and ſuddenly, but without a ſhock, he has ameliorated the condition of the women, by giving them an equal portion of the deſcending property, with a right to diſpoſe of it at will. He marries his ſoldiers to the women of the country, prohibits all premature marriages, lays reſtraints on polygamy, and, in a word, is founding in Aſia a new civil code.

By his œconomy and foreſight he is reviving the manufactures of the country. He has prohibited the ruinous and abſurd luxury of Ruſſian hoops, and of Cachemirian ſhawls. He has called upon the neutral provinces, and procured from them by the way of exchange, the iron, the copper, and the wood, for which he had occaſion. He is not likely to be in any want of powder.

He has appointed ſchools of inſtruction for the people, and military colleges, where the young French, the Copts, and the Arabs, inſtruct each other in the Arabic and French, in geography, the mathematics, and other ſciences. He has, in one word, created a nation; and, by managing the powerful reſources of enthuſiaſm, he has recalled to the Arabs the glory of their anceſtors. He has ſhewn them, in the French army, the miraculous inſtrument of the decrees of Providence, as wiſhing to revive the empire of the ancient Arabs, to deliver them from a barbarous yoke, to purify the laws of their prophet, which had been altered by ignorant or impious men, and to open in Aſia a new age of grandeur, of ſcience, and of glory.

On this the London papers make the following remarks.—It would be equally ſuperfluous and tedious to enter into a minute diſcuſſion of the variety of reports which are aſloat in regard to Egypt. Thoſe which are official bear evident marks of partiality; but even from theſe accounts, a pretty exact ſtatement may be formed of the military and political poſition of the French in that ill-fated country, whoſe great diſtance from France has not been able to ſhelter it from the deſtructive viſit of the modern Vandals.

The French occupy Alexandria (forty miles from Roſetta), Cairo, Roſetta, and Damietta, which form the three ſalient angles of the Delta, a populous and fertile country. One of their corps ſeems to have marched up the Nile to a conſiderable diſtance, but the entrenched camp of Gizè, two leagues from Cairo, covers that town from incurſions from the ſide of Upper Egypt, which proves that they are not maſters of that country. To the north they are ſeparated by the ſea, and by vaſt deſerts from all inhabited countries. The forces which can attack them by land muſt come from Syria by the Iſthmus of Suez. The French have there poſted a ſmall body of troops, and run up ſome weak entrenchments; for what ſort of entrenchments can be conſtructed in a country without ſtone and wood, and whoſe ſoil conſiſts of a ſhifting ſand? This communicates with Cairo and Damietta by a deſert of which the Bedouin Arabs are maſters. It is clear that vaſt deſerts, the Nile, and its different branches, ſeparate all the different bodies of French troops, and they have no modes of communication with each other but ſuch as are extremely dangerous.—As ſoon as the Engliſh have once got ready the neceſſary ſhips of war to ſail up the two principal arms of the Nile, the low banks of which offer no advantage to the land-batteries, the communication with Damietta, the frontiers of Syria and Suez, and

Roſetta

Rosetta and Alexandria, can only be kept up by the way of Cairo, which, for a body of troops, requires at least three weeks marching.

The French army, at first, consisted of 25,000 men, but is since much diminished by actions and diseases; it has no cavalry, and no ammunition and warlike stores, but such as were brought on-board the transports; and it is left alone to defend that vast extent of country, against the troops which can be landed every where from Alexandria to Damietta, against the armies of Syria, against the Arabian and Mamaluke horse, and against the inhabitants. The French have no other resource left than to recruit their army with the inhabitants of the country.

On the 22d of September, a grand civic festival was given by the general at Grand Cairo, to celebrate the 7th anniversary of the foundation of the French republic. The festival was celebrated in every station of the army. Buonaparte gave at his head-quarters a dinner of 100 covers, to which all the generals, all the commanders of corps, and a great number of Turks of distinction, were invited. The festival began very early in the morning. The tri-coloured standard was planted on the column of Pompey, on the pyramids, on the ramparts of the ancient famous city of Thebes, and on the shores of the Red Sea. At eight in the evening horse and foot races took place, and the troops in Upper Egypt celebrated their festival on the ruins of Thebes. The night was enlivened by a grand fire-work.—A pyramid was erected, whereon were engraved the names of those who fell in the action against the Mamalukes; and on this occasion Buonaparte addressed the army to the following effect:

"Soldiers, We celebrate the first day of the 7th year of the republic.—Five years since the independence of the French people was threatened with ruin; but you took Toulon, and that was the forerunner of the destruction of our enemies.—A year after you vanquished the Austrians at Dego.—The following year you were on the summit of the Alps.—Two years ago you besieged Mantua, and you gained the celebrated victory of St. George.—Last year you were at the sources of the Drave and the Isonzo, on your return from Germany.—Who could then have predicted that you would be this day on the borders of the Nile, in the center of the ancient continents? From the English, celebrated in arts and commerce, down to the hideous and savage Bedouins, you arrest the attention of the world.

"Soldiers, your destiny is glorious, because you are worthy of what you have atchieved, and of the opinion which is entertained of you. You will die with honour, like the gallant men whose names are inscribed on this pyramid; or you will return to your country covered with laurels, and commanding the admiration of mankind. For five months past, since we have departed from Europe, we have been the constant object of the anxiety of our fellow citizens. On this day, the thoughts of 40 millions of citizens are turned towards you. They all exclaim, It is to their labours, to the blood which they shed, that we shall be indebted for a general peace, for tranquillity, for the prosperity of commerce, and the blessings of civil liberty."

By an order issued from the head-quarters, on the 29th of August, it appears, that General Lanus was directed to proceed to the town

of Alkam at the head of 500 men, to bring the magiſtrates priſoners to Cairo, give up the place to pillage, and not leave a houſe ſtanding, in conſequence of the inhabitants having aſſaſſinated the aid-de-camp Julien, and 15 French ſoldiers, by whom he was eſcorted. He was alſo enjoined to make known, by proclamation, to the neighbouring villages, that Alkam had been burnt, as a puniſhment inflicted upon its inhabitants, who had aſſaſſinated the French as they were purſuing their voyage on the Nile.

The following are the ſpeculations of Volney as to the deſtination of Buonaparte, which he thus puts into the mouth of that general: Let us leave to Zemaun Shah, and to Tippoo Sultan, the care of driving the Engliſh from Bengal. Zemaun Shah alone can do this with his 120,000 knights. Beſides, why ſhould I go to the other end of the world to employ fruitleſs and inglorious efforts on an obſcure and barbarous theatre? When I ſhall have driven the Engliſh from India, will their power be ſhaken? Will they be the leſs on that account the maſters of the Ocean, or the maſters of the Mediterranean, in which they dare to ſay that I am a priſoner? Does not their alliance with the Ruſſians, for the purpoſe of deceiving the Turks, open to them a new world, for the purpoſe of glutting their avarice? No; it is not to the factories of Madras or Calcutta that I am to look for glory. It is not there that France, of which my army is a precious portion, can be uſeful. It is Europe that muſt be made the theatre of the war; and, ſince the Turk has been ſo imprudent as to rear the ſtandard of it, it is in Conſtantinople that I will tear it from his hands. I will put Egypt in a ſtate ſufficient for its defence and preſervation. I ſhall pave the way for my expedition, by gaining over to my ſide the Arabs, the Druſes, and the Maronites. When maſter of Syria, I ſhall there form my magazines, and ſhall protect, by the mountains, my rapid march on the ſkirts of the deſert. When arrived at the mountains of Cilicia, my poſition will be ſtrengthened: my left wing will be ſupported by the ſea, my right by the Euphrates. I ſhall be able to keep open my communications with the Diarbekir and Armenia, corn-countries, and which are diſaffected to the Grand Turk. I will call on the aſſiſtance of the Bedouins, Turcomans, Kurds, Armenians, and Perſians, to the ruin of their common enemy; and, forming a great body of cavalry, I ſhall ſoon croſs the ſix or ſeven hundred miles which ſeparate me from the Boſphorus, which I may perhaps croſs on rafts, and I will then enter Conſtantinople. There a new courſe is opened to me. I enter on the theatre of Europe, and form a counterpoiſe to all the powers. I ſhall be able either to eſtabliſh or ſtrengthen the republic of all Greece by Albania and Corfu. I ſhall be able to keep open the communication with Italy and France. I ſhall be able to raiſe Poland from its ruins, and to form a ſtate there which may maintain the ancient balance of the North. Ruſſia will be kept in check, and will be apprehenſive of internal diſturbances. Auſtria, placed between two enemies, will have ſtill greater cauſe to be alarmed, and will be apprehenſive for the enfranchiſement of Hungary. Pruſſia will reſume her ſtate of natural alliance with France and the new empire of Byzantium. Denmark and Sweden, relieved from the preſſure of Ruſſia, will increaſe both in their means and their influence. Moſcow, jealous of Peterſburgh, will reclaim its independence. England, driven from the Archipelago, will

will quit the Mediterranean, and governments, tired at length with so much war, battles, fire, massacre, crime, and follies, will then in a mass be ready to listen to peace. May I be able to see that happy day, and to see an obelisk in Constantinople bear this inscription: "To the French army, the conquerors of Italy, of Africa, and of Asia. To Buonaparte, member of the national institute, the pacificator of Europe."

The intercepted correspondence from the army of General Buonaparte in Egypt, of which so much has been said, is now published. It is not only interesting on account of the confession of the persons employed on the expedition, respecting the condition of the army, and the disgust which prevails in being sent to such an inhospitable country; but the introduction contains some very pertinent observations on the motives which induced the directory to set it on foot. The French had long turned their eyes towards Egypt. The sanguine disposition of their consuls in the Levant had ministered with admirable effect to the credulity and avarice, and ambition, of this restless nation, by assuring them that Egypt was the Paradise of the East, the key of the treasures of the Indies; easy to be seized, and still more easy to be kept! There was not a Frenchman under the old regimen, who was not fully persuaded of the truth of all this; and certainly they have lost nothing of their ambition, their avarice, and their credulity, under the new.

Egypt, however, though said and believed to be a rich country, promised no immediate supplies of plunder; and the project for seizing it would still have remained in the port-folio of Citizen Talleyrand, had not a circumstance happened that made its speedy adoption a measure of necessity.

Every one knows that the directory long since engaged to make a free gift to the army, of 1000 million livres, at the conclusion of a general peace. This engagement, like many others, it seemed to have forgotten; till the necessity of attaching the troops to their interests, and thus enabling them to perfect the revolution of the 18th Fructidor, made it necessary for the triumvirate to renew their promise, and to revive the languid expectations of the army. None contributed more to the success of this fatal day than the army of Italy, which, to the eternal disgrace of Buonaparte, was permitted to overawe the councils, and to assume to itself the whole power of the state. Such a service could not be overlooked: their claim to a portion of the milliard became doubly valid; and, as the war in Italy was now supposed to be at an end, thousands of them returned to France to claim it.

Here began the difficulties of the directory. They had no money to give; but it was not advisable to confess it: and the expedition to Egypt was, therefore, brought forward, as an excellent expedient for quieting the present clamour, and providing for 40,000 veteran troops, inured to plunder, and impatient of controul; who were too sensible of their merits to be quietly laid aside, and too urgent in their demands to be cajoled with empty promises.

Hence arose the expedition to Egypt, which was to eclipse, in immediate advantages, the boasted conquests of Cortes and Pizarro.

It appears from some of Buonaparte's letters, that he had not the slightest idea of wintering in Egypt. "I shall pass (says he) the cold months in Burgundy; where I wish you would look out some

little place for me." Buonaparte was to leave his devoted followers to moulder away in the undisturbed possession of Egypt, and under some plausible pretence to return to Europe with his ablest officers, and with, perhaps, a handful of the most ductile and tractable of his troops.

This plan, and no other, accounts for his keeping the fleet on the coast, in spite of the remonstrances of Brueys, and the evident danger to which it was exposed—it was to carry back the "Conqueror of Egypt" in triumph to France, and the admiral, who was wholly unacquainted with his design, fell a sacrifice at last to a perfidy which he could not comprehend.

Extract of a Letter from Adjutant-general Boyer, to General Kilmaine, dated Grand Cairo, July 28, 1798.

"Our entrance into Grand Cairo will doubtless excite that sensation at home, which every extraordinary event is calculated to produce; but, when you come to know the kind of enemy we had to combat, the little art they employed against us, and the perfect nullity of all their measures, our expedition and our victories will appear to you very common things.

We began by making an assault upon a place without any defence, and garrisoned by about 500 Janizaries, of whom scarce a man knew how to level a musket. I allude to Alexandria, a huge and wretched skeleton of a place, open on every side, and most certainly very unable to resist the efforts of 25,000 men, who attacked it at the same instant. We lost, notwithstanding, 150 men, whom we might have preserved by only summoning the town—but it was thought necessary to begin by striking terror into the enemy.

After this we marched against the Mamelucks, a people highly celebrated amongst the Egyptians for their bravery. This rabble (I cannot call them soldiers), who has not the most trifling idea of tactics, and know nothing of war but the blood that is spilt in it, appeared for the first time opposed to our army on the 13th of July. From the first dawn of day, they made a general display of their forces, which struggled round and round our army like so many cattle; sometimes gallopping, and sometimes pacing in groups of 10, 50, 100, &c. After some time, they made several attempts, in a style equally ridiculous and curious, to break in upon us; but, finding every where a resistance which they probably did not expect, they spent the day in keeping us exposed to the fury of a burning sun. Had we been a little more enterprizing this day, I think their fate would have been decided; but General Buonaparte temporized, that he might make a trial of his enemy, and become acquainted with their manner of fighting. The day ended with the retreat of the Mamelucks, who scarcely lost 25 men. We continued our march up the Nile till the 21st, which was the day that put a final termination to the power of the Mamelucks in Egypt. I should be familiar with the language of the country, and, what is of still more importance, in the confidence of the great, to be enabled to give you an idea of the resources found in this city; but, from the complaints I hear, and the demands of several generals who wish to return, I can easily perceive that there are vast discontents in the army. Generally speaking, it is hardly possible to conceive the miseries endured by the army during its 17 days' march; finding no where a bit of bread,

bread, nor a drop of wine, we were reduced to live on melons, gourds, poultry, buffalo-meat, and Nile-water.

Such, my general, is the succinct account of our operations. There is a talk already of our ascending the Nile as far as the cataracts: an expedition that will make a number of officers throw up their commissions."

In this correspondence there are two confidential letters from Rear-admiral Genteaume to the minister of the marine in France, giving an account of the glorious battle off Aboukir. He was on-board l'Orient during the engagement. These letters are the more interesting, as they elucidate two very important points.—The first proves that Buonaparte acted the part of a villain in having endeavoured to injure the reputation of Admiral Brueys, and to insult his ashes. Buonaparte had asserted, that this unfortunate admiral detained the French fleet on the coast of Egypt contrary to his wishes; and, in this letter, Genteaume commander in chief of all the French naval forces in Egypt, proves that Brueys only remained on the coast because Buonaparte would not permit him to depart!—The second proves that the assertion made in the French papers, and re-echoed in some of our patriotic prints, that the fate of the day was undecided until the Orient took fire, is false. Besides, the authentic and irrefragable testimony of Admiral Genteaume, that the van of the French fleet was in our possession before the event took place, we have also the express authority of Capt. Berry for saying, that six of their ships had struck before the Orient was perceived to be on fire; and that not only he, but every officer who was in a situation of judging, is persuaded that the Orient herself had previously struck to the British flag.

Nov. 17, 1798. General Buonaparte, having been made acquainted with the intentions of the Arab chief, Mourad Bey, who was marching towards Cairo with very considerable forces to attack him, summoned a council of war, to which some of the leading men among the natives, who professed friendship to his views, as well as all the superior officers of his own army were invited to attend, in order to consider of the best means of defending the country, and of levying new impositions on the inhabitants to pay the troops.

Buonaparte having opened the business of the meeting, a native of Tripoli, who was present, drew a pistol and shot Buonaparte dead on the spot. The native officers followed the example of the Tripoline, by falling on the other French officers, all of whom were put to death. This proceeding was the signal for a general massacre of the French who were at Cairo.

The above intelligence seems to form the conclusion of our article; which, though not confirmed by any official advices, certainly has not as yet been officially contradicted. If any thing further, worthy the notice of our readers, should occur on the subject, we shall give it in a future number.

PHENOMENA OF CONGELATION.

WATER and other fluids are capable of containing the element of fire or heat in two very different states. In the one, they seem to imbibe the fire in such a manner, that it eludes all the methods

thods by which we are accustomed to observe it, either by our sensation of feeling, or the thermometer; in the other, it manifests itself obviously to our senses, either by the touch, the thermometer, or the emission of light.

In the first of these states, we call the body *cold*; and are apt to say that this coldness is occasioned by the absence of heat. But this manner of expressing ourselves is certainly improper; for even those fluids which are coldest to the touch contain a vast deal of heat. This vapour, which is colder to the touch than the water from which it was raised, contains an immense quantity of fire, even more than sufficient to heat it red hot. The like may be said of common salt, and snow, or ice. If a quantity of these substances is separately reduced to the degree of 28 or 30 of Fahrenheit's thermometer, upon mixing them together, the heat which would have raised the thermometer to the degree above mentioned now enters into the substance of them in such a manner that the mercury falls downs to 0. Here an excessive degree of cold is produced, and yet we are sure that the substances contain the very same quantity of heat that they formerly did: nay, they will even seem exceedingly cold, when they most certainly contain a great deal more heat than they originally did; for they absorb it from all bodies around them; and, if a small vessel full of water is put in the middle of such a mixture, it will in a short time be full of ice.

It appears, therefore, that our senses, even when assisted by thermometers, can only judge of the state in which the element of fire is with relation to the bodies around us, without regard to the quantity contained in them. Thus, if heat flows from any part of our body into any substance actually in contact with it, the sensation of cold is excited, and we call that substance *cold*; but if it flows from any substance into our body, the sensation of heat is excited, and we call that substance *hot*, without regard to the absolute quantity contained in either case.

Of all known substances, the atmosphere either absorbs or throws out heat with the most remarkable facility: and in one or other of these states it always is with respect to the surface of the earth, and such bodies as are placed on or near it; for these, properly speaking, have no temperature of their own, but are entirely regulated by that of the atmosphere.—When the air has been for some time absorbing the heat from terrestrial bodies, a frost must be the undoubted consequence, for the same reason that water freezes in a vessel put into a freezing mixture; and, were this absorption to continue for a length of time, the whole earth would be converted into a frozen mass. There, are, however, certain powers in nature, by which this effect is always prevented; and the most violent frost we can imagine must always as it were defeat its own purposes, and end in a thaw. To understand this subject, we must observe,

1. In that state of the atmosphere which we denominate frost, there is a most intimate union between the air and the water it contains; and therefore frosty weather, except in very high latitudes, is generally clear.

2. When such an union takes place, either in winter or summer, we observe the atmosphere also inclined to absorb heat, and consequently to frost. Thus in clear settled weather, even in summer,

mer, though the day may be excessively hot by reason of the continued sunshine, yet the mornings and evenings are remarkably cold, and sometimes even disagreeably so.

3. The air being therefore always ready in the time of frost, or in clear weather, to absorb heat from every substance which comes into contact with it, it follows that it must also absorb part of that which belongs to the vapours contained in it.

4. Though vapour is capable of becoming much colder than water without being frozen, yet by a continued absorption it must at last part with its latent heat, i. e. that which essentially constitutes it vapour; and without which it is no longer vapour, but water or ice. No sooner, therefore, does the frost arrive at a certain pitch, than the vapours, every where dispersed through the air, give out their latent heat: the atmosphere then becomes clouded; the frost either totally goes off, or becomes milder by reason of the great quantity of heat discharged into the air; and the vapours descend in rain, hail, or snow, according to the particular disposition of the atmosphere at the time.

5. Even in the polar regions, where it may be thought that the frost must increase beyond measure, there are also natural means for preventing its running to extremes. The principal cause here is, the mixture of a great quantity of vapours from the more temperate regions of the globe with the air in those dreary climates. It is well known, that aqueous vapour always flies from a warm to a colder place. For this reason, the vapours raised by the sun in the more temperate regions of the earth, must continually travel northward and southward in great quantities. Thus they furnish materials for those immense quantities of snow and ice which are to be found in the neighbourhood of the poles, and which we cannot imagine the weak influence of the sun in these parts capable of raising. It is impossible that a quantity of vapour can be mixed with frosty air, without communicating a great deal of heat to it: and thus there are often thaws of considerable duration even in those climates where, from the little influence of the sun, we should suppose the frost would be perpetual.

6. We may now account with some probability for the uncertain duration of frosts. In this country they are seldom of a long continuance; because the vapours raised from the sea with which our island is surrounded, perpetually mix with the air over the island, and prevent a long duration of the frost. For the same reason, frosts are never of such long duration in maritime places on the continent as in the inland ones. There is nothing, however, more uncertain than the motion of the vapours with which the air is constantly filled; and therefore it is impossible to prognosticate the duration of a frost with any degree of certainty. In general, we may always be certain, that, if a quantity of vapour is accumulated in any place, no intense frost can subsist in that place for any length of time; and, by whatever causes the vapours are driven from place to place, by the same causes the frosts are regulated throughout the whole world.

In the northern parts of the world, even solid bodies are liable to be affected by frost. Timber is often apparently frozen, and rendered exceedingly difficult to saw. Marl, chalk, and other less solid terrestrial concretions, will be shattered by strong and durable frosts.

frosts. Metals are contracted by frost: thus, an iron tube, 12 feet long, upon being exposed to the air in a frosty night, lost two lines of its length. On the contrary, frost swells or dilates water near one-tenth of its bulk. Mr. Boyle made several experiments with metalline vessels, exceedingly thick and strong; which being filled with water, close stopped, and exposed to the cold, burst by the expansion of the frozen fluid within them. Trees are frequently destroyed by frost, as if burnt up by the most excessive heat; and in very strong frosts, walnut-trees, ashes, and even oaks, are sometimes split and cleft, so as to be seen through, and this with a terrible noise, like the explosion of fire-arms.

Frost naturally proceeds from the upper parts of bodies downwards: but how deep it will reach in earth or water, is not easily known; because this depth may vary with the degree of coldness in the air, by a longer or shorter duration of the frost, the texture of the earth, the nature of the juices wherewith it is impregnated, the constitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr. Boyle, in order to ascertain this depth, after four nights of hard frost, dug in an orchard, where the ground was level and bare, and found the frost had scarcely reached three inches and a half, and in a garden nearer the house only two inches below the surface. Nine or ten successive frosty nights froze the bare ground in the garden six inches and a half deep; and in the orchard, where a wall sheltered it from the south sun, to the depth of eight inches and a half. He also dug in an orchard, near a wall, about a week afterwards, and found the frost to have penetrated to the depth of 14 inches. In a garden at Moscow, the frost in a hard season only penetrates to two feet: and the utmost effect that Captain James mentions the cold to have had upon the ground of Charlton island, was to freeze it to 10 feet deep: whence may appear the different degrees of cold of that island and Russia. And, as to the freezing of water at the abovementioned island, the captain tells us, it does not naturally congeal above the depth of six feet, the rest being by accident. Water also, exposed to the cold air in large vessels, always freezes first at the upper surface, the ice gradually increasing and thickening downwards: for which reason, frogs retire in frosty weather to the bottom of ditches; and it is said that shoals of fish retire in winter to those depths of the seas and rivers where they are not to be found in summer. Water, like the earth, seems not disposed to receive any very intense degree of cold at a considerable depth or distance from the air. The vast masses of ice found in the northern seas, being only many flakes and fragments, which, sliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the frost often proves fatal to mankind; not only producing gangrenes, but even death itself. Those who die of it have their hands and feet first seized, till they grow past feeling it; after which the rest of their bodies is so invaded, that they are taken with a drowsiness, which, if indulged, they awake no more, but die insensibly. But there is another way whereby it proves mortal, viz. by freezing the abdomen and viscera, which on dissection are found to be mortified and black.

The great power of frost on vegetables is a thing sufficiently known; but the differences between the frosts of a severe winter and

and those which happen in the spring mornings, in their effects on plants and trees, were never perfectly explained, till by Mess. Du Hamel and Buffon in the memoirs of the Paris Academy.

The frosts of severe winters are much more terrible than those of the spring, as they bring on a privation of all the products of the tenderer part of the vegetable world; but then they are not frequent, such winters happening perhaps but once in an age; and the frosts of the spring are in reality greater injuries to us than these, as they are every year repeated.

In regard to trees, the great difference is this, that the frosts of severe winters affect even their wood, their trunks, and large branches; whereas those of the spring have only power to hurt the buds. The winter frost happening at a time when most of the trees in our woods and gardens have neither leaves, flowers, nor fruits, upon them, and have their buds so hard as to be proof against slight injuries of weather, especially if the preceding summer has not been too wet; in this state, if there are no unlucky circumstances attending, the generality of trees bear moderate winters very well; but hard frosts, which happen late in the winter, cause very great injuries even to those trees which they do not utterly destroy. These are, 1. Long cracks following the direction of the fibres. 2. Parcels of dead wood inclosed round with wood yet in a living state. And, 3. That distemperature which the foresters call the *double blea*, which is a perfect circle of blea, or soft white wood, which, when the tree is afterwards felled, is found covered by a circle of hard and solid wood.—The opinions of authors about the exposition of trees to the different quarters, have been very different, and most of them grounded on no rational foundation. Many are of opinion that the effects of frost are most violently felt on those trees which which are exposed to the north; and others think the south or the west are most strongly affected by them. There is no doubt but the north exposure is subject to the greatest cold. It does not, however, follow from this, that the injury must be always greatest on the trees exposed to the north in frosts: on the contrary, there are abundant proofs that it is on the south side that trees are generally more injured by frost: and it is plain from repeated experiments, that there are particular accidents, under which a more moderate frost may do more injury to vegetables, than the most severe one which happens to them under more favourable circumstances.

It is plain from the accounts of the injuries trees received by the frosts in 1709, that the greatest of all were owing to repeated false thaws, succeeded by repeated new frosts. But the frosts of the spring-season furnish abundantly more numerous examples of this truth; and some experiments made by the Count de Buffon, at large in his own woods, prove incontestably, that it is not the severest cold or most fixed frost that does the greatest injury to vegetables.

This is an observation directly opposite to the common opinion; yet is not the less true, nor is it any way discordant to reason. We find by a number of experiments, that humidity is the thing that makes frost fatal to vegetables; and therefore every thing that can occasion humidity in them, exposes them to these injuries, and every thing that can prevent or take off an over proportion of humidity in them, every thing that can dry them though with ever so increased a cold, must prevent or preserve them from those injuries. Numerous

 experiments

experiments and obſervations tend to prove this. It is well known that vegetables always feel the froſt very deſperately in low places where there are fogs. The plants which ſtand by a river ſide are frequently found deſtroyed by the ſpring and autumnal froſts, while thoſe of the ſame ſpecies, which ſtand in a drier place, ſuffer little or perhaps not at all by them; and the low and wet parts of foreſts are well known to produce worſe wood than the high and drier. The coppice wood in wet and low parts of common woods, though it puſh out more vigorouſly at firſt than that of other places, yet never comes to ſo good a growth; for the froſt of the ſpring, killing theſe early top-ſhoots, obliges the lower part of the trees to throw out lateral branches: and the ſame thing happens in a greater or ſmaller degree to the coppice wood that grows under cover of larger trees in great foreſts; for here the vapours, not being carried off either by the ſun or wind, ſtagnate and freeze, and in the ſame manner deſtroy the young ſhoots, as the fogs of marſhy places. It is a general obſervation alſo, that the froſt is never hurtful to the late ſhoots of the vine, or to the flower-buds of trees, except when it follows heavy dews, or a long rainy ſeaſon, and then it never fails to do great miſchief, though it be ever ſo ſlight.

The froſt is always obſerved to be more miſchievous in its conſequences on newly cultivated ground than in other places; and this is becauſe the vapours which continually ariſe from the earth, find an eaſier paſſage from thoſe places than from others. Trees alſo which have been newly cut, ſuffer more than others by the ſpring froſts, which is owing to their ſhooting out more vigorouſly.

Froſts alſo do more damage on light and ſandy grounds, than on the tougher and firmer ſoils, ſuppoſing both equally dry; and this ſeems partly owing to their being more early in their productions, and partly to their lax texture ſuffering a greater quantity of vapours to tranſpire.

It alſo has been frequently obſerved, that the ſide-ſhoots of trees are more ſubject to periſh by the ſpring froſts than thoſe from the top; and M. Buffon, who examined into this with great accuracy, always found the effects of the ſpring froſts much greater near the ground than elſewhere. The ſhoots within a foot of the ground quickly periſhed by them; thoſe which ſtood at two or three feet high, bore them much better; and thoſe at four feet and upwards frequently remained wholly unhurt, while the lower ones were entirely deſtroyed.

There is a ſeries of obſervations, which have proved beyond all doubt, that it is not the hard froſts which ſo much hurt plants, as thoſe froſts, though leſs ſevere, which happen when they are full of moiſture; and this clearly explains the account of all the great damages done by the ſevere froſts being on the ſouth ſide of the trees which are affected by them, though that ſide has been plainly all the while leſs cold than the north. Great damage is alſo done to the weſtern ſides of trees and plantations, when after a rain with a weſt wind the wind turns about to the north at ſun-ſet, as is frequently the caſe in ſpring, or when an eaſt wind blows upon a thick fog before ſun-riſing.

Dr. Blagden (Phil. Tranſ. vol. lxxiii.) obſerves, that it was not till near the year 1730, that thermometers were made with any degree of accuracy; and in four or five years after this, the firſt obſervations

observations were made which prove the freezing of quicksilver. On the accession of the Empress Anne Ivanouna to the throne of Russia, three professors of the Imperial academy were chosen to explore and describe the different parts of her Asiatic dominions, and to inquire into the communication betwixt Asia and America. These were Dr. John George Gmelin, in the department of natural history and chemistry; M. Gerard Frederic Muller, as general historiographer; and M. Louis de l'Isle de la Croyere, for the department of astronomy; draughtsmen and other proper assistants being appointed to attend them. They departed from Petersburgh in 1733; and such as survived did not return till ten years after. The thermometrical observations were communicated by Professor Gmelin, who first published them in his Flora Sibirica, and afterwards more fully in the Journal of his Travels. An abstract of them was likewise inserted in the Petersburg Commentaries for the years 1756 and 1765, taken, after the professor's death, from his original dispatches in possession of the Imperial academy.

In the winter of 1734 and 1735, Mr. Gmelin being at Yeneseisk, in 58½ N. lat. and 92 E. lon. from Greenwich, first observed such a descent of the mercury, as we know must have been attended with congelation. "Here (says he) we first experienced the truth of what various travellers have related with respect to the extreme cold of Siberia; for, about the middle of December, such severe weather set in, as we were sure had never been known in our time at Petersburg. The air seemed as if it were frozen, with the appearance of a fog, which did not suffer the smoke to ascend as it issued from the chimnies. Birds fell down out of the air as dead, and froze immediately, unless they were brought into a warm room. Whenever the door was opened, a fog suddenly formed round it. During the day, short as it was, parhelia and haloes round the sun were frequently seen; and in the night mock moons, and haloes about the moon. Finally, our thermometer, not subject to the same deception as the senses, left us no doubt of the excessive cold; for the quicksilver in it was reduced, on the 5th of January O. S. to —120° of Fahrenheit's scale, lower than it had ever hitherto been observed in nature."

The next instance of congelation happened at Yakutsk, in N. lat. 62. and E. lon. 130. The weather here was unusually mild for the climate, yet the thermometer fell to —72°; and one person informed the professor by a note, that the mercury in his barometer was frozen. He hastened immediately to his house to behold such a surprising phenomenon; but, though he was witness to the fact, the prejudice he entertained against the possibility of the congelation would not allow him to believe it. "Not feeling (says he), by the way, the same effects of cold as I had experienced at other times in less distances, I began, before my arrival, to entertain suspicions about the congelation of his quicksilver. In fact, I saw that it did not continue in one column, but was divided in different places as into little cylinders, which appeared frozen; and, in some of these divisions between the quicksilver, I perceived like the appearance of frozen moisture. It immediately occurred to me, that the mercury might have been cleaned with vinegar and salt, and not sufficiently dried. The person acknowledged it had been purified in that manner. This same quicksilver, taken out of the barometer, and well

dried, would not freeze again, though exposed to a much greater degree of cold, as shewn by the thermometer."

Another set of observations, in the course of which the mercury frequently congealed, were made by Professor Gmelin at Kirenga fort, in 57½ N. lat. 108 E. lon. his thermometer, at different times, standing at —108°, —86°, —100°, —113°, and many other intermediate degrees. This happened in the winter of 1737 and 1738. On the 27th of November, after the thermometer had been standing for two days at —46°, he found it sunk at noon to 108°. Suspecting some mistake, after he had noted down the observation, he instantly ran back, and found it at 102°; but ascending with such rapidity, that in the space of half an hour it had risen to —19°. This phenomenon, which appeared so surprising, undoubtedly depended on the expansion of the mercury frozen in the bulb of the thermometer, and which now melting, forced upwards the small thread in the stem.

A similar appearance was observed at the same fort a few days after; and on the 29th of December, O. S. he found the mercury, which had been standing at —40° in the morning, sunk to —100° at four in the afternoon. At this time, he says, he "saw some air in the thermometer separating the quicksilver for the space of about six degrees." He had taken notice of a similar appearance the preceding evening, excepting that the *air*, as he supposed it to be, was not then collected into one place, but lay scattered in several.

These appearances undoubtedly proceeded from a congelation of the mercury, though the prejudice entertained against the possibility of this phenomenon would not allow the professor even to inquire into it at all. Several other observations were made; some of which were lost, and the rest contain no farther information.

The second instance where a natural congelation of mercury has certainly been observed, is recorded in the Transactions of the Royal Academy of Sciences at Stockholm. The weather, in January 1760, was remarkably cold in Lapland; so that, on the 5th of that month, the thermometers fell to —76°, —128°, or lower; on the 23d and following days they fell to —58°, —79°, —92° and below —238° entirely into the ball. This was observed at Tornea, Sombio, Jakasserf, and Utsioki, four places in Lapland, situated between the 65th and 78th degrees of N. lat. and the 21st and 28th of E. lon. The person who observed them was M. Andrew Hellant, who makes the following remarks, of themselves sufficient to shew that the quicksilver was frozen. "During the cold weather at Sombio (says he), as it was clear sunshine, though scarcely the whole body of the sun appeared above the low woods that covered our horizon, I took a thermometer which was hanging before in the shade, and exposed it to the rising sun about eleven in the forenoon, to see whether, when that luminary was so low, it would have any effect upon the instrument. But to my great surprise, upon looking at it about noon, I found that the mercury had entirely subsided into the ball, though it was standing as high as —61° at eleven o'clock, and the scale reached down to 238° below 0." On bringing the instrument near a fire, it presently rose to its usual height; and the reason of its subsiding before was its being somewhat warmed by the rays of the sun; which, feeble as they were, had yet sufficient power to melt the small thread of congealed mercury in the stem of the thermometer, and allow it to subside along with the rest. Mr. Hellant, however, so little under-

stood

ſtood the reaſon of this phenomenon, that he frequently attempted to repeat it by bringing the thermometer near a fire, when the cold was only a few degrees below the freezing point of water, but could never ſucceed until it fell to —58°, or lower, that is, until the cold was ſufficiently intenſe to congeal the metal. The only ſeeming difficulty in his whole account is, that, when the mercury had ſubſided entirely into the ball of the thermometer, a vacuum or empty ſpot appeared, which ran round the cavity like an air bubble, on turning the inſtrument; but this proceeded from a partial liquefaction of the mercury, which muſt neceſſarily melt firſt on the outſide, and thus exhibit the appearance juſt mentioned.

The moſt remarkable congelation of mercury, which has ever yet been obſerved, was that related by Dr. Peter Simon Pallas, who had been ſent by the Empreſs of Ruſſia, with ſome other gentlemen, on an expedition ſimilar to that of Dr. Gmelin. He did not, however, ſpend the winters in which he was in Siberia in the coldeſt parts of that country; that is, about the middle of the northern part. Twice indeed he reſided at Kraſnoyarſk, in N. lat. 56½, E. lon. 93; where, in the year 1772, he had an opportunity of obſerving the phenomenon we ſpeak of. "The winter (ſays he) ſet in early this year, and was felt with uncommon ſeverity in December. On the 6th and 7th of that month happened the greateſt cold I have ever experienced in Siberia; the air was calm at the time, and ſeemingly thickened; ſo that, though the ſky was in other reſpects clear, the ſun appeared as through a fog. I had only one ſmall thermometer left, in which the ſcale went no lower than —7°; and on the 6th in the morning, I remarked that the quickſilver in it ſunk into the ball, except ſome ſmall columns which ſtuck faſt in the tube.—When the ball of the thermometer, as it hung in the open air, was warmed by being touched with the finger, the quickſilver roſe; and it could plainly be ſeen, that the ſolid columns ſtuck and reſiſted a good while, and were at length puſhed upward with a ſort of violence. In the mean time I placed upon the gallery, on the north ſide of my houſe, about a quarter of a pound of clean and dry quickſilver in an open bowl. Within an hour I found the edges and ſurface of it frozen ſolid, and ſome minutes afterwards the whole was condenſed by the natural cold into a ſoft maſs very much like tin. While the inner part was ſtill fluid, the frozen ſurface exhibited a great variety of branched wrinkles; but in general it remained pretty ſmooth in freezing, as did alſo a larger quantity which I afterwards expoſed to the cold. The congealed mercury was more flexible than lead; but, on being bent ſhort, it was found more brittle than tin; and, when hammered out thin, it ſeemed ſomewhat granulated. If the hammer had not been perfectly cooled, the quickſilver melted away under it in drops; and the ſame thing happened when the metal was touched with the finger, by which alſo the finger was immediately benumbed. In our warm room it thawed on its ſurface gradually, by drops, like wax on the fire, and did not melt all at once. When the frozen maſs was broken to pieces in the cold, the fragments adhered to each other and to the bowl on which they lay. Although the froſt ſeemed to abate a little towards night, yet the congealed quickſilver remained unaltered, and the experiment with the thermometer could ſtill be repeated. On the 7th of December, I had an opportunity of making the ſame obſervations all day; but ſome hours after ſun-

ſet,

set, a north-west wind sprung up, which raised the thermometer to —46°, when the mass of quicksilver began to melt."

In the beginning of the year 1780, M. Von Elterlein, of Vytegra, a town of Russia, in lat. 61. E. lon. 36. froze quicksilver by natural cold; of which he gives the following account. "On the 4th of January 1780, the cold having increased to —34 that evening at Vytegra, I exposed to the open air three ounces of very pure quicksilver in a china tea-cup, covered with paper, pierced full of holes. Next day, at eight in the morning, I found it solid, and looking like a piece of cast lead, with a considerable depression in the middle. On attempting to loosen it in the cup, my knife raised shavings from it as if it had been lead, which remained sticking up; and at length the metal separated from the bottom of the cup in one mass. I then took it in my hand to try if it would bend: it was stiff like glue, and broke into two pieces; but my fingers immediately lost all feeling, and could scarcely be restored in an hour and an half by rubbing with snow. At eight o'clock a thermometer, made by Mr. Lexmann of the academy, stood at —57°; by half after nine it was risen to —40°; and then the two pieces of mercury which lay in the cup had lost so much of their hardness, that they could no longer be broken, or cut into shavings, but resembled a thick amalgam, which, though it became fluid when pressed by the fingers, immediately afterwards resumed the consistence of pap. With the thermometer at —39°, the quicksilver became fluid. The cold was never less on the 5th than —28°, and by nine in the evening it had increased again to —33°."

An instance of the natural congelation of quicksilver also occurred in Jemtland, one of the provinces of Sweden, on the 1st of January 1782; and lastly, on the 26th of the same month, Mr. Hutchins observed the same effect of the cold at Hudson's bay. "The subject of this curious phenomenon (says he), was quicksilver put into a common two-ounce vial, and corked. The vial was about a third part full, and had constantly been standing by the thermometer for a month past. At eight o'clock this morning I observed it was frozen rather more than a quarter of an inch thick round the sides and bottom of the vial, the middle part continuing fluid. As this was a certain method of finding the point of congelation, I introduced a mercurial and a spirit thermometer into the fluid part, after breaking off the top of the vial, and they rose directly and became stationary; the former at 40° or 40½°, the latter at 29¾°, both below the cypher. Having taken these out, I put in two others, a mercurial one formerly described, and a spirit thermometer; the former of which became stationary at 40 and the latter at 30°. I then decanted the fluid quicksilver, to examine the internal surface of the frozen metal; which proved very uneven, with many radii going across, some of which resembled pin-heads. Urgent business called me away an hour. On my return I found a small portion only had liquefied in my absence. I then broke the vial entirely, and with a hammer repeatedly struck the quicksilver. It beat out flat, yielded a deadish sound, and became fluid in less than a minute afterwards. —It may be worth remarking, that the quicksilver in one of the thermometers, which had sunk to very near 500, and was then at 444, very readily ran up and down the tube by elevating either end of the instrument."

These

These are all the well authenticated accounts of the congelation of mercury by the natural cold of the atmosphere. Some others have been published; but being either less important, or not so well authenticated, we forbear to mention them. On Mr. Hatchins's experiment, and on congelation in general, Mr. Cavendish makes many valuable remarks: the substance of which is as follows:

"If a vessel of water, with a thermometer in it, be exposed to the cold, the thermometer will sink several degrees below the freezing point, especially if the water be covered up so as to be defended from the wind, and care taken not to agitate it; and then in dropping in a bit of ice, or on mere agitation, spiculæ of ice shoot suddenly through the water, and the inclosed thermometer rises quickly to the freezing point, where it remains stationary." In a note he says, that though in conformity to the common opinion he has allowed that "mere agitation may set the water a freezing, yet some experiments lately made by Dr. Blagden seem to shew, that it has not much, if any, effect of that kind, otherwise than by bringing the water in contact with some substance colder than itself. Though in general also the ice shoots rapidly, and the inclosed thermometer rises very quick; yet he once observed it to rise very slowly, taking up not less than half a minute, before it ascended to the freezing point; but in this experiment the water was cooled not more than one or two degrees below freezing; and it should seem, that the more the water is cooled below the freezing point, the more rapidly the ice shoots and the inclosed thermometer rises."

Mr. Cavendish then observes, "that from the foregoing experiments we learn that water is capable of being cooled considerably below the freezing point, without any congelation taking place; and that, as soon as by any means a small part of it is made to freeze, the ice spreads rapidly through the whole of the water. The cause of this rise of the thermometer is, that all or almost all bodies, by changing from a fluid to a solid state, or from the state of an elastic to that of an unelastic fluid, generate heat; and that cold is produced by the contrary process. Thus all the circumstances of the phenomenon may be perfectly well explained; for, as soon as any part of the water freezes, heat will be generated thereby in consequence of the above-mentioned law, so that the new formed ice and remaining water will be warmed, and must continue to receive heat by the freezing of fresh portions of water, till it is heated exactly to the freezing point, unless the water could become quite solid before a sufficient quantity of heat was generated to raise it to that point, which is not the case: and it is evident, that it cannot be heated above the freezing point; for, as soon as it comes thereto, no more water will freeze, and consequently no more heat will be generated.—The reason why the ice spreads all over the water, instead of forming a solid lump in one part, is, that, as soon as any small portion of ice is formed, the water in contact with it will be so much warmed as to be prevented from freezing, but the water at a little distance from it will still be below the freezing point, and will consequently begin to freeze.

"Were it not for this generation of heat, the whole of any quantity of water would freeze as soon as the process of congelation began; and in like manner the cold is generated by the melting of ice; which is the cause of the long time required to thaw ice and snow.

snow. It was formerly found that, by adding snow to warm water, and stirring it about until all was melted, the water was as much cooled as it would have been by the addition of the same quantity of water rather more than 150° degrees colder than the snow; or, in other words, somewhat more than 150° of cold are generated by the thawing of the snow; and there is great reason to believe that just as much heat is produced by the freezing of water. The cold generated in the experiment just-mentioned was the same whether ice or snow was used.

"A thermometer, kept in melted tin or lead till they become solid, remains perfectly stationary from the time the metal begins to harden round the sides of the pot till it is entirely solid; but it cannot be perceived at all to sink below that point, and rise up to it when the metal begins to harden. It is not unlikely, however, that the great difference of heat between the air and melted metal might prevent this effect from taking place; so that, though it was not perceived in these experiments, it is not unlikely that those metals, as well as water and quicksilver, may bear being cooled a little below the freezing or hardening point (for the hardening of melted metals, and freezing of water, seems exactly the same process), without beginning to lose their fluidity.

"The experiments of Mr. Hutchins prove, that quicksilver contracts or diminishes in bulk by freezing; and that the very low degrees to which the thermometers have been made to sink, is owing to this contraction, and not to the cold having been in any degree equal to that shewn by the thermometer. In the fourth experiment, one of the thermometers sunk to 450°, though it appeared, by the spirit thermometer, that the cold of the mixture was not more than five or six degrees below the point of freezing quicksilver. In the first experiment also, it sunk to 448°, at a time when the cold of the mixture was only 2½° below that point; so that, it appears, that the contraction of quicksilver by freezing must be at least equal to its expansion by 404 degrees of heat. This, however, is not the whole contraction that it suffers; for it appears by an extract from a meteorological journal kept by Mr. Hutchins at Albany fort, that his thermometer once sunk to 490° below 0; though it was known by a spirit thermometer, that the cold scarcely exceeded the point of freezing quicksilver. There are two experiments also of Professor Braun, in which the thermometer sunk to 544 and 556° below nothing; which is the greatest descent he ever observed without the ball being cracked. It is not indeed known how cold his mixtures were; but, from Mr. Hutchins's experiments, there is great reason to think they could not be many degrees below 40°. If so, the contraction which quicksilver suffers in freezing, is not much less than its expansion by 500° or 510° of heat, that is, almost $\frac{1}{25}$ of its whole bulk; and in all probability is never much more than that, though it is probable that this contraction is not always determinate: for a considerable variation may frequently be observed in the specific gravity of the same piece of metal cast different times over; and almost all cast metals become heavier by hammering. Mr. Cavendish observed, that, on casting the same piece of tin three times over, its density varied from 7·252 to 7·294, though there was great reason to think that no hollows were left in it, and that only a small part of this difference could proceed from the error of the experiment.

This

This variation of denſity is as much as is produced in quickſilver by an alteration of 66° of heat; and it is not unlikely, that the deſcent of a thermometer, on account of the contraction of the quickſilver in its ball by freezing, may vary as much in different trials, though the whole maſs of quickſilver is frozen without any vacuities.

"The cold produced by mixing ſpirit of nitre with ſnow is entirely owing to the melting of the ſnow. Now, in all probability, there is a certain degree of cold in which the ſpirit of nitre, ſo far from diſſolving ſnow, will yield part of its own water, and ſuffer that to freeze, as is the caſe with ſolutions of common ſalt; ſo that, if the cold of the materials before mixing is equal to this, no additional cold can be produced. If the cold of the materials is leſs, ſome increaſe of cold will be produced; but the total cold will be leſs than in the former caſe, ſince the additional cold cannot be generated without ſome of the ſnow being diſſolved, and thereby weakening the acid, and making it leſs able to diſſolve more ſnow; but yet, the leſs the cold of the materials is, the greater will be the additional cold produced. This is conformable to Mr. Hutchins's experiments; for in the fifth experiment, in which the cold of the materials was —40°, the additional cold produced was only 5°. In the firſt experiment, in which the cold of the materials was only —23°, an addition of at leaſt 19° of cold was obtained; and by mixing ſome of the ſame ſpirit of nitre with ſnow in this climate, when the heat of the materials was +26°, Mr. Cavendiſh was able to ſink the thermometer to —29, ſo that an addition of 55° of cold was produced.

Acids, eſpecially thoſe of the mineral kind, powerfully reſiſt congelation. There is, however, a peculiarity with regard to that of vitriol. M. Chaptal, a foreign chemiſt, obſerved that it condenſed by the cold of the atmoſphere, and the cryſtals began to melt only at +70° of his thermometer; which, if Reaumur's, correſponds to about 47° of Fahrenheit. The cryſtals were unctuous from the melting acid, and they felt warmer than the neighbouring bodies: the form was that of a priſm of ſix ſides, flatted and terminated by a pyramid of ſix ſides; but the pyramid appeared on one end only; on the other, the cryſtal was loſt in the general maſs. The pyramid reſulted from an aſſemblage of ſix iſoſceles triangles: the oil when the cryſtal was melted was of yellowiſh black; on re-diſtilling it in a proper apparatus, no peculiar gas came over. M. Chaptal repeated his experiments with the highly concentrated acid, but found that it did not freeze; that the denſity of the acid which he thought froze moſt eaſily was to the oil, of the uſual ſtrength for ſale, as from 63 and 65 to 66; and the neceſſary degree of cold about 19 of Fahrenheit. Oil of vitriol once melted will not cryſtallize again with the ſame degree of cold.

M. Moré, a conſiderable manufacturer of oil of vitriol at Hadimont near Vervier, in the duchy of Limbourg in Germany, attributes this congelation to the addition of nitrous air. The acid of vitriol is uſually ſeparated from ſulphur by burning it in cloſe veſſels; and the air is ſupplied by adding to the ſulphur a little nitre. He found, that by mixing the acid, capable of being congealed, with water, or employing it for other purpoſes, orange-colured fumes, and the ſmell of the true nitrous acid, were very evident. When this gas was deſtroyed, no degree of cold would congeal the acid, whatever was its degree of concentration; and the congelation was ge-

 nerally

nerally observed immediately after the process by which the acid was obtained.

Mr. Macquer relates, in the second edition of his Chemical Dictionary, article *Vitriolic Acid*, that the Duke d'Ayen had observed the congelation of concentrated vitriolic acid, which had been exposed to a cold expressed by 13 or 14° below 0 on Reaumur's thermometer; but that mixtures, consisting of one part of the above-mentioned concentrated acid, with two or more parts of water, could not be frozen by the cold to which he exposed them, till he had diluted the acid so much, that its density was to that of water as 104½ to 96; in which latter case of congelation it is probable that the water only was frozen, as is the case in dilute solutions of salts. Similar experiments were made by M. de Morveau, and with equal success. Having produced an intense cold by pouring spirit of nitre on pounded ice, he congealed a part of some vitriolic acid which had been previously concentrated; but he observed, that, though a very intense cold had been made use of to congeal the acid at first, it nevertheless remained congealed in much smaller degrees of cold, and that it thawed very slowly. This coincides with the observations of M. Chaptal; though the latter observes, that there is some difference between strong oil of vitriol lowered with water, and that produced of a given strength by rectification. The latter always has some colour; and it will not dissolve indigo in such a manner as to carry the colour into the stuff, though the stronger oil, diluted to the same degree, succeeds very well. Some observations were also made by Mr. M'Nab at Hudson's Bay, an account of which is given in the Phil. Transf. for 1786 by Mr. Cavendish, at whose desire they had been made. From them it appears, that vitriolic acid, whose specific gravity was to that of water as 1843 to 1000, froze when exposed to a cold of —15° of Fahrenheit's scale; that another more dilute vitriolic acid, consisting of 629 parts of the former concentrated acid, and 371 parts of water, congealed in a temperature of —36°; and that, when farther diluted, it was capable of sustaining a much greater degree of cold without freezing at all. In these experiments, as well as in those of M. Morveau, it appeared, that the whole of the acid did not congeal, but that part of it retained its fluidity; and on examining the strength of that which remained fluid, Mr. Cavendish found that there was very little difference between it and the other; whence he was led to suppose, that the reason of this congelation does not arise from any difference in strength, but on some less obvious quality, and such as constitutes the difference between common and icy oil of vitriol.

In all the experiments hitherto made, however, Mr. Cavendish had found some uncertainty in determining the point of easiest freezing; neither could he determine whether the cold necessary for congelation does not increase without any limitation in proportion to the strength of the acid. A new set of experiments were therefore made by Mr. Keir to determine this point. He had observed, after a severe frost at the end of the year 1784 and beginning of 1785, that some vitriolic acid, contained in a corked phial, had congealed, while other bottles containing the same, some stronger and some weaker, retained their fluidity. As the congelation was naturally imputed to the extremity of the cold, he was afterwards surprised to find, when the frost ceased, that the acid remained congealed for many days, when

when the temperature of the atmosphere was sometimes above 40° of Fahrenheit; and, when the congealed acid was brought into a warm room on purpose to thaw it, a thermometer placed in contact with it during its thawing continued stationary at 45°. Hence he concluded, that the freezing and thawing point of this acid was nearly at 45°; and accordingly, on exposing the liquor which had been thawed to the air at the temperature of 30°, the congelation again took place in a few hours. From the circumstance of other parcels of the same acid, but of different strengths, remaining fluid, though they had been exposed to a much greater degree of cold, he was led to believe that there must be some certain strength at which the acid is more disposed to congeal than at any other. The specific gravity of the acid which had frozen was to that of water nearly as 1800 to 1000, and that of the stronger acid which had not frozen was as 1846 to 1000, which is the common density of that usually sold in England; and there was not the least difference, excepting in point of strength, between the acid which had frozen and that which had not; Mr. Keir having taken the acid some weeks before with his own hands from the bottle which contained the latter, and diluted it with water, till it became of the specific gravity of 1800.

To render the experiment complete, Mr. Keir immersed several acids of different strengths in melting snow, instead of exposing them to the air; the temperature of which was varaible, whereas that of melting snow was certain and invariable. Those which would not freeze in melting snow were afterwards immersed in a mixture of common salt, snow, and water; the temperature of which, though not so constant and determinate as that of melting snow, generally remained for several hours at 18°, and was sometimes several degrees lower. The intention of adding water to the snow and salt was to lessen the intensity of the cold of this mixture, and to render it more permanent than if the snow and salt alone were mixed. The acids which had frozen in melting snow were five in number; which, being thawed and brought to the temperature of 60°, were found on examination to have the following specific gravities, viz. 1786, 1784, 1780, 1772, 1775. Those which had not congealed with the melting snow, but which did so with the mixture of snow, salt, and water, were found, when brought to the temperature of 60°, to be of the following specific gravities, viz. 1814, 1810, 1804, 1794, 1790, 1770, 1759, 1750. Those which remained, and would freeze neither in melting snow nor in the mixture of snow, salt, and water, were of the gravities 1846, 1839, 1815, 1745, 1720, 1700, 1610, 1551. From the first of these it appears, that the medium density of the acids which froze with the natural cold was 1780; and from the second, that at the densities of 1790 and 1770 the acid had been incapable of freezing with that degree of cold. Hence it follows, that 1780 is nearly the degree of strength of easiest freezing, and that an increase or diminution of that density equal to $\frac{1}{178}$th of the whole, renders the acid incapable of freezing with the cold of melting snow, though this cold is something above the freezing point of the most congealable acid. From the second it appears, that by applying a more intense cold, viz. that produced by a mixture of snow, salt, and water, the limits of the densities of acids capable of congelation were extended to about $\frac{1}{178}$ths above or below the point of easiest freezing; and there seems little reason to doubt, that, by greater

augmentations of cold, these limits may be farther extended; but in what ratio these augmentations and extensions proceed, cannot be determined, without many observations made in different temperatures.

In our own country we are seldom distressed with extreme degrees of cold: yet in the winter of 1780, Mr. Wilson of Glasgow observed, that a thermometer laid on the snow sunk to 25° below 0; but this was only for a short time; and, in general our atmosphere does not admit of very great degrees of cold for any length of time. Mr. Derham, however, in the year 1708, observed in England, that the mercury stood within one tenth of an inch of its station when plunged into a mixture of snow and salt. In 1732, the thermometer at Petersburgh stood at 28° below 0; and in 1737, when the French academicans wintered at the north polar circle, or near it, the thermometer sunk to 33° below 0; and in the Asiatic and American continents still greater degrees of cold are very common.

The following was the state of a thermometer hanging out of a window on the north aspect in St. Paul's church-yard, at Christmas, 1798: Thursday, December 27, 16° at eleven at night. Friday, 28th, 15° at seven in the morning; and 12° at eleven at night. Saturday, 29th, 26° at seven in the morning; and 32½° by twelve at noon.

THE THREE PILGRIMS AND THE DERVISE.

THREE pilgrims, a Jew, a Christian, and a Mussulman, set out from Cairo, with a caravan, in order to cross the desert of Salem. For the first part of the journey they moved with the multitude, as a drop in the stream, almost without thinking whither they were going. But reflecting, at length, that they must perish if they missed the way, they began to cast an anxious look before them, and to explore the paths of the desert. In my opinion, said the Jew, we need not long hesitate about our route; yonder, to the right, is the pillar set up by Moses, who, as every body knows, conducted thousands in safety through this wilderness; and our wisest course is to follow this land-mark which he has set up to direct us.—It is true, said the Mussulman, Moses got safely through this wilderness, but it was by a route which his firmest adherents must own to be extremely difficult. For my own part, I prefer, by much, the path that was trod by the prophet of Mecca; it is distinctly marked by that pillar to the left, which has ever directed the steps of the faithful.—I am sorry to see both of you mistaken, said the Christian, the one recommending a road so tedious as to be now almost obsolete, and the other preferring a road in which there are so many pits and precipices, and in which the sabre has been so busy, that the steps are slippery with the blood of the murdered. The straight and only safe, as well as pleasant, road, is that which has been marked by Jesus, where yonder midmost pillar rears its head on high, and meets at a distance the eye of the pilgrim. Don't you perceive, right over it, the distant towers of Salem?—I perceive them over the pillar on the right, said the Jew.—And I swear they are in a line with that on the left, said the Mussulman. They disputed, they grew warm, they quarrelled; each imagining that he could compel, by force, those whom he could not convince by reason.

In this situation, they were overtaken by a venerable dervise, who, learning

learning the cause of their difference, thus addressed them: "Children, you are not wise. Had you changed your places, your views had also changed; and, having seen the cause of your misunderstanding, you had all been reconciled. Besides, the city of Salem is so great, that a part of it, like the horizon, may be seen over each of the pillars; and it is possible, that thousands, who took the direct line by each, have found their way. For my own part, I have known many well-meaning people who, having no opportunity of knowing any of these roads, took a different course from all, and I am far from doubting of their safety; for that depends not only on the way, but, in some measure, on the prudence and care of the pilgrim. It is impossible, however, that all these roads should be equally safe and commodious, or that it should be a matter of indifference which of them is chosen. I have been considering them long, and comparing the different accounts and charts of them, as every man ought in a matter of such infinite moment. For I hold no man is at liberty to take what way he pleases, and hazard his life, without weighing the evidence in favour of each, and using his reason to enable him to make the wisest choice. I have done so with care, and my observations I give you. The road by the pillar to the right, was once the best and safest in the world, but it has been for a long time neglected, and is now much out of repair.—That by the left was at first extremely foul, nor is it yet such as could be wished: it has, however, some things to recommend it. Five times a-day the travellers are admonished, by public criers, to pray for the guidance of heaven; and all give such punctual obedience, that they seem to emulate each other in piety. On this road, too, there is much accommodation for the weak and needy. I dare not, therefore, reprobate, though I pity, all who choose it; it is because they know no better path.—But the way by the midmost pillar is, in every respect, the straightest, the safest, and the most pleasant. On this road, at almost every step, palm-trees shade and fountains refresh the pilgrim: and, did they who enter upon it follow the directions inscribed upon the pillar and the chart with which they are furnished, every other path would soon be forsaken. But, instead of this, multitudes turn aside into bye-paths on the right and on the left, and, for some trifles which attract their notice, forget to proceed on their journey. Even they who remain on the road too often spend their time in quarrels and contentions, almost equally fatal; some alleging that all ought to walk on this side of the road, while others contend they ought to walk on that; some searching for the track of this, and others of that, predecessor, and each alleging it is death to tread any other part of that fair and beautiful road which is open before them. By these unhappy means, the immense crowd which enters it is perpetually thinned as it proceeds; and but the few, who study only to be on the road, and to advance in it, reach the end of the journey. This, you may perceive, is the way which I myself intend to pursue; and I intend to do it with all my might, keeping my eye upon the chart, without searching for the track of Peter, of Martin, or of John.

"If you can think as I do, and come with me, it will give me pleasure; if not, we shall part in peace, for why should we quarrel, or contend with any weapons but those of reason? And, indeed, when, in our education, reading, habits of life, company, and constitution, there must be so much difference, how can it be expected that

that our opinions should entirely be the same; God knows our frame, and knows that, if any one of us had been in the place and circumstances of the other, he must, perhaps, have had his opinions too. He knows that we all wish to take the course which is safest to ourselves, and, of course, most pleasing to him, since none of us, I trust, would wilfully and knowingly run the hazard of perishing in the desert. Judge, therefore, my brethren, of each other's conduct with candour. Let each be persuaded, in his own mind, that he does what is best, and, whatever road he takes, (after carefully examining and comparing them,) keep bent on getting forward to the end of his journey. Then we may possibly arrive, all of us, in due time, where we wish; and talk of the difference of the roads when we meet at Salem."

Struck with the meekness of his temper, and the moderation of his sentiments, all three blushed for having quarrelled, and, by way of the midmost pillar, unanimously followed the dervise.

EXTRACTS FROM LA PEROUSE'S VOYAGE ROUND THE WORLD IN THE YEARS 1785, 86, 87, AND 1788.

JEAN-François Galaup de la Perouse, *chef d'escadre*, was born at Albi, in 1741. Entering at a very early age into the marine school, his enthusiasm was first excited by the example of those celebrated navigators who had done honour to their country, and he took from that time the resolution to walk in their steps; but, being only able to advance in this difficult road by slow degrees, he prepared himself, by previously studying their works, hereafter to equal them. He united, at a very early period, experience with theory; he had been eighteen years at sea when the command of the last expedition was entrusted to him. He entered as midshipman in 1756, and served five years at sea during that war. In 1764 he was promoted to the rank of *enseigne de vaisseau*, and afterwards served as commander on-board several ships, where he conducted himself in many engagements with the utmost skill and bravery. In 1781 the French government formed the project of taking and destroying the establishments of the English in Hudson's Bay: La Pérouse was appointed to execute this troublesome mission, which, after experiencing many dangers, he partly accomplished: in conformity with rigorous orders to destroy the possessions of his enemies, he did not forget at the same time the respect that was due to misfortune; he had the humanity to leave behind him provisions and arms for the English, who had fled into the woods at his approach. On this subject, the editor quotes the following sincere declaration of an English seaman in his account of a Voyage to Botany Bay:—"We ought to call to mind, with gratitude, in England especially, this humane and generous man, for his conduct when ordered to destroy our establishment in Hudson's Bay, in the course of the last war."

On the establishment of peace in 1783, this expedition ended:—"The indefatigable La Pérouse enjoyed not a long repose: a more important service awaited him; alas! it was destined to be the last. He was appointed to command the expedition projected in 1785, preparations for which were forwarding at Brest."

La Pérouse, according to his last letters from Botany Bay, was to return to the Isle de France in 1788.—The two following years being expired,

expired, the Society of Natural History requested at the bar of the national assembly that vessels might be sent out in search of him; this request was received with the most lively interest, and followed up by a law, ordering two frigates to be immediately fitted out in search of La Pérouse.

General d'Entrecasteaux commanded this new expedition: "He completely fulfilled the order prescribed by his instructions, without being able to obtain the smallest information, or acquire any thing like probability concerning the fate of our unfortunate navigator."

There were various conjectures in France as to the cause of his loss: some persons, unacquainted with the track he had to follow from Botany Bay, which is traced in his letter, have advanced, that his ships had been caught in the ice, and that La Pérouse, and all his companions, had perished by the most horrible of deaths; others have given out, that during his passage to the Isle de France, towards the end of 1788, he had been the victim of that violent hurricane, which proved so fatal to the Venus frigate, which was never heard of afterwards, and which totally dismasted the Resolution frigate.—The public indications still in existence of the track he followed, and of the places he examined, are the medals struck on occasion of his voyage, and left or distributed by La Pérouse during the course of it. He took out with him about a hundred of silver and bronze, and six hundred others of different kinds. As we know the route which he had still to perform, these medals may one day point out to us nearly in what spot his misfortune interrupted it.

In concluding his account of the animal and vegetable productions of Port des Français, M. de la Pérouse observes, "that, if they resemble a great many others, the appearance of the country has no sort of comparison; and I have my doubts whether the profound valleys of the Alps and Pyrenees present views as frightful, but which are at the same time so picturesque, that they would deserve the visits of the curious, were they not at the extremity of the world."

Nature assigns inhabitants to so frightful a country, who as widely differ from the people of civilized countries as the scene I have just described differs from our cultivated plains; as rude and barbarous as their soil is rocky and barren, they inhabit this land only to destroy its population: at war with all the animals, they despise the vegetable substances which grow around them. I have seen women and children eat some raspberries and strawberries; but these are undoubtedly viands far too insipid for men, who live upon the earth like vultures in the air, or wolves and tigers in the forests.

Their arts are somewhat advanced, and in this respect civilization has made considerable progress; but that which softens their ferocity, and polishes their manners, is yet in its infancy; the mode of life they pursue excluding all kind of subordination, they are continually agitated by fear or revenge; prone to anger, and easily irritated, they are continually attacking each other dagger in hand. Exposed in the winter to perish for want, because the chase cannot be successful, they live during the summer in the greatest abundance, as they can catch in less than an hour a sufficient quantity of fish for the support of their family: they remain idle during the rest of the day, which they pass at play, to which they are as much addicted as some of the inhabitants in our great cities. This gaming is the

great source of their quarrels. If to all these destructive vices they should unfortunately add a knowledge of the use of any inebriating liquor, I should not hesitate to pronounce, that this colony would be entirely annihilated.

In vain may philosophers exclaim against this picture. They write books in their closets, whilst I have been engaged in voyages during a course of thirty years. I have been a witness of the injustice and deceptions of these people, whom they have described to us as so good, because they are very near to a state of nature; but this same nature is only sublime in her masses, she is negligent of all details. It is not possible to penetrate into woods which the hand of civilized man has not made passable; to traverse plains filled with stones and rocks, and inundated by impassable marshes; in a word, to form society with man in a state of nature; because he is barbarous, deceitful, and wicked. In this opinion I have been confirmed by my own melancholy experience: I nevertheless have not thought proper to make use of the force which was entrusted to me, for the purpose of repelling the injustice of these savages, and of teaching them that men have rights which must not be violated with impunity.

Indians in their canoes were continually round our frigates; they passed two or three hours there before they began to exchange a few fishes, or two or three otter's skins; they seized all occasions to rob us; they tore off the iron which was easy to be carried away; and, above all, they examined carefully how they might deceive our vigilance during the night. I caused the principal persons amongst them to come on-board my frigate, I loaded them with presents: yet these very men, whom I so particularly distinguished, did not disdain the theft of an old pair of breeches or a nail. When they assumed a mild and pleasant appearance, I was positive they had stolen something, although I frequently pretended not to perceive it.

I had expressly recommended the caressing of their children, and giving them little presents: the parents were insensible to this mark of benevolence, which I thought incident to all countries; the only reflection it gave rise to in their breasts was, to ask to accompany their children when I made them come on-board; and I several times, for my instruction, had the pleasure of seeing the father take advantage of the moment in which we seemed most engaged with his child, to take up and hide under his skin garment every thing that lay within his reach.

Sometimes, immediately after loading them with presents, I pretended to have a desire for certain little articles of trifling value, which belonged to these Indians; but this was a trial of their generosity, which I always made in vain.

I will however admit, if it be desired, that it is impossible for a society to exist without some virtues; but I am obliged to confess, that I had not the penetration to perceive them; quarrelling continually among themselves, indifferent to their children, and absolute tyrants over their women, whom they incessantly condemn to the most painful labours; I have observed nothing among these people which will permit me to soften the colouring of this picture.

I think I may venture to assert, that this port is inhabited only in the favourable season, and that the Indians never pass a winter in it; I did not see a single cabin sheltered from the rain; and, although there had never been collected together so many as three hundred Indians

Indians in the bay, we were visited by seven or eight hundred others. The canoes were continually entering and going out of the bay, and each of them brought and carried away their house and furniture, which consisted of a great many small boxes, in which were enclosed their most valuable effects: these boxes are placed at the entrance of their cabins, which possess a nastiness and stench, to which the den of no known animal in the world can properly be compared.—They never remove themselves more than two steps for the performance of any necessary occasion, in which they seek neither for shade nor privacy, as if they had not an instant to lose; and, when this happens during a meal, they take their place again, from which they never were at a greater distance than five or six feet. The wooden vessels in which they cook their fish are never washed; they serve them for kettle, dish, and plate; as these vessels cannot bear the fire, they make the water boil with red-hot flint stones, which are renewed at intervals till the victuals are quite ready. They are also acquainted with the method of roasting, which differs little or nothing from that of soldiers in a camp. It is probable that we may only have seen a small part of these people, who in all likelihood inhabit a considerable part of the sea-shore. During the summer they wander in the different bays, seeking their food like seals; and in the winter they push into the interior of the country, to hunt beavers and other animals, of which they brought us the spoils. Though their feet are always naked, the sole of them is never callous, and they cannot, without shrinking, walk over stones; which is a proof they only travel in canoes, or on the snow with rackets.

Dogs are the only animals with which they have entered into alliance; there are generally three or four of them in a cabin; they are small, and resemble the shepherd's dog of M. de Buffon; they seldom bark, but have a hiss nearly resembling that of the Bengal jackal, and they are so savage, that to other dogs they seem to be what their masters are to civilized people.

The men pierce the cartilage of the ears and nose, to which they hang different small ornaments; they make scars on their arms and breasts, with a very keen edged instrument, which they sharpen by passing over their teeth as over a stone; their teeth are filed close to the gums, and for this operation they use a sand-stone rounded in the shape of a tongue. They use ochre, soot, and plumbago, mixed up with train oil, to paint the face and the rest of the body in a frightful manner. In their full dress, their hair is flowing at full length, powdered, and plaited with the down of sea birds: this is their greatest luxury; and is perhaps reserved only to the chiefs of a family; their shoulders are covered with a simple skin; the rest of the body absolutely naked, except the head, which is generally covered with a little straw hat, very skilfully plaited; but they sometimes place on their heads two horned bonnets of eagles' feathers, and even whole heads of bears in which they fix a wooden skull cap. These several head-dresses are extremely various; but their principal object, like all their other customs, is to render themselves frightful, perhaps for the purpose of keeping their enemies in awe.

Some Indians had entire shirts of otter's skin, and the common dress of a great chief was a shirt of a tanned skin of the elk, bordered with a fringe of deers' hoofs and beaks of birds, which, when they dance, imitates the noise of a kind of bell: this same dress is very

well known among the ſavages of Canada, and other nations who inhabit the eaſtern parts of America.

I never ſaw any tatooing but on the arms of a few women, who are addicted to a cuſtom which renders them hideous, and which I could ſcarcely have believed, had I not been a witneſs to it; all of them, without exception, have the lower lip ſlit at the root of the gums, the whole width of the mouth; they wear a kind of wooden bowl, without handles, which reſts againſt the gums, to which this lower cut lip ſerves for a ſupport, ſo that the lower part of the mouth juts out two or three inches. The young girls have only a needle in the lower lip, and the married women alone have the right of the bowl. We ſometimes prevailed on them to pull off this ornament, to which they with difficulty agreed; they then teſtified the ſame embarraſſment, and made the ſame geſtures, as a woman in Europe who diſcovers her boſom. The lower lip then fell upon the chin, and this ſecond picture was not more enchanting than the firſt.

The Americans of Port des Français know how to forge iron, to faſhion copper, to ſpin the hair of different animals, and, by the help of a needle, to fabricate with this yarn a tiſſue equal to our tapeſtry; they intermix in this tiſſue narrow ſtrips of otter's ſkin, which gives their cloaks the ſemblance of the fineſt ſilk ſhag. In no part of the world can hats and baſkets of reeds be plaited with more ſkill; they figure upon them very agreeable deſigns; they alſo engrave very tolerable figures of men and animals in wood and ſtone; they inlay boxes with mother of pearl, the former of which is very elegant; they make ornaments of ſerpetine, to which they give the poliſh of marble.

I have ſpoken of the paſſion of theſe Indians for play; that to which they deliver themſelves up with the greateſt avidity is abſolutely a game of chance; they have thirty wooden pieces, each having different marks like our dice; of theſe they hide ſeven; each of them plays in his turn, and he whoſe gueſs comes neareſt to the number marked upon the ſeven pieces, is the winner of the ſtake agreed upon, which is generally a piece of iron or a hatchet. This gaming renders them ſerious and melancholy; I have nevertheleſs very frequently heard them ſing; and, when the chief came to pay me a viſit, he commonly paddled round the ſhip ſinging, his arms extended in the form of a croſs in token of friendſhip; he then came on-board, and played a pantomine, which was expreſſive either of combats, ſurpriſes, or death. The air which preceded this dance was agreeable, and tolerably harmonious.

I will finiſh the article reſpecting theſe people by ſaying, that we have not perceived among them any trace of anthropophagiſm; but it is ſo general a cuſtom among the Indians of America, that I ſhould ſtill perhaps have this trait to add to their picture, had they been at war, and taken any priſoners.

PHENOMENA OF CONGELATION.—Continued from p. 308.

NATURE AND PROPERTIES OF SNOW.

SNOW is formed by the freezing of the vapours in the atmoſphere. It differs from hail and hoar-froſt, in being as it were cryſtallized, which they are not. This appears on examining a flake of ſnow by a magnifying glaſs; when the whole of it will appear to be compoſed

posed of fine shining spicula diverging like rays from a centre. As the flakes fall down through the atmosphere, they are continually joined by more of these radiated spicula, and thus increase in bulk like the drops of rain or hailstones. Dr. Grew, in a discourse of the nature of snow, observes, that many parts thereof are of a regular figure; for the most part stars of six points, and are as perfect and transparent ice as any we see on a pond, &c. Upon each of these points are other collateral points, set at the same angles as the main points themselves: among which there are divers other irregular, which are chiefly broken points, and fragments of the regular ones. Others also, by various winds, seem to have been thawed and frozen again into irregular clusters; so that it seems as if the whole body of snow were an infinite mass of icicles irregularly figured. That is, a cloud of vapours being gathered into drops, the said drops forthwith descend; upon which descent, meeting with a freezing air as they pass through a colder region, each drop is immediately frozen into an icicle, shooting itself forth into several points; but these still continuing their descent, and meeting with some intermitting gales of warmer air, or in their continual waftage to and fro touching upon each other, some of them are a little thawed, blunted, and again frozen into clusters, or intangled so as to fall down in what we call *flakes*.

The lightness of snow, although it is firm ice, is owing to the excess of its surface, in comparison to the matter contained under it; as gold itself may be extended in surface till it will ride upon the least breath of air.

The whiteness of snow is owing to the small particles into which it is divided; for ice, when pounded, will become equally white. An artificial snow has been made by the following experiment. A tall phial of aquafortis being placed by the fire till it is warm, and filings of pure silver, a few at a time, being put into it; after a brisk ebullition, the silver will dissolve slowly. The phial being then placed in a cold window, as it cools the silver particles will shoot into crystals, several of which running together will form a flake of snow, which will descend to the bottom of the phial. While they are descending, they represent perfectly a shower of silver snow, and the flakes will lie upon one another at the bottom like real snow upon the ground.

According to Signior Beccaria, clouds of snow differ in nothing from clouds of rain, but in the circumstance of cold that freezes them. Both the regular diffusion of the snow, and the regularity of the structure of its parts (particularly some figures of snow or hail which fall about Turin, and which he calls *rosette*), shew that clouds of snow are acted upon by some uniform cause like electricity; and he endeavours to shew how electricity is capable of forming these figures. He was confirmed in his conjectures by observing, that his apparatus for observing the electricity of the atmosphere never failed to be electrified by snow as well as rain. Professor Winthrop sometimes found his apparatus electrified by snow when driven about by the wind, though it had not been affected by it when the snow itself was falling. A more intense electricity, according to Beccaria, unites the particles of hail more closely than the more moderate electricity does those of snow, in the same manner as we see that the drops of rain which fall from thunder-clouds are larger than

those which fall from others, though the former descend through a less space.—But we are not to consider snow merely as a curious and beautiful phenomenon. The Great Dispenser of universal bounty has so ordered it, that it is eminently subservient, as well as all the works of creation, to his benevolent designs. Were we to judge from appearances only, we might imagine, that, so far from being useful to the earth, the cold humidity of snow would be detrimental to vegetation. But the experience of all ages asserts the contrary. Snow, particularly in those northern regions where the ground is covered with it for several months, fructifies the earth, by guarding the corn or other vegetables from the intenser cold of the air, and especially from the cold piercing winds. It has been a vulgar opinion, very generally received, that snow fertilizes the lands on which it falls more than rain, in consequence of the nitrous salts which it is supposed to acquire by freezing. But it appears from the experiments of Margraaf in the year 1751, that the chemical difference between rain and snow-water is exceedingly small; that the latter is somewhat less nitrous, and contains a somewhat less proportion of earth than the former; but neither of them contain either earth or any kind of salt in any quantity which can be sensibly efficacious in promoting vegetation. Allowing, therefore, that nitre is a fertilizer of lands, which many are upon good grounds disposed utterly to deny, yet so very small is the quantity of it contained in snow, that it cannot be supposed to promote the vegetation of plants upon which the snow has fallen. The peculiar agency of snow, as a fertilizer in preference to rain, may admit of a very rational explanation, without recurring to nitrous salts supposed to be contained in it. It may be rationally ascribed to its furnishing a covering to the roots of vegetables, by which they are guarded from the influence of the atmospherical cold, and the internal heat of the earth is prevented from escaping.

The internal parts of the earth, by some principle which we do not understand, is heated uniformly to the 48th degree of Fahrenheit's thermometer. This degree of heat is greater than that in which the watery juices of vegetables freeze, and it is propagated from the inward parts of the earth to the surface, on which the vegetables grow. The atmosphere being variably heated by the action of the sun in different climates, and in the same climate at different seasons, communicates to the surface of the earth, and to some distance below it, the degree of heat or cold which prevails in itself. Different vegetables are able to preserve life under different degrees of cold, but all of them perish when the cold which reaches their roots is extreme. Providence has therefore, in the coldest climates, provided a covering of snow for the roots of vegetables, by which they are protected from the influence of the atmospherical cold. The snow keeps in the internal heat of the earth, which surrounds the roots of vegetables, and defends them from the cold of the atmosphere.

Snow or ice water is always deprived of its fixed air, which escapes during the process of congelation. Accordingly, as some of the inhabitants of the Alps who use it for their constant drink have enormous wens upon their throats, it has been ascribed to this circumstance. If this were the cause of these wens, it would be easy to remove it by exposing the snow-water to the air for some time. But several eminent physicians have rejected the notion that snow-water

is the cause of these wens; for in Greenland, where snow-water is commonly used, the inhabitants are not affected with such swellings: on the other hand, they are common in Sumatra, where snow is never seen.

We may here notice a remarkable snow-grotto, which is an excavation made by the waters on the side of Mount Etna, by making their way under the layers of lava, and by carrying away the bed of pozzolana below them. It occurred to the proprietor, that this place was very suitable for a magazine of snow: for in Sicily, at Naples, and particularly at Malta, they are obliged for want of ice to make use of snow for cooling their wine, sherbet, and other liquors, and for making sweetmeats.

This grotto was hired by the knights of Malta, who, having neither ice nor snow on the rock which they inhabit, have hired several caverns on Etna, into which people whom they employ collect and preserve quantities of snow to be sent to Malta when needed. This grotto has therefore been repaired within at the expence of that order; flights of steps are cut into it, as well as two openings from above, by which they throw in the snow, and through which the grotto is enlightened. Above the grotto they have also levelled a piece of ground of considerable extent: this they have inclosed with thick and lofty walls, so that when the winds, which at this elevation blow with great violence, carry the snow from the higher parts of the mountain, and deposite it in this inclosure, it is retained and amassed by the walls. The people then remove it into the grotto through the two openings; and it is there laid up, and preserved in such a manner as to resist the force of the summer heats; as the layers of lava with which the grotto is arched above prevent them from making any impression.

When the season for exporting the snow comes on, it is put into large bags, into which it is pressed as closely as possible; it is then carried by men out of the grotto, and laid upon mules, which convey it to the shore, where small vessels are waiting to carry it away.

But, before those lumps of snow are put into bags, they are wrapped in fresh leaves; so that, while they are conveyed from the grotto to the shore, the leaves may prevent the rays of the sun from making any impression upon them.

The Sicilians carry on a considerable trade in snow, which affords employment to some thousands of mules, horses, and men. They have magazines of it on the summits of their loftiest mountains, from which they distribute it through all their cities, towns, and houses; for every person in the island makes use of snow. They consider the practice of cooling their liquors as absolutely necessary for the preservation of health; and in a climate the heat of which is constantly relaxing the fibres, cooling liquors, by communicating a proper tone to the fibres of the stomach, must greatly strengthen them for the performance of their functions.

In this climate a scarcity of snow is no less dreaded than a scarcity of corn, wine, or oil. We are informed by a gentleman who was at Syracuse in the year 1777, when there was a scarcity of snow, the people of the town learned that a small vessel loaded with that article was passing the coast; without a moment's deliberation they ran in a body to the shore and demanded her cargo; which when the crew refused to deliver up, the Syracusans attacked and took, though with the loss of several men.

REMARKABLE

REMARKABLE RECOVERIES FROM APPARENT DEATH.

It happens more frequently than is commonly imagined, that persons, supposed to be dead, and treated as such, possess, nevertheless, in some parts of the body, such remains of heat and motion as, with proper assistance, might contribute to restore them entirely to life. We have had many instances of this nature in the frequent recovery of persons that have been drowned, and doubt not but the same success might attend our endeavours to recover others in similar circumstances, though owing to different accidents. In this climate we are not often subject to the severest extremities of cold; and yet we have had some instances of people having been frozen to death. The first anecdote we shall relate is from the Memoirs of the Royal Academy of Sweden, published in the year 1758:

On the 23d of March, 1756, a peasant about 60 years of age, of the province of Scheeren in Sweden, having been made very drunk with brandy, was, in his way home, thrown down by the violence of the wind; and, as he was too far gone in liquor to recover his legs again, he soon fell asleep where he lay. Not being discovered till the next morning, he was found then frozen stiff, and taken up for dead. He was put into a shell, in order for interment; when fortunately Mr. Nauder, a physician of the province of Gothland, being on a journey, arrived on the spot where the accident happened. He examined the body; the face and all the extremities were cold as ice, and the cheeks of an extraordinary red colour. The joints were immoveable; the eyes were open, and fixed. Not the least motion of the heart or pulse, nor the smallest signs of respiration, were left; and the feet were so completely frozen, that the toes were all become black, except the great toe of the right foot. After some time contemplating on these unfavourable circumstances, Mr. Nauder imagined he could perceive some warmth at the pit of the stomach, which encouraged him to hope the poor object might be recovered; but there being no apothecary, nor medicines of any kind to be had in the place, he was reduced to try the following methods: He began by ordering the arms, legs, and loins, of the patient to be rubbed with coarse woollen cloths. He put on the stomach and belly, warm cloths of the same kind, which were frequently changed, increasing their warmth by degrees. At the same time the patient was laid on a mattrass on the floor; no care being taken as yet about his feet, which the physician supposed it was impossible to save. On reflecting afterwards, however, on the custom of putting frozen meat into cold water, in order to thaw it without prejudice, he had a mind to try the same expedient. But, as the joints were as yet inflexible, he could not find means to immerse the feet in water, so was obliged to content himself with ordering wet linen cloths, frequently changed, to be wrapped round them.

By these means, the region of the heart began to recover warmth, but it was not till after four hours constant rubbing, there was the least appearance of respiration. This was about two o'clock in the afternoon. No pulse, however, was to be perceived till near half an hour after three; when the muscles began to lose their rigidity; the cheeks relaxed, and before five a silver spoon might be got in between his teeth. At this time they strove to make him swallow some hot wine, which with much difficulty was effected: after which his face was covered with sweat, and his cheeks began to return to their natural colour. Soon afterwards he began to move his eyebrows, and,

and, at ſix o'clock, his arms and hands. He was now placed in his bed, before a good fire; his arms and legs being well covered with warm blankets. He took alſo two more ſpoonfuls of hot wine; and, about eight o'clock, began firſt to talk, but in a manner very confuſed and unintelligible; being delirious, and fancying himſelf ſtill in the foreſt. By degrees the cold had almoſt left his feet, and the blackneſs of the toes in a great meaſure diſappeared, although the free motion of the joints was not as yet reſtored. About ten o'clock, however, he began to bend his back, and complained of a violent pain in his legs. He took now a little beer made hot, with an egg beat in it, and ſoon after went to ſleep. In the morning, his feet were warm, and without pain, and his toes recovered entirely their natural colour, but both were extremely tender. His pulſe beat quick and ſtrong, and together with a burning thirſt indicated bleeding; but, no lancet being to be got, Mr. Nauder ordered him ſome water-gruel, which he drank of at intervals, plentifully, till noon; when he was relieved farther by a ſtool. He went again in the evening to ſleep, and was the next morning capable of ſitting up, and being conveyed home in a carriage, not indeed entirely free from pain, but in a fair way of a perfect and ſpeedy recovery.

The following is the remarkable caſe of a young woman who had lain ſome hours under water; from the Journal Hiſtorique for December, 1758.

This account was communicated to the author of the above-mentioned journal by Dr. du Moulin, an eminent phyſician, who accidentally, and luckily for the poor girl, happened to hear of her misfortune ſoon after ſhe was taken out of the water.

A ſervant maid, he ſays, of about eighteen years of age, had fallen into a river, down which ſhe was carried, by the force of the ſtream, upwards of one hundred and fifty paces from the place ſhe fell in at. But her clothes catching hold of ſome piles, driven down for the uſe of a neighbouring tanner, ſhe there ſtopt; and, ſome hours after, the tanner's people coming that way, ſhe was taken up. Being perſonally unknown to thoſe who firſt found her, ſhe was expoſed ſome time before her friends heard of the diſaſter that had happened. At length ſhe was carried to the houſe of her miſtreſs; where ſhe was ſtript and laid down before the fire, without any hopes however of her recovery. In this ſituation the doctor found her, without motion, ſtiff and cold, her eyes ſhut, her mouth open, her countenance pale and hollow, and her whole body much ſwelled and full of water. She had no pulſe, and, the caſe being looked upon as deſperate, the doctor had a mind to try an experiment, ſuggeſted to him by what he had obſerved of flies and other inſects, that, being drowned and apparently dead, will yet recover by half burying them in aſhes, or ſalt. He accordingly ordered a ſufficient quantity of dry pot-aſhes to be ſtrowed upon a bed to about three inches deep: upon this layer of aſhes the girl was placed, and another layer of aſhes of about two inches deep was ſprinkled over her. On her head was put a cap, containing a good quantity of aſhes alſo, and round her throat a ſtocking filled with the ſame. The blankets were now laid on the bed, and thus the patient lay about half an hour; when her pulſe began to beat, by degrees ſhe recovered her voice, and ſoon cried our articulately, "O, I am frozen!—I am frozen!"

A cor-

A cordial was adminiſtered, and ſhe continued to lie eight hours in in the aſhes; during which time the water came away by the urinary paſſages, to an amazing quantity: after which ſhe found herſelf greatly relieved; and, though for the three following days ſhe was ſtill a little indiſpoſed, the indiſpoſition was ſlight, and went ſoon off. In want of a ſufficient quantity of dry pot-aſhes, dry ſalt may be uſed, and, according to the doctor, with the ſame ſucceſs.

SITUATION FOR ERECTING COTTAGES.

GREAT farmers are very unwilling to admit cottages cloſe to their farms; and nothing is more common, than for a poor labourer to be obliged to come a mile, and ſometimes more, to his labour, and return home again at night, in all kinds of weather, after he has done a hard day's work. Cottages ſhould therefore be erected, if poſſible, on ſome ſheltered ſpot, near the farm where the labour lies; and true policy points out, that every farm ought to have a ſufficient number of ſuch uſeful appendages, in proportion to its ſize. Such cottages, under ſome ſuch regulations as theſe, would be of great uſe and ornament to a country, and a real credit to every gentleman's reſidence; as, on the contrary, nothing can reflect greater diſgrace upon him, than a ſhattered miſerable hovel at his gate, unfit for human creatures to inhabit. Upon encouragement like this, good tenants would never be wanting. Induſtry would meet with a reward, the poor-rates would neceſſarily be lightened, and population increaſed. A farm thus provided with ſuch a ſufficient number of labourers as might, at all times and ſeaſons, be depended upon, would be of more value on that account. The tenant of ſuch farm would not be ſubject to pay exorbitant wages, as he otherwiſe muſt, on particular occaſions. He would not be obliged to court the vagrant to lend him a precarious aſſiſtance, or to have recourſe to towns to pick up diſorderly people. In ſummer, beſides the uſual buſineſs of hay-making, he might employ even the women and children in weeding and other uſeful buſineſs.

Almoſt every pariſh is, in a great meaſure, ſubject to ſome particular gentleman, who has ſufficient power and influence over it, to correct the preſent grievance, and to ſet a better example. Such gentlemen ſhould conſider themſelves as guardians of the poor, and attend to their accommodation and happineſs: it is their particular buſineſs, becauſe they and their families have a laſting intereſt in the proſperity of the pariſh: the farmers only a temporary one. If a gentleman's fortune be ſo large, that he cannot attend to objects of this ſort, he ſhould, at leaſt, recommend the cottagers to the attention of his agent; and give him ſtrict inſtructions, to act as their friend and protector; for, unleſs ſome ſuch check be put upon great farmers, they are very apt to contribute to the demolition, inſtead of the protection, of cottages; and, when the neſt is deſtroyed, the bird muſt emigrate into ſome other pariſh. A cottager, in this caſe, has no other choice, unleſs it be to make application to the neighbouring juſtice of the peace, for his order to the pariſh officers to find him ſome other place to lay his head in. If it were not for this excellent law, which obliges pariſh officers to find habitations for their poor, I am ſorry to remark, that in many pariſhes, they would literally be driven into the open fields.

ADULTERATION

ADULTERATION OF MILK.

THE following curious facts on this subject, so interesting to the inhabitants of this metropolis, are extracted from Middleton's Agricultural Survey of the County of Middlesex:

The consumers of milk pay three-pence halfpenny per quart to the retailers. If the latter were to sell the milk pure and unadulterated at this price, it would yield them a profit of 64l. 14s. per cent. But, in order to discover the actual profit of the retailers, we must add sixpence for short measure, and the extraneous articles mixed with it, which increases 2s. 4d. the usual price of eight quarts, to 2s. 10d. and, as it costs them only 1s. 5d. there remains for labour and profit 100 per cent. Thus the retailer clears 28l. 6s. 8d. by every cow. On the whole, they divide among them the unreasonable large sum of 240,833l. and the sum paid for milk amounts to 481,666l.

When the families of fashion are in London for the winter season, the consumption; and consequent deterioration, of milk, are at the highest. During the summer months, when such families are for the most part in the country, the milk may probably be of rather a better quality. The cream is taken from so much as remains unsold, and made into fresh butter for the London markets. The butter-milk is given to the hogs.

The milk is always given in its genuine state to the retail dealers; and, as it is sold to them by the cow-keepers after the rate of 2½d. per quart, and is retailed by them at 3½d. per quart, the profit is surely so large as ought to prevent even the smallest adulteration. But when it is considered how much it is reduced by water, and impregnated with much worse ingredients, it is to be lamented that no method has yet been devised, to put a stop to the many scandalous frauds and impositions in general practised with regard to this very necessary article of human sustenance.

It is certainly an object well deserving the consideration of the legislature. It cannot be doubted but that many persons would be glad to make some addition to the price now paid for it, (high as that price is,) provided they could, for such increased price, procure so useful an article in domestic economy perfectly genuine.

Five or six men only are employed in attending near three hundred cows. As one woman cannot milk more than eight or nine cows twice a-day, that part of the business would necessarily be attended with considerable expence to the cow-keeper, were it not that the retailer agrees for the produce of a certain number of cows, and takes the labour and expence of milking on himself.

Every cow-house is provided with a milk-room, where the milk is measured, and served out by the cow-keeper; and this room is mostly furnished with a pump, to which the retail dealers apply in rotation; not secretly, but openly, before any person that may be standing by; from which they pump water into the milk-vessel, at their discretion. The pump is placed there expressly for that purpose, and indeed is very seldom used for any other. A considerable cow-keeper in Surrey has a pump of this kind, which goes by the name of the *famous black cow* (from the circumstance of its being painted black), and is said to yield *more than all the rest put together.*

DESCRIPTION OF THE BAY OF NAPLES.

THE bay is of a circular figure; in moſt places upwards of 20 miles in diameter; ſo that, including all its breaks and inequalities, the circumference is conſiderably more than 60 miles. The whole of this ſpace is ſo wonderfully diverſified by all the riches both of art and nature, that there is ſcarce an object wanting to render the ſcene complete; and it is hard to ſay, whether the view is more pleaſing from the ſingularity of many of theſe objects, or from the incredible variety of the whole. You ſee an amazing mixture of the antient and modern; ſome riſing to fame, and ſome ſinking to ruin. Palaces reared over the tops of other palaces, and antient magnificence trampled under foot—by modern folly. Mountains and iſlands, that were celebrated for their fertility, changed into barren waſtes, and barren waſtes into fertile fields and rich vineyards. Mountains ſunk into plains, and plains ſwelled into mountains. Lakes drunk up by volcanos, and extinguiſhed volcanos turned into lakes. The earth ſtill ſmoking in many places; and in others throwing out flame. In ſhort, Nature ſeems to have formed this coaſt in her moſt capricious mood; for every object is a *luſus naturæ*. She never ſeems to have gone ſeriouſly to work; but to have devoted this ſpot to the moſt unlimited indulgence of caprice and frolic.

The bay is ſhut out from the Mediterranean by the iſland of Capre, ſo famous for the abode of Auguſtus; and afterwards ſo infamous for that of Tiberius. A little to the weſt lie thoſe of Iſchia, Procida, and Niſida; the celebrated promontory of Micænum, where Æneas landed; the claſſic fields of Baia, Cuma, and Puzzoli; with all the variety of ſcenery that formed both the Tartarus and Elyſium of the ancients; the Campi Phlegrei, or burning plains where Jupiter overcame the giants; the Monte Novo, formed of late years by fire; the Monte Barbaro; the picturesque city of Puzzoli, with the Solfattera ſmoking above it; the beautiful promontory of Pauſillippe, exhibiting the fineſt ſcenery that can be imagined; the great and opulent city of Naples, with its three caſtles, its harbour full of ſhips from every nation, its palaces, churches, and convents innumerable. The rich country from thence to Portici, covered with noble houſes and gardens, and appearing only a continuation of the city. The palace of the king, with many others ſurrounding it, all built over the roofs of thoſe of Herculaneum, buried near a hundred feet by the eruptions of Veſuvius. The black fields of lava that have run from that mountain, intermixed with gardens, vineyards, and orchards. Veſuvius itſelf, in the back ground of the ſcene, diſcharging volumes of fire and ſmoke, and forming a broad track in the air over our heads, extending without being broken or diſſipated to the utmoſt verge of the horizon. A variety of beautiful towns and villages, round the baſe of the mountain, thoughtleſs of the impending ruin that daily threatens them. Some of theſe are reared over the very roofs of Pompeia and Stabia, where Pliny periſhed; and with their foundations have pierced through the ſacred abodes of the ancient Romans; thouſands of whom lie buried here, the victims of this inexorable mountain. Next follows the extenſive and romantic coaſt of Caſtello Mare, Sorrentum, and Mola; diverſified with every picturesque object in nature. It was the ſtudy of this wild and beautiful country

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that formed our greatest landscape-painters. This was the school of Poussin and Salvator Rosa, but more particularly of the last, who composed many of his most celebrated pieces from the bold craggy rocks that surround this coast; and no doubt it was from the daily contemplation of these romantic objects, that they stored their minds with that variety of ideas they have communicated to the world with such elegance in their works.

This extensive coast, this prodigious variety of mountains, valleys, promontories, and islands, covered with an everlasting verdure, and loaded with the richest fruits, is all the produce of subterraneous fire; the fact is certain, and can only be doubted by those who have wanted time or curiosity to examine it. It is strange that Nature should make use of the same agent to create as to destroy; and that what has only been looked upon as the consumer of countries, is in fact the very power that produces them. Indeed, this part of our earth seems already to have undergone the sentence pronounced upon the whole of it; but, like the phœnix, has risen again from its own ashes, in much greater beauty and splendour than before it was consumed. The traces of these dreadful conflagrations are still conspicuous in every corner; they have been violent in their operations, but in the end have proved salutary in their effects. The fire in many places is not yet extinguished, but Vesuvius is now the only spot where it rages with any degree of activity.

RUINS OF POESTUM.

AMONG the circumstances contributing to render the kingdom of Naples so interesting a subject of curiosity, is to be included that of its containing very considerable remains of ancient magnificence, which had remained totally undiscovered for several centuries. In 1755, an apprentice to a painter at Naples, who was on a visit to his friends at Capaccio, by accident took a walk to the mountains which surround the territory of Pœstum. The only habitation he perceived was the cottage of a farmer, who cultivated the best part of the ground, and reserved the rest for pasture. The ruins of the ancient city of Pœstum, or Possidonia, made a part of this view, and particularly struck the eyes of the young painter. Upon his return to Capaccio, he consulted the neighbouring people about the origin of these monuments of antiquity. He could only learn, that this part of the country had been uncultivated and abandoned during their memory; that about ten years before, the farmer, whose habitation he had noticed, established himself there; and that having dug in many places, and searched among the ruins that lay round him, he had found treasures sufficient to enable him to purchase the whole. At the painter's return to Naples, he informed his master of these particulars, whose curiosity was so greatly excited by the description, that he took a journey to the place, and made drawings of the principal views. These were shewn to the King of Naples, who ordered the ruins to be cleared, and Pœstum arose from the obscurity in which it had remained for upwards of 700 years, as little known to the inhabitants as the travellers.

The following is a concise description of Pœstum in its present state. It is of an oblong figure, about two miles and a half in circumference. It has four gates, which are opposite to each other. On the key-

ſtone of the arch of the north-gate, on the outſide, is the figure of Neptune in baſſo relievo, and within a hippocampus. The walls which ſtill remain are compoſed of very large cubical ſtones, and are extremely thick, in ſome parts, 18 feet. That the walls have remained unto this time, is owing to the very exact manner in which the ſtones are fitted to one another, a circumſtance obſerved univerſally in the maſonry of the ancients, and perhaps in ſome meaſure to a ſtalactical concretion which has grown over them. On the walls here and there are placed towers of different heights, thoſe near the gates being much higher and larger than the others.

From its ſituation among marſhes, bituminous and ſulphurous ſprings, Pœſtum muſt have been unwholeſome. In ſuch a ſituation the water muſt have been bad. Here the inhabitants were obliged to convey that neceſſary of life from purer ſprings by means of aqueducts, of which many veſtiges ſtill remain.

The principal monuments of antiquity are, a theatre, an amphitheatre, and three temples. The theatre and amphitheatre are much ruined. The firſt temple is hexaſtylos and amphiproſtylos. At one end the pilaſters which divided the cella from the pronaos are ſtill remaining. Within the cella are two rows of ſmaller columns, with an architrave, which ſupport the ſecond order. The ſecond temple is alſo amphiproſtylos; it has nine columns in front and 18 in flank. The third is likewiſe amphiproſtylos, and it has ſix columns in front and 13 in flank. The columns of theſe temples are of that kind of Doric order which we find employed in works of the greateſt antiquity. They are hardly five diameters in height. They are without baſes, which alſo has been urged as a proof of their antiquity; but we do not find that the ancients ever uſed baſes of this order, at leaſt till very late. Vitruvius makes no mention of baſes to this order; and the only inſtance we have of it, is in the firſt order of the coliſæum, at Rome, which was built by Veſpaſian. The pillars of theſe temples are fluted with very ſhallow flutings, in the manner deſcribed by Vitruvius. The columns diminiſh from the bottom, which was the moſt ancient method almoſt univerſally in all the orders. The columns have aſtragals of a very ſingular form, which ſhews the error of thoſe who imagine that this member was firſt invented with the Ionic order, to which the Greeks gave an aſtragal, and that the Romans were the firſt who applied it to the Doric. The echinus of the capital is of the ſame form with that of the temple of Corinth deſcribed by Le Roy. About the time when the temples of Pœſtum were built, architecture ſeems to have received that degree of improvement which the elegant taſte of the Greeks had ſtruck out from the rude maſſes of the Egyptians, the firſt inventors of this as of many other arts.

SINGULAR CHARACTER AT BAGARIA, NEAR PALERMO.

[From BRYDONE'S TOUR through SICILY and MALTA.]

THE Prince of P——, a man of immenſe fortune, has devoted his whole life to the ſtudy of monſters and chimeras, greater and more ridiculous than ever entered into the imagination of the wildeſt writers of romance or knight-errantry.

The amazing crowd of ſtatues that ſurround his houſe, appear at a diſtance like a little army drawn up for its defence; but when you get

get amongst them, and every one assumes his true likeness, you imagine you have got into the regions of delusion and enchantment; for of all that immense group, there is not one made to represent any object in nature; nor is the absurdity of the wretched imagination that created them less astonishing than its wonderful fertility. It would require a volume to describe the whole, and a sad volume indeed it would make. He has put the heads of men to the bodies of every sort of animal, and the heads of every other animal to the bodies of men. Sometimes he makes a compound of five or six animals that have no sort of resemblance in nature. He puts the head of a lion to the neck of a goose, the body of a lizard, the legs of a goat, the tail of a fox. On the back of this monster, he puts another, if possible still more hideous, with five or six heads, and a bush of horns, that beats the beast in the Revelations all to nothing. There is no kind of horn in the world that he has not collected; and his pleasure is to see them all flourishing upon the same head. This is a strange species of madness; and it is truly unaccountable that he has not been shut up many years ago; but he is perfectly innocent, and troubles nobody by the indulgence of his phrenzy; on the contrary, he gives bread to a number of statuaries and other workmen, whom he rewards in proportion as they can bring their imaginations to coincide with his own; or, in other words, according to the hideousness of the monsters they produce. It would be idle and tiresome to be particular in an account of these absurdities. The statues that adorn, or rather deform, the great avenue, and surround the court of the palace, amount already to six hundred, notwithstanding which, it may be truly said, that he has not broken the second commandment; for of all that number, there is not the likeness of any thing in heaven above, in the earth beneath, or in the waters under the earth. The old ornaments which were put up by his father, who was a sensible man, appear to have been in a good taste. They have all been knocked to pieces, and laid together in a heap, to make room for this new creation.

The inside of this inchanted castle corresponds exactly with the out; it is in every respect as whimsical and fantastical, and you cannot turn yourself to any side, where you are not stared in the face by some hideous figure or other. Some of the apartments are spacious and magnificent, with high arched roofs; which, instead of plaister or stucco, are composed entirely of large mirrors, nicely joined together. The effect that these produce (as each of them makes a small angle with the other) is exactly that of a multiplying glass; so that, when three or four people are walking below, there is always the appearance of three or four hundred walking above. The whole of the doors are likewise covered over with small pieces of mirror, cut into the most ridiculous shapes, and intermixed with a great variety of crystal and glass of different colours. All the chimney-pieces, windows, and side-boards, are crowded with pyramids and pillars of tea-pots, candle-cups, bowls, cups, saucers, &c. strongly cemented together; some of these columns are not without their beauty: one of them has a large china chamber-pot for its base, and a circle of pretty little flower-pots for its capital; the shaft of the column, upwards of four feet long, is composed entirely of tea-pots of different sizes, diminished gradually from the base to the capital. The profusion of china that has been employed

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in forming these columns is incredible; I dare say there is not less than forty pillars and pyramids formed in this strange fantastic manner.—Most of the rooms are paved with fine marble tables of different colours, that look like so many tomb-stones. Some of these are richly wrought with lapis lazuli, porphyry, and other valuable stones; their fine polish is now gone, and they only appear like common marble; the place of these beautiful tables he has supplied by a new set of his own invention, some of which are not without their merit. These are made of the finest tortoise-shell mixed with mother of pearl, ivory, and a variety of metals; and are mounted on fine stands of solid brass.

The windows of this inchanted castle are composed of a variety of glass of every different colour, mixed without any sort of order or regularity. Blue, red, green, yellow, purple, violet.—So that at each window, you may have the heavens and earth of whatever colour you chuse, only by looking through the pane that pleases you. The house-clock is cased in the body of a statue; the eyes of the figure move with the pendulum, turning up their white and black alternately, and make a hideous appearance.

His bed-chamber and dressing-room are like two apartments in Noah's ark; there is scarcely a beast, however vile, that he has not placed there; toads, frogs, serpents, lizards, scorpions, all cut out in marble, of their respective colours. There are a good many busts too, that are not less singularly imagined.—Some of these make a very handsome profile on one side; turn to the other, and you have a skeleton; here you see a nurse with a child in her arms; its back is exactly that of an infant; its face is that of a wrinkled old woman of ninety.

For some minutes one can laugh at these follies, but indignation and contempt soon get the better of your mirth, and the laugh is turned into a sneer. I own I was soon tired of them; though some things are so strangely fancied, that it may well excuse a little mirth, even from the most rigid cynic.

The family statues are charming; they have been done from some old pictures, and make a most venerable appearance; he has dressed them out from head to foot, in new and elegant suits of marble; and indeed the effect it produces is more ridiculous than any thing you can conceive. Their shoes are all of black marble, their stockings generally of red; their clothes are of different colours, blue, green, and variegated, with a rich old-fashioned lace. The periwigs of the men and head-dresses of the ladies are of fine white; so are their shirts, with long flowing ruffles of alabaster. The walls of the house are covered with some fine basso relievos of white marble, in a good taste; these he could not well take out, or alter, so he has only added immense frames to them. Each frame is composed of four large marble tables.

The author and owner of this singular collection is a poor miserable lean figure, shivering at a breeze, and seems to be afraid of every body he speaks to. He is one of the richest subjects in the island, and it is thought he has not laid out less than 20,000l. in the creation of this world of monsters and chimeras.—He certainly might have fallen upon some way to prove himself a fool at a cheaper rate. However, it gives bread to a number of poor people, to whom he is an excellent master. His house at Palermo is a good deal in

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the same style; his carriages are covered with plates of brass, so that some of them are musket-proof.

The government have had serious thoughts of demolishing the regiment of monsters he has placed round his house; but, as he is humane and inoffensive, and as this would certainly break his heart, they have as yet forborne. However, the seeing of them by women with child is said to have been already attended with very unfortunate circumstances; and ladies complain that they dare no longer take an airing in the Bagaria; that some hideous form always haunts their imagination for some time after: their husbands too, it is said, are as little satisfied with the great variety of horns.

ON THE CAUSES OF THE DIFFERENCE OF COMPLEXION.

FEW questions in philosophy have engaged the attention of naturalists more than the diversities among the human species, among which that of colour is the most remarkable. The great differences in this respect have given occasion to several authors to assert, that the whole human race have not sprung from one original; but that as many different species of men were at first created as there are now different colours to be found among them. All the arguments which can be brought for specific differences among mankind, whether drawn from a difference of colour, stature, or disposition, must necessarily be inconclusive. It remains, however, a matter of no small difficulty to account for the remarkable variations of colour that are to be found among different nations. On this subject Dr. Hunter hath published a thesis, in which he considers the matter more accurately than hath commonly been done, and determines absolutely against any specific difference among mankind. He introduces his subject by observing, that when the question has been agitated, whether all the human race constituted only one species or not, much confusion has arisen from the sense in which the term *species* has been adopted. He therefore thinks it necessary to set out with a definition of the term. He includes under the same species all those animals which produce issue capable of propagating others resembling the original stock from whence they sprung. This definition he illustrates by having recourse to the human species as an example. And in this sense of the term he concludes, that all of them are to be considered as belonging to the same species. And as, in the case of plants, one species comprehends several varieties, depending upon climate, soil, culture, and similar accidents; so he considers the diversities of the human race to be merely varieties of the same species, produced by natural causes. Of the different colours observable among mankind, he gives the following views:

BLACK.—Africans under the line; inhabitants of New Guinea; inhabitants of New Holland.

SWARTHY.—The Moors in the northern parts of Africa; the Hottentots in the southern parts of it.

COPPER-COLOURED.—The East Indians.

RED-COLOURED.—The Americans.

BROWN-COLOURED.—Tartars, Persians, Arabs, Africans on the coast of the Mediterranean, Chinese.

BROWNISH.—The inhabitants of the southern parts of Europe; as Sicilians, Abyssinians, Spaniards, Turks, and likewise the Samoiedes and Laplanders.

WHITE.

WHITE.—Most of the European nations; as Swedes, Danes, English, Germans, Poles, &c. Kabardinski, Georgians; inhabitants of the islands in the Pacific Ocean.

In attempting to investigate the causes of these differences, our author observes, that there can be no dispute of the seat of colour being placed in the skin; that it is not even extended over the whole of this, but confined to that part named the cuticle, consisting of the epidermis and reticulum; and, that it chiefly occupies the latter of these. The cuticle is much thicker and harder in black people than in white ones; the reticulum in the latter being a thin mucus, in the former a thick membrane. He concludes that this seat of colour in whites is transparent, and either totally deprived of vessels, or only furnished with very few; as the yellow colour appearing in jaundice vanishes on the cause of the disease being removed; which is not the case with stains in the cuticle from gunpowder, or similar causes. He next points out three causes destroying the pellucidity of the cuticle, giving it a brown colour, and rendering it thicker. These are, access of air, nastiness, and the heat of the sun. The influence of each of these he proves by many examples; and from these he is inclined to consider the last as by much the most powerful. If, however, it be admitted that these causes have this effect, he thinks that all the diversity of colour which is to be observed among mankind may be thus accounted for. He remarks, that all the inhabitants of the torrid zone incline more or less to a black colour. When we observe the differences which occur among them, we must at the same time remember, that a black colour is not referred to heat alone, but to the other causes also: and, when we attend to the diversity of temperature that occurs even in the torrid zone, the existence of a white nation there would by no means 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 very easily be explained. This he accounts for from the manner of life of the inhabitants, by which they are either exposed to the inclemency of the air, or to constant nastiness from smoky houses.

Having thus attempted to account, from natural causes, for the varieties which occur among mankind with respect to colour, our author observes, that, to all this reasoning, an objection will naturally be made, from considering that infants bring these marks into the world along with them, before they can be exposed to any such causes. Dr. Hunter imagines, however, that this may readily be explained upon the supposition that many peculiarities acquired by parents are transmitted to their posterity; and of this, he thinks, no one can entertain the least doubt who attends to hereditary diseases. Thus, gout, scrophula, mania, and many other affections, although at first induced by particular accidents, will continue to affect families for many generations. In the same manner, a parent, exposed to causes destroying 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. Thus all the different shades may have been at first induced, and afterwards continued.—The objection here obviated, however, might have been shortly answered by denying the fact; for it is now generally known, that the children of the blackest negroes are absolutely *born white*, as will be afterwards noticed.

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This subject of complexion has been very well illustrated by Mr. Clarkson, in a dissertation introduced in his Essay, on the commerce and slavery of the human species. The first point that occurs to be ascertained, is, "What part of the skin is the seat of colour?" The old anatomists usually divided the skin into two parts or laminæ; the exterior and thinnest, called by the Greeks *epidermis*, by the Romans *cuticula*, and hence by us *cuticle*; and the interior, called by the former *derma*, and by the latter *cutis*, or *true skin*. Hence they must necessarily have supposed, that, as the true skin was in every respect the same in all human subjects, however various their external hue, so the seat of colour must have existed in the cuticle or upper surface.

Malpighi, an eminent Italian physician of the last century, was the first person who discovered that the skin was divided into three laminæ, or parts: the cuticle, the true skin, and a certain coagulated substance situated between both, which he distinguished by the title of *rete mucosum*, which coagulated substance adhered so firmly to the cuticle, as in all former anatomical preparations to have come off with it, and thence led the ancient anatomists to believe, that there were but two laminæ, or divisible portions, in the human skin.

This discovery was sufficient to ascertain the point in question: for it appeared afterwards, that the cuticle, when divided according to this discovery from the other lamina, was semi-transparent; that the cuticle of the blackest negro was of the same colour and transparency as that of the purest white; and hence, the true skins of both being invariably the same, that the rete mucosum was the seat of colour. This has been farther confirmed by all subsequent anatomical experiments; by which it appears, that, whatever is the colour of this intermediate coagulated substance, nearly the same is the apparent colour of the upper surface of the skin. Neither can it be otherwise; for the cuticle, from its transparency, must necessarily transmit the colour of the substance beneath it, in the same manner, though not in the same degree, as the cornea transmits the colour of the iris of the eye. This transparency is a matter of ocular demonstration in white people: it is conspicuous in every blush; for no one can imagine that the cuticle becomes red as often as this happens: nor is it less discoverable in the veins, which are so easy to be discerned; for no one can suppose that the blue streaks, which he constantly sees in the fairest complexions, are painted, as it were, on the surface of the upper skin. From these, and a variety of other observations, no maxim is more true in physiology, than that on the rete mucosum depends the colour of the human body; or, in other words, that the rete mucosum being of a different colour in different inhabitants of the globe, and appearing through the cuticle or upper surface of the skin, gives them that various appearance which strikes us so forcibly in contemplating the human race.

As this can be incontrovertibly ascertained, it is evident, that, whatever causes co-operate in producing this different appearance, they produce it by acting upon the rete mucosum; which, from the almost incredible manner in which the cuticle is perforated, is as accessible as the cuticle itself. These causes are probably those various qualities of things, which, combined with the influence of the sun, contribute to form what we call *climate*. For when any person considers, that the mucous substance before mentioned is found to vary

in its colour, as the climates vary from the equator to the poles, his mind must be instantly struck with the hypothesis, and he must adopt it without any hesitation, as the genuine cause of the phenomenon.

This fact, of the variation of the mucous substance, according to the situation of the place, has been clearly ascertained in the numerous anatomical experiments that have been made; in which subjects of all nations have come under consideration. The natives of many of the kingdoms and isles of Asia are found to have their rete mucosum black; those of Africa, situated near the line, of the same colour; those of the maritime parts of the same continent, 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: hence the epidemic complexion, prevalent among them, is nearly of the colour of the pickled Spanish olive; while in this country, and those situated nearer the north pole, it appears to be nearly, if not absolutely, white.

These are facts which anatomy has established; and we acknowledge them to be such, that we cannot divest ourselves of the idea, that climate has a considerable share in producing a difference of colour.—The only objection of any consequence that has ever been made to the hypothesis of climate, is this, that people under the same parallels are not exactly of the same colour. But this is no objection in fact; for it does not follow that those countries which are at an equal distance from the equator, should have their climates the same. Indeed nothing is more contrary to experience than this. Climate depends upon a variety of accidents. High mountains in the neighbourhood of a place make it cooler, by chilling the air that is carried over them by the winds. Large spreading succulent plants, if among the productions of the soil, have the same effect; they afford agreeable cooling shades, and a moist atmosphere from their continual exhalations, by which the ardour of the sun is considerably abated. While the soil, on the other hand, if of a sandy nature, retains the heat in an uncommon degree, and makes the summers considerably hotter than those which are found to exist in the same latitude where the soil is different. To this proximity of what may be termed *burning sands*, and to the sulphureous and metallic particles which are continually exhaling from the bowels of the earth, is ascribed the different degree of blackness by which some African nations are distinguishable from each other, though under the same parallels. To these observations we may add, that, though the inhabitants of the same parallel are not exactly of the same hue, yet they differ only by shades of the same colour; or, to speak with more precision, that there are no two people, in such a situation, one of whom is white and the other black. To sum up the whole—Suppose we were to take a common globe; to begin at the equator; to paint every country along the meridian line in succession from thence to the poles; and to paint them with the same colour which prevails in the respective inhabitants of each, we should see the black, with which we had been obliged to begin, insensibly changing to an olive, and the olive, through as many intermediate colours, to a white: and if, on the other hand, we should complete any one of the

the parallels according to the same plan, we should see a difference perhaps in the appearance of some of the countries through which it ran, though the difference would consist wholly in shades of the same colour.

The argument, therefore, which is brought against the hypothesis, is so far from being an objection, that it may be considered as one of the first arguments in its favour: for, if climate has really an influence on the mucous substance of the body, it is evident, that we must not only expect to see 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.

To this argument may be added one that is uncontrovertible, which is, that when the black inhabitants of Africa are transplanted to colder, or the white inhabitants of Europe to hotter, climates, their children, born there, are of a different colour from themselves; that is, lighter in the first, and darker in the second, instance.

As a proof of the first, we shall give the words of the Abbé Raynal, in his admired publication. "The children," says he, "which they (the Africans) procreate in America, are not so black as their parents were. After each generation, the difference becomes more palpable. It is possible, that, after a numerous succession of generations, the men come from Africa would not be distinguished from those of the country into which they may have been transplanted."

This circumstance we have had the pleasure of hearing confirmed by a variety of persons who have been witnesses of the fact; but particularly by many intelligent Africans, who have been parents themselves in America, and who have declared, that the difference is so palpable in the northern provinces, that not only they themselves have constantly observed it, but that they have heard it observed by others.

Neither is this variation in the children from the colour of their parents improbable. The children of the blackest Africans are born white. In this state they continue for about a month, when they change to a pale yellow. In process of time they become brown. Their skin still continues to increase in darkness with their age, till it becomes of a dirty sallow black; and at length, after a certain period of years, glossy and shining. Now, if climate has any influence on the mucous substance of the body, this variation in the children from the colour of their parents is an event which must be reasonably expected: for being born white, and not having equally powerful causes to act upon them in colder as their parents had in the hotter climates which they left, it must necessarily follow, that the same effect cannot possibly be produced.

Hence also, if the hypothesis be admitted, may be deduced the reason why even those children who have been brought from their country at an early age into colder regions, have been observed to be of a lighter colour than those who have remained at home till they arrived at a state of manhood. For having undergone some of the changes which we mentioned to have attended their countrymen from infancy to a certain age, and having been taken away before the rest could be completed, these farther changes, which would have taken place had they remained at home, seem either to have

been checked in their progress, or weakened in their degree by a colder climate.

We come now to the second and opposite case; for a proof of which we shall appeal to the words of Dr. Mitchell in the Philosophical Transactions, No. 476. sect. 4. "The Spaniards, 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 the Europeans, but lead the same rude and barbarous lives with the Indians, it is very probable, that, in a succession of many generations, they would become as dark in complexion."

To this instance we shall add one, which is mentioned by a late writer, who, describing the African coast and the European settlements there, has the following passage. "There are several other small Portuguese settlements, and one of some note at Mitomba, a river in Sierra Leona. 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."

These facts with respect to the colonists of the Europeans are of the highest importance in the present case, and deserve a serious attention. For when we know to a certainty from whom they are descended; when we know that they were, at the time of their transplantation, of the same colour as those from whom they severally sprung; and when, on the other hand, we are credibly informed that they have changed it for the native colour of the place which they now inhabit: the evidence in support of these facts is as great as if a person, on the removal of two or three families into another climate, had determined to ascertain the circumstance; as if he had gone with them and watched their children; as if he had communicated his observations at his death to a successor; as if his successor had prosecuted the plan: and thus an uninterrupted chain of evidence had been keen kept up from their first removal to any determined period of succeeding time.

But, though these facts seem sufficient of themselves to confirm our opinion, they are not the only facts which can be adduced in its support. It can be shown, that the members of the very same family, when divided from each other, and removed into different countries, have not only changed their family complexion, but that they have changed it to as many different colours as they have gone into different regions of the world, we cannot have, perhaps, a more striking instance of this than in the Jews. These people are scattered over the face of the whole earth. They have preserved themselves distinct from the rest of the world by their religion; and, as they never intermarry with any but those of their own sect, so they have no mixture of blood in their veins, that they should differ from each other: and yet nothing is more true, than that the English Jew is white, the Portuguese swarthy, the Armenian olive, and the Arabian copper; in short, that there appear to be as many different species of Jews as there are countries in which they reside.

To these facts we shall add the following observation, that, if we can give credit to the ancient historians in general, a change from the darkest black to the purest white must have actually been accomplished.

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One instance, perhaps, may be thought sufficient. Herodotus relates, that the Colchi were black, and that they had crisped hair. These people were a detachment of the Æthiopian army under Sesostris, who followed him in his expedition, and settled in that part of the world where Colchis is usually represented to have been situated. Had not the same author informed us of this circumstance, we should have thought it strange that a people of this description should have been found in such a latitude. Now as they were undoubtedly settled there, and as they were neither so totally destroyed, nor made any such rapid conquests, as that history should notice the event, there is great reason to presume that their descendants continued in the same, or settled in the adjacent, country; from whence it will follow, that they must have changed their complexion to that which is observed in the inhabitants of this particular region at the present day; or, in other words, that the black inhabitants of Colchis must have been changed into the fair Circassian. Suppose, without the knowledge of any historian, they had made such considerable conquests as to have settled themselves at the distance of 1000 miles in any one direction from Colchis, still they must have changed their colour: for, had they gone in an eastern or western direction, they must have been of the same colour as the Circassians; if to the north, whiter; if to the south, of a copper. There are no people within that distance of Colchis who are black.

From the whole of the preceeding observations on the subject, we may conclude, that as all the inhabitants of the earth cannot be otherwise than the children of the same parents, and as the difference of their appearance must have of course proceeded from incidental causes, these causes are a combination of those qualities which we call *climate*, that the blackness of the Africans is so far ingrafted in their constitution, in a course of many generations, that their children wholly inherit it if brought up in the same spot; but that it is not so wholly interwoven in their nature, that it cannot be removed if they are born and settled in another.

The same principles with the above we find adopted and farther illustrated by Professor Zimmerman of Brunswick, in his celebrated work, The Geographical History of Man, &c. He there proves in the most satisfactory manner, That the complexion of the human species is uniformly correspondent with the degree of heat or cold to which they are habitually exposed. In maintaining this position, he makes a very proper distinction with regard to climate. By *climate* we are to understand, not simply or solely those distinguished by the geographical divisions of the globe, to the exclusion of what he terms *physical* climate, or that which depends on the changes produced in any given latitude by such adventitious circumstances as the lower or more elevated situations of a country, its being encompassed by water or large tracts of land, overspread or surrounded with forests, placed in an extensive plain, or environed by lofty mountains. Peculiarities of the like kind, as has been already noticed, frequently prevent the *physical* climate from corresponding entirely with the *geographical*, as a country influenced by them is often much warmer or colder than other regions placed under the same degree of latitude. The influence of these secondary or modifying circumstances has been already adverted to, and need not be farther enlarged upon: we shall here only observe, that the erroneous reasoning of Lord

Kames

Kames on this subject seems to have been owing to this inattention to the difference above mentioned. At Senegal, and in the adjacent lands, 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, Wherefore are not the Abyssinians and the inhabitants of Zaara of as dark a complexion as the Moors on the coast of Guinea? M. Zimmerman answers, that "these countries are much cooler. The desert is not only farther 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, must considerably mitigate the heat. Nor is Abyssinia so warm as either Monomotopa or Guinea. The north-east winds from the side of Persia and Arabia are cooled by their passage over the Red Sea: the northern winds from 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 it is that negroes are not found either in Asia or South America under the equator. The situations of these countries, our author observes, expose them to sea-breezes and cooling winds from the continent. He confirms this hypothesis by observing, that the mountaineers of warm climates, as in Barbary and Ceylon, are much fairer than the inhabitants of the valleys: that the Saracens and Moors, who conquered the north-east part of Africa in 1700, from being brown, are become like the negroes near the equator; that the Portuguese, who settled at Senegal in 1400, became blacks; and Tudela the Jew asserts, that his countrymen in Abyssinia acquired the dark complexion of the original natives.

Upon the whole, colour and figure may be styled habits of the body. Like other habits, they are created, not by great and sudden impressions, but by continual and almost imperceptible touches. Of habits both of mind and body, nations are susceptible as well as individuals. They are transmitted to offspring, and augmented by inheritance. Long in growing to maturity, national features, like national manners, become fixed only after a succession of ages. They become, however, fixed at last; and, if we can ascertain any effect produced by a given state of weather or of climate, it requires only repetition during a sufficient length of time to augment and impress it with a permanent character. The sanguine countenance will, for this reason, be perpetual in the highest latitudes of the temperate zone; and we shall for ever find the swarthy, the olive, the tawny, and the black, as we descend to the south.

The uniformity of the effect in the same climate, and on men in a similar state of society, proves the power and certainty of the cause. If the advocates of different human species suppose that the beneficent Deity hath created the inhabitants of the earth of different colours, because these colours are best adapted to their respective zones; it surely places his benevolence in a more advantageous light to say, he has given to human nature the power of accommodating itself to every

every zone. This pliancy of nature is favourable to the unions of the most distant nations, and facilitates the acquisition and the extension of science, which would otherwise be confined to few objects and to a very limited range. It opens the way particularly to the knowledge of the globe which we inhabit; a subject so important and interesting to man. It is verified by experience. "Mankind are for ever changing their habitations by conquests or by commerce; and we find them in all climates, not only able to endure the change, but so assimilated by time, that we cannot say with certainty whose ancestor was the native of the clime, and whose the intruding foreigner.

ACCOUNT OF MESSINA IN SICILY.

THE approach to Messina is the finest that can be imagined; it is not so grand as that of Naples, but it is much more beautiful. The key is built in the form of a crescent, and is surrounded by a range of magnificent buildings, four stories high, and exactly uniform, for the space of an Italian mile. The street betwixt these and the sea is about an hundred feet wide, and forms one of the most delightful walks in the world. It enjoys the freest air, and commands the most beautiful prospect: it is only exposed to the morning sun, being shaded all the rest of the day by these buildings. It is besides constantly refreshed by the cooling breeze from the Straits; for the current of the water produces likewise a current in the air, that renders this one of the coolest habitations in Sicily.—This beautiful city was almost annihilated by the plague in the year 1743, when upwards of 70,000 people are said to have died in it and its district in the space of a few months.

The harbour of Messina is formed by a small promontory or neck of land that runs off from the east end of the city, and separates that beautiful bason from the rest of the Straits. The shape of this promontory is that of a reaping hook, the curvature of which forms the harbour, and secures it from all winds. From the striking resemblance of its form, the Greeks, who never gave a name that did not either describe the object or express some of its most remarkable properties, called this place *Zancle*, or the Sickle, and feigned that the sickle of Saturn, fell on this spot, and gave it its form; but the Latins, who were not quite so fond of fable, changed its name to Messina, (from *messis*, a harvest,) because of the great fertility of its fields. It is certainly one of the safest harbours in the world after ships have got in; but it is likewise one of the most difficult access. The celebrated gulph or whirlpool of Charybdis lies near to its entry, and often occasions such an inestine and irregular motion in the water, that the helm loses most of its power, and ships have great difficulty to get in, even with the fairest wind that can blow. This whirlpool is probably formed by the small promontory we have mentioned; which, contracting the Straits in this spot, must necessarily increase the velocity of the current; but no doubt other causes, of which we are ignorant, concur, for this will by no means account for all the appearances which it has produced. The great noise occasioned by the tumultuous motion of the waters in this place, made the ancients liken it to a voracious sea-monster perpetually roaring for its prey; and it has been represented by their authors as the most tremendous passage in the world. Aristotle

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gives a long and a formidable description of it in his 125th chapter De Admirandis. It is described by Homer, 12th Odyssey; Virgil, 3d Æneid; Lucretius, Ovid, Sallust, Seneca, as also by many of the old Italian and Sicilian poets, who all speak of it in terms of horror; and represent it as an object that inspired terror, even when looked on at a distance. It certainly is not now so formidable: and very probably, the violence of this motion, continued for so many ages, has by degrees worn smooth the rugged rocks, and jutting shelves, that may have intercepted and confined the waters. The breadth of the Straits too, in this place, no doubt is considerably enlarged. Indeed, from the nature of things it must be so; the perpetual friction occasioned by the current must wear away the bank on each side, and enlarge the bed of the water.

Vessels in this passage are obliged to go as near as possible to the coast of Calabria, in order to avoid the suction occasioned by the whirling of the waters in this vortex; by which means, when they come to the narrowest and most rapid part of the Straits betwixt Cape Pelorus and Scylla, they were in great danger of being carried upon that rock. Hence arose the proverb which is still applied to those, who in attempting to avoid one evil fall into another: "Incidit in Scyllam, cupiens evitare Caribdem." There is a fine fountain of white marble on the key, representing Neptune holding Scylla and Charybdis chained, under the emblematical figures of two sea-monsters, as represented by the poets.

The little-neck of land, forming the harbour of Messina, is strongly fortified. The citadel, which is indeed a very fine work, is built on that part which connects it with the main land. The farthermost point, which runs out to sea, is defended by four small forts, which command the entry into the harbour. Betwixt these lie the the lazaret, and a light-house to warn sailors of their approach to Charybdis, as that other on Cape Pelorus is intended to give them notice of Scylla. It is probably from these light-houses (by the Greeks called *Pharoi*) that the whole of this celebrated Strait has been denominated the Faro of Messina.

There are a number of gallies and galliots in this beautiful harbour, which add greatly to its beauty. These vessels make a very picturesque appearance as they go out of the harbour; their oars moving all together, with the greatest regularity. There are nine or ten men to each oar; they all rise at every stroke of the oar, and, when they pull, they almost throw themselves on their backs, and seem to exert their utmost force. These wretches are chained to their oars, and sleep every night on the bare benches, without any thing to throw over them. Yet, what is strange, notwithstanding all the misery they suffer, we are told there was never known an instance of any of them putting themselves to death.

There are fine shady walks on all sides of Messina; some of these run along the sea-shore, and are for ever fanned by the cooling breeze from the Straits. The houses are large, and most of the articles of life are cheap and in plenty; particularly fish, which are reckoned better here than any where else in the Mediterranean. The hire of lodgings is next to nothing; and Brydone is of opinion, that there is no place so admirably calculated for the residence of that flock of valetudinarians, which every autumn leave our country with the swallows, in search of warm climates. Their winter season, in

general, is preferable to that of Naples. They have sometimes heavy rain for two or three weeks; but it never lasts longer; and besides, they have always some fair hours every day, when people can go out for exercise; for the moment the rain is over, the walks are dry, the soil being a light gravel.

After seeing the beautiful harbour of Messina, there is little worthy of notice in the city. Some of the churches are handsome, and there are a few tolerable paintings. This place is held in great veneration by the rest of Sicily, for the assistance it gave to Count Rugiero in freeing the island from the yoke of the Saracens; in consideration of which, great privileges were granted it by the succeeding kings; some of which are said still to remain. It was here that the Normans landed; and this city, by the policy of some of its own inhabitants, was the first conquest they made; after which their victorious arms were soon extended over the whole island; and a final period put to the Saracen tyranny. Count Rugiero fixed the seat of government at Palermo; and put the political system of the island upon a solid basis; of which the form (and the form alone) still remained in 1798. He divided the whole island into three parts; one he gave to his officers, another to the church, and a third he reserved for himself. Of these three branches he composed his parliament, that respectable body, of which the skeleton only now exists: for it has long ago lost all its blood, nerves, and animal spirits; and for many ages past has been reduced to a perfect caput mortuum. The superstitious tyranny of Spain has not only destroyed the national spirit of its own inhabitants, but likewise that of every other country which has fallen under its power.

OF THE EXERCISE OF CHILDREN.

OF all the causes which conspire to render the life of man short and miserable, none has greater influence than the want of proper exercise. Healthy parents, wholesome food, and proper clothing, will avail little, where exercise is neglected. Sufficient exercise will make up for several defects in nursing; but nothing can supply the want of it. It is absolutely necessary to the health, the growth, and the strength, of children.

The desire of exercise is coeval with life itself. Were this principle attended to, many diseases might be prevented. But, while indolence and sedentary employments prevent two thirds of mankind from either taking sufficient exercise themselves, or giving it to their children, what have we to expect but diseases and deformity among their offspring?—The rickets, so destructive to children, never appeared in Britain till manufactures began to flourish, and people, attracted by the love of gain, left the country to follow sedentary employments in great towns. It is amongst these people that this disease chiefly prevails, and not only deforms, but kills, many of their offspring.

The conduct of other young animals shews the propriety of giving exercise to children. Every other animal makes use of its organs of motion as soon as it can, and many of them, even when under no necessity of moving in quest of food, cannot be restrained without force. This is evidently the case with the calf, the lamb, and most other young animals. If these creatures were not permitted to frisk

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about, and take exercise, they would soon die or become diseased. The same inclination appears very early in the human species; but, as they are not able to take exercise themselves, it is the business of their parents and nurses to assist them.

Children may be exercised various ways. The best method, while they are light, is to carry them about in the nurse's arms. This gives the nurse an opportunity of talking to the child, and of pointing out every thing that may please and delight its fancy. Besides, it is much safer than swinging an infant in a machine, or leaving it to the care of such as are not fit to take care of themselves. Nothing can be more ridiculous than to set one child to keep another: this conduct has proved fatal to many infants, and has rendered others miserable for life.

When children begin to walk, the safest and best method of leading them about is by the hands. The common way of swinging them in leading-strings fixed to their backs, has several bad consequences. It makes them throw their bodies forward, and press with their whole weight upon the breast:—by this means the breathing is obstructed, the breast flattened, and the bowels compressed; which must hurt the digestion, and occasion consumptions of the lungs, and other diseases.

It is a common notion, that, if children be set upon their feet too soon, their legs will become crooked. There is reason to believe that the very reverse of this is true. Every member acquires strength in proportion as it is exercised. The limbs of children are weak indeed, but their bodies are proportionably light; and, had they skill to direct themselves, they would soon be able to support their own weight.—Who ever heard of any other animal that became crooked by using its legs too soon? Indeed, if a child be not permitted to make use of its legs till a considerable time after the birth, and be then set upon them with its whole weight at once, there may be some danger; but this proceeds intirely from a child's not having been accustomed to use its legs from the beginning.

Mothers of the poorer sort think they are great gainers by making their children lie or sit while they themselves work. In this they are greatly mistaken. By neglecting to give their children exercise, they are obliged to keep them a long time before they can do any thing for themselves, and to spend more on medicine than would have paid for proper care.

To take care of their children, is the most profitable business in which even the poor can be employed:—but, alas, it is not always in their power: poverty often obliges them to neglect their offspring in order to procure the necessaries of life. When this is the case, it becomes the interest as well as the duty of the public to assist them. Ten thousand times more benefit would accrue to the state, by enabling the poor to bring up their own children, than from all the hospitals that ever can be erected for their relief.

Whoever considers the structure of the human body, will soon be convinced of the necessity of exercise for the health of children. The body is composed of an infinite number of vessels, whose fluids cannot be pushed on without the action and pressure of the muscles. But, if the fluids remain inactive, obstructions must happen, and the humours will of course be vitiated, which cannot fail to occasion diseases. Nature has furnished both the vessels which carry the blood

blood and lymph with numerous valves, in order that the action of every muſcle might puſh forward their contents; but without action this admirable contrivance can have no effect. This part of the animal œconomy proves to a demonſtration the neceſſity of exercise for the preſervation of health.

Arguments to ſhew the importance of exercise might be drawn from every part of the animal œconomy.—Without exercise the circulation of the blood cannot be properly carried on, nor the different ſecretions duly performed: without exercise the humours cannot be properly prepared, nor the ſolids rendered ſtrong or firm. The action of the heart, the motion of the lungs, and all the vital functions, are greatly aſſiſted by exercise. But, to point out the manner in which theſe effects are produced, would lead us farther into the œconomy of the human body, than moſt of those for whom this ſlight eſſay is intended would be able to follow. We ſhall therefore only add, that, where exercise is neglected, none of the animal functions can be duly performed; and, when that is the caſe, the whole conſtitution muſt go to wreck.

ACCOUNT OF A FIERY-METEOR, SEEN IN GASCONY, IN JULY 1790; BY M. BAUDIN, PROFESSOR OF PHILOSOPHY AT PAU.

ABOUT half an hour after ten o'clock on Sunday evening, July 24, 1790, as I was walking in the court of the caſtle of Mormes, along with M. de Carrits Barbotan, the atmoſphere being perfectly calm and ſerene, and not a cloud to be ſeen, we found ouſelves ſurrounded, all of a ſudden, by a whitiſh clear light, which obſcured that of the moon, though the latter ſhone with great luſtre, as it wanted only thirty hours of being at the full. On looking upwards we obſerved, almoſt in our zenith, a fire-ball of a larger diameter than the moon. It had behind it a tail, the length of which ſeemed to be equal to about five or ſix times the diameter of the body: at the place where it was connected with the body it had about the ſame breadth, and decreaſed gradually till it ended in a point. The ball and the tail were of a pale white colour; but the point of the latter was almoſt as red as blood. The direction of this meteor, which proceeded with great velocity, was from ſouth to north.

Scarcely had we looked at it for two ſeconds when it divided itſelf into ſeveral portions of conſiderable ſize, which we ſaw fall in different directions, and almoſt with the ſame appearance as the burſting of a bomb. All theſe different fragments became extinguiſhed in the air, and ſome of them, in falling, aſſumed that blood-red colour which I had obſerved in the point of the tail. It is not improbable that all the reſt may have aſſumed the ſame colour; but I remarked only those which proceeded in a direction towards Mormes, and which were particularly expoſed to my view.

About three or perhaps two minutes and a half after, I am not certain which, as I was not reflecting upon what might be the conſequences, and therefore did not look at my watch, we heard a dreadful clap of thunder, or rather exploſion as if ſeveral large pieces of ordnance had been fired off together. The concuſſion of the atmoſphere by this ſhock was ſo great that we all thought an earthquake had taken place. The windows ſhook in their frames,

and some of them, which probably were laid to and not closely shut, were thrown open. We were informed next day, that in some of the houses at Houga, a small town about half a mile distant from Mormes, the kitchen utensils were thrown from the shelves, so that the people concluded there had been an earthquake. But, as no movement was observed in the ground below our feet, I am inclined to think that all these effects were produced merely by the violent concussion of the atmosphere.

We proceeded into the garden, while the noise still continued, and appeared to be in a perpendicular direction above us. Some time after, when it had ceased, we heard a hollow noise, which seemed to roll along the chain of the Pyrenees, in echoes, for the distance of fifteen miles. It continued about four minutes, becoming gradually more remote, and always weaker; and at the same time we perceived a strong smell of sulphur.

While we were endeavouring to point out to some persons present the place where the meteor had divided itself, we observed a small whitish cloud, which arose perhaps from the vapour of it, and which concealed from us the three stars of the great bear lying in the middle of those forming the semicircle. With some difficulty, however, we could at last distinguish these stars again behind the thin cloud. There arose, at the same time, a fresh gentle breeze.

From the time that elapsed between the bursting of the ball and the explosion which followed, I was inclined to think that the meteor was at the height of, at least, seven or eight miles, and that it fell four miles to the north of Mormes. The latter part of my conjecture was soon confirmed, by an account which we received, that a great many stones had fallen from the atmosphere at Juliace, and in the neighbourhood of Barbotan. One of these places lies at the distance of about four miles to the north of Mormes, and the other at about the distance of five to the north-north-west.

M. de Carrits Barbotan, who was at Juliac two days after, confirmed to us the truth of this circumstance; and it appeared from the accounts of several intelligent persons, highly worthy of credit, that the meteor burst at a little distance from Juliac, and that the stones which fell were found lying in an almost circular space, about two miles in diameter. They were of various sizes. I have not heard of any houses being damaged, though some of the stones fell into courts and gardens. In the neighbouring woods some branches were found broken and torn by the falling of the stones, which as they descended made a strong whistling noise that many persons heard. I was told also by people of respectability, that as the meteor proceeded in its course they heard a rushing noise and snapping, like that of electrical sparks; which appears to me very natural, though they were heard neither by myself nor M. de C. Barbotan.—Some stones were seen to fall, which, when found, weighed 18 or 20 pounds, and which had sunk into the earth from two to three feet. I was told also that some were found which weighed fifty pounds. M. de C. Barbotan procured one weighing eighteen pounds, which he transmitted to the Academy of Sciences at Paris. I examined a small stone which was brought to me, and found it very heavy in proportion to its size: it was black on the outside; of a greyish colour in the inside, and interspersed a number of small shining metallic particles. On striking it with a piece of steel, it produced

produced a few small dark red sparks, not very lively. A mineralogist, to whom a like piece of stone from the same meteor was shewn at Paris, described it as a kind of grey slag mixed with calcareous spar, the surface of which exhibited vitrified blackish calx of iron. I was told also that some stones were found totally vitrified.

This meteor was seen at Bayonne, Auch, Pau, Tarbes, and even at Bourdeaux and Thoulouse. I learned that in the last-mentioned place it excited no great attention; which is not surprising, when we consider the great distance. It appeared there only somewhat brighter than those shooting stars which are seen from time to time; and after it burst, there was heard a hollow report almost like a distant clap of thunder.

Had it been accurately observed at Auch and Pau what stars were obscured by the vapour that arose from the bursting of the meteor, the real height of it might have been thence determined with precision.

Such, says Professor Chladni, is the account given by Baudin of this meteor; the phenomena of which he endeavours to explain from accumulations in the upper parts of the atmosphere.

According to all the observations hitherto made with any accuracy on fire-balls, the height at which they were first perceived was always very considerable; and, by comparing the angles under which they were seen from different points, often nineteen German miles, and even more; their velocity, for the most part, several miles in a second; and their size always very great, often a quarter of a mile, and even more in diameter. They were all seen to fall mostly in a oblique direction: not one of them ever proceeded upwards. All of them have appeared under the form of a globular mass, sometimes a little extended in length and highly luminous; having behind it a tail, which, according to every appearance, was composed of flames and smoke. All of them burst after they were seen to move through a large space, sometimes over several districts, with an explosion which shook every thing around. In every instance where there has been an opportunity of observing the fragments that fell after they burst, and which sometimes have sunk to the depth of several feet into the earth, they were found to consist of scorious masses which contained iron in a metallic or calcined state, pure, or else mixed with different kinds of earth and sulphur. All the ancient and modern accounts, written partly by naturalists and partly by others, are so essentially similar, that the one seems to be only a repetition of the other. This conformity in accounts, the authors of which knew nothing of those given by others, and who could have no interest in fabricating similar tales, can scarcely have arisen from accident or fiction, and gives to the related facts, however inexplicable many of them may seem, every degree of credibility. In my essay on the mass of iron found by Professor Pallas in Siberia, and others of the like kind, and several natural phenomena therewith connected, I have collected the principal observations made on fire-balls and the falling of ferruginous scorious masses observed at the same time, and have given a kind of explanation, which, however romantic it may seem, yet agrees better, in my opinion, with the facts hitherto observed than any other, and is contrary to no law of nature hitherto known. Some critics, as well as others, have ridiculed my singular hypothesis, or condemned it altogether; but no one has yet confuted my principles, or given any

other explanation that corresponds so well with facts. On the other hand, I could mention several naturalists, who, as I know from their own mouths, agree with me in the essential parts of my explanation, did I not consider it improper to bring them thus forward to public notice without their express permission. The strongest objection made to my assertions is, that such a mass, from such a prodigious height, would not sink to the depth of a few feet, but to the centre of the earth. This assertion, however, contradicts itself; because such a mass is not solid, as may be concluded from the variation of its form so often remarked, and the increase of its size till it at length bursts; but consists of soft and elastic fluids, which, probably being expanded by the heat, extends to a monstrous globular form; is then supported by the atmosphere, and loses the greater part of its gravity. To this may be added, that a soft tough mass, which besides falls in a very oblique direction, would not in general sink so far into the earth as a solid mass that falls in a perpendicular direction.—The above-described meteor seems, in every point of view, to confirm my method of explanation as much as if it had absolutely taken place for that purpose. This much, at any rate, is proved, that all the phenomena which accompany fire-balls, as well as the falling of masses of ferruginous earth and sulphureous masses, observed at the same time, cannot be explained from accumulations in the upper regions of the atmosphere, as it can hardly be supposed that such gross substances could float or be dissolved in so rarefied air at a height of twenty German miles, so as to be collected and to unite into monstrous masses. As we are acquainted with no power which is able to force such large bodies to so considerable a height, and then to give them an oblique movement downwards, and sometimes almost horizontal, with a velocity which is equal to that of the planets in their orbits; and as no such mass has ever been seen to ascend; they appear not to be terrestrial, but cosmical bodies. Should this not be admitted, it is much to be wished that some other person might give an explanation consistent with the observed facts; and that more attention than has hitherto been bestowed, were paid to the observation of fire-balls and shooting stars; as for example, that observed on the 8th of March 1796 in Lusatia, and in some parts of Saxony and Brandenburg.

Shooting stars are perhaps meteors of the same nature as those telescopic sparks of light observed by Mr. Schröter, and may be different from fire-balls only in this, that they move at a much greater distance from our earth, and that they do not fall, but only occasion a transient luminous appearance in their passage through the upper regions of the atmosphere.

I shall here mention an idea which does not proceed from myself, but from a very intelligent astronomer, that shooting stars might be employed to determine the difference of two meridians. Two or more astronomers, residing at some distance from each other, might agree to make observations on shooting stars, which appear almost at all times, when the weather is clear, in some part of the heavens, not with instruments, but merely with the naked eye; and to remark, not only the time of their appearance, but also their apparent course; and, from the difference of the times of seeing these shooting stars, the difference of the meridians of the places might be determined; and, from the difference of their apparent courses, their real height and real course might be discovered.

ORIGIN

ORIGIN OF THE YELLOW FEVER IN NORTH AMERICA.

THE yellow fever, like the plague, is certainly a diſorder originating in the warm climates of Aſia or Africa, from whence both of them may be clearly traced; the plague itſelf was firſt introduced into Europe, in ſome degree, by the armies returning from the cruſades, but chiefly by commerce; for many ages it ravaged moſt of the European cities, particularly the commercial ones; in London it prevailed fourteen different times, with dreadful violence, between the reigns of Edward III. (when it was firſt introduced) and George I. when the quarantine laws were paſſed; theſe inſtitutions, which ſeem to have been generally adopted about the laſt period, have ever ſince preſerved Europe from the plague, and confined it to the countries of the Eaſt, where the warmth of climate, and manners of the people, ſtill keep it conſtantly alive.

In a ſimilar manner the yellow fever was introduced into the Weſt Indies by the African ſhips, and has now become general in the iſlands, whoſe warm climate keeps it in continual exiſtence; in time of peace, the eaſe of removing from it renders it little dreaded, and prevents its extenſion; but, during a war, when the inhabitants are confined in beſieged towns, and fleets and armies maintained in ſituations ſo favourable to diſeaſe as ſhips, camps, barracks, and hoſpitals, it rages with uncontroulable violence.

Europe is preſerved from it by the length of the voyage from the Weſt Indies, and perhaps by the fleets arriving generally in ſeaſons ſufficiently cold or damp to check it; but the immenſe commerce of the United States, with the ſhortneſs of the voyage, which is little more than a fortnight, renders the Weſt Indies to them the ſame ſource of contagion that the Levant is to Europe.

During the preſent war, though the fever has ravaged moſt of the iſlands, it has been more ſeverely felt in the French, particularly Guadaloupe and St. Domingo, which have been the principal ſcenes of military operation. With theſe iſlands the American commerce has been chiefly conducted to a degree far beyond all former times: as it conſiſted very much in carrying proviſions, it has been proſecuted to ports and fleets in ſuch ſituations as to render it impoſſible to eſcape contagion; and the veſſels in their return being generally crowded with paſſengers, with baggage, and every ſpecies of goods, have perhaps conſtantly conveyed it home: when it has arrived during the winter, or moderate ſeaſons, it has doubtleſs been deſtroyed; but during the heat of ſummer, it has produced the ravages we have heard of.

Although advantage has been taken of every circumſtance which could admit of doubt and difficulty that might be ſuppoſed to occur, in tracing the origin of the fever in ſome inſtances, from the crews of veſſels being diſperſed, or goods ſold to a variety of different perſons and places diſtant from the ſpot where they were firſt landed, ſo that the contagion might appear in many places at once, yet there is not only the moſt poſitive proofs of the introduction of it in this manner, in every inſtance where it has attacked the United States, but the ſtrongeſt collateral evidence, ariſing from the identity of the diſorder, and from a variety of other facts.

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The idea of its originating in the United States was first mentioned by a physician of Philadelphia, in 1793, who is remarkable for the eccentricity and enthusiasm of his systems, which were prosecuted almost to a degree of insanity, contrary to the general opinion of the faculty, and the good sense of the citizens at large; to these systems every fact was perverted or overlooked. Unfortunately too, the rivalship and jealousy of the other towns of the continent, for a city which was so eminently leading in its commerce and population, at first led them to attribute the fever to causes existing there, until they were themselves attacked by it, and found from whence it originated; thus the opinion has been circulated, to an extent scarcely to be reached by the numerous facts which disprove it.

In examining the origin of the yellow fever, it is necessary strictly to discriminate it from diseases of an inferior tribe, such as intermittent, bilious, and putrid, fevers, gaol fevers, and others of the like kind. These undoubtedly originate from causes immediately depending on reason, or local situation; and the cities of the United States are subject to them in the same manner, though not in a greater degree than those of Europe; but the yellow fever, which is unquestionably of the same tribe as the plague, is not only traced like that disorder, and the small pox, by a regular process of contagion, but is so different, and so far more extensive in its effects, that, whenever it has appeared, it is marked with characters which prove its entire distinction from the tribe of local diseases.

Though the yellow fever is a disorder of the same class as the plague, it is far inferior in malignity; no time or art has materially lessened the destruction of the plague, even in those countries where it constantly exists; while the yellow fever is so much reduced in the West Indies to the power of medicine, as not to be dreaded by the natives, more than other disorders, and is chiefly fatal to strangers. Its extensive effects in North America might perhaps be adduced as one proof of its novelty and origin from a foreign cause; but, even in its worst appearance, the proportion of individuals who recover is considerable; and in 1793, it was known to attack whole families, without the loss of a single person.

No regulations in Europe proved effectual to relieve its cities from the plague until quarantines were generally adopted, and many ages passed before they were established with such rigour as to render them effectual: the dreadful prevalence of the disease at Marseilles, and other towns, in the beginning of the present century, seems at last to have occasioned the present laws, which are, perhaps, the most severe and best executed of any that exist; the partial regulations of the kind in the United States have doubtless been attended with very good effects, but as yet they have never been adopted with the rigour of Europe, and evasions have been too little noticed, or punished.

The cities of the United States have now existed, many of them, near two centuries, and Philadelphia itself more than one; during this period, by clearing and cultivating the country, they have overcome all the natural disadvantages of new situations, and have decreased in local and autumnal disorders, insomuch that their bills of mortality prove them to be as healthy in general as the cities of Europe; but at no period since their existence have they been ravaged by disorders similar to the yellow fever, until within a few years

years paſt—it is impoſſible therefore to ſuppoſe, that a climate which for ſo many years, and under more diſadvantages than it now labours, could thus all at once engender diſeaſes, of which the hiſtory of mankind does not furniſh a ſimilar inſtance.

In the year 1760, during the French war, the yellow fever firſt appeared at Philadelphia, and was traced to ariſe from the clothes of a young man who died of it in Jamaica, which were ſent to his friends in Philadelphia; thoſe friends were the firſt who died of it, and, though it extended to others, its ravages were not very extenſive.

It was not afterwards known in America until the year 1793, when, in the month of June, a great number of veſſels, which were at Cape François during the dreadful capture of it by the negroes, brought away from it all the wretched inhabitants that eſcaped: many of theſe veſſels arrived at Philadelphia in July, full of paſſengers, and goods of every deſcription; in the latter end of the ſame month the fever broke out in the lodging-houſes which accommodated the crews of thoſe veſſels, and among the ſhipwrights who repaired them—ſo minutely was this fact inveſtigated, that the firſt perſons who died of it were the ſailors from thoſe lodging-houſes, and nearly all the families of one or two ſhip-carpenters in whoſe yards the veſſels were refitted.

The quarantines which were immediately eſtabliſhed, and the attention to every circumſtance that could increaſe the health of the city, and prevent communication, probably preſerved it for the enſuing four years, as it did not appear there again until 1797; in the mean time, however, other towns were attacked by it.

In 1794 it appeared at Baltimore, where it was brought by a veſſel from the Weſt Indies; it broke out, and was nearly altogether confined to a part of the town ſeated on a high point of land, and on a wide river, which forms the port, diſtant near a mile from the city itſelf, to which it was ſcarcely communicated.

In 1795 it appeared in New York, when it was alſo traced to have ariſen from a Weſt-India veſſel.

In 1797 it again appeared in Philadelphia, and was clearly traced to a veſſel from St. Domingo, as it broke out at the quay where ſhe was unladen, and among the merchants and others who were about her; on this occaſion much blame ſeems to have been imputed to the phyſician of the port, and to the want of proper vigilance in the health-officers.

During the late ſummer it has appeared, not only in Philadelphia and New York, but in many other of the commercial towns, in all of which it is not only traced to the cauſes here mentioned, but the following facts have occurred to ſupport its foreign origin:

Firſt, It has appeared in no town which has not had ſome immediate connection with the Weſt Indies.

2dly, Since the veſſels from the Weſt Indies have been prevented reaching Philadelphia, it has broke out in all the little towns and outports on the river Delaware, where they have been obliged to unlade their cargoes; while it has never appeared either in the country towns near them, or thoſe near the metropolis.

3dly, It has ravaged the ſmaller towns to which it has been thus introduced, nearly in as great a proportion as the great cities.

4thly, It has been more felt in the towns of the Middle and Northern States, in the moſt favourable ſituations, but who carry on

great trade, than in those of the Southern states, unquestionably in less healthy climates, but with less commerce.

The history of the plague, the small pox, and disorders of the same tribe, are not only regularly traced, but the best authorities agree, that they never originated in the cities of Europe, and that the causes which create the smaller diseases are not adequate to produce them; but, of all the reasons assigned for the yellow fever being of local origin, there is none which is general to the many places in which it has appeared in the United States, nor any which do not exist in a far greater degree in most European cities. Great population, crowded streets, filth, and want of common sewers, &c. if they existed in the greater towns, could not influence the smaller ones; and low or unhealthy situations cannot be attributed to those which are situated on bold promontories, and on the margin of the ocean; the climate of the United States, though hot, is not hotter than the middle and south of Europe, and it is corrected in winter by frosts far more continued and severe.

A variety of reports which have existed in Europe relative to the situations of the cities of the United States, and to their construction, are untrue, and originate either in the supposition of those who were ignorant of them, or in the misrepresentation of those who wanted other reasons to support the idea of the local origin of the yellow fever. In fact, rather than that credit should be given to the plain demonstration of its being an imported disease, numerous stories have been propagated relative to their crowded construction, want of common sewers, and other causes generally assigned as the source of disease.

New York, and all the seaport towns in the Northern States, are built on situations remarkably elevated, and exposed to the air of the sea. In their construction they are equal to any towns in Europe, and in no instances so thickly built; in general they are remarked for having few of the common autumnal complaints, and can boast, perhaps, of as high health as any towns in the world.

The city of Philadelphia is at a considerable distance from the sea; though situate on the banks of two noble rivers, it stands on a fine open plain, equally elevated as London; and the country around it, on all sides but one, rises into gentle hills, like those of Middlesex and Surry; on the river below it, are some meadows, but they are equally drained, and cultivated, and by no means so extensive, as those on the Thames around London; its water is in general excellent; its streets are wide, well paved, and perfectly drained; a considerable part of it is furnished with common sewers, and those parts to which they are not yet extended, have neither been so long, or so thickly settled, as to experience inconvenience for want of them; its houses are in general airy, and seldom contain more than one family; and the police of the city, the moral order and the cleanliness of its inhabitants, will yield to no one in Europe, if equalled by them.

After having seen most of the European cities, we cannot but adduce them as proofs against the local origin of disorders similar to the yellow fever; leaving the cities of the north of Europe, situate in climates which might be supposed in some degree to protect them, and in general of more cleanly habits, and with a better police, we shall speak more particularly of those of the south of France and Italy, especially of Marseilles, Milan, Genoa, and Leghorn. If improvements

provements have been introduced into these, they are certainly not such as have destroyed the causes usually assigned for disease, and are confined to such parts of them as are newly constructed; the narrow streets in the old parts of those towns are badly paved, and often not paved at all, these being the general receptacle of all filth, without the attention of a police to cleanse them; the want of common sewers, the height and crowded construction of the houses, the numerous families with which they are filled, the rooms seldom cleaned, and the walls covered with cotton and silk tapestry, in lieu of plaister, must have struck the attention of all who have visited them; if, then, under such unfavourable circumstances, these towns, thus situated, in one of the hottest climates, where the winters often have no frost, not only have never known either that or any disorder of the kind to originate among them, but have been able entirely to rid themselves of the plague by their quarantines, and enjoy a high degree of health ever since they were adopted, it affords the strongest arguments against the origin of the yellow fever in the towns of North America, and in favour of their being wholly relieved from it by the establishment of similar regulations.

It is clearly demonstrable, that the disease does not remain in the cities of America from one year to another, but that, in each instance, it is produced by fresh contagion; cold and rain have, in all instances, totally destroyed it, and, until 1798, it has never appeared twice in one place; in the year 1793, the 17th day of October was the most fatal to the city of Philadelphia, and yet, by the 3d of November the disorder had wholly ceased, and the inhabitants had returned as usual; in the year 1798, though so fatal in September, the citizens began to return by the last of October, and, in all instances, the rains and frosts of the autumn and winter have immediately destroyed the contagion, and restored the cities to their usual health, without leaving a trace of the disease, or any return of it in the succeeding spring.

There are many persons who, from a love of speculative theory, may endeavour to establish opposite opinions, and some, perhaps, from a wish to check the connexions with America. Already the differences among the medical faculty in America itself, both on the origin, the nature, and the treatment, of the disease, have been prosecuted with an enthusiasm and rancour, which have proved one of the severest afflictions that has accompanied it, and has robbed the unhappy sufferer of all the comfort which confidence in a physician is capable of inspiring; these circumstances should teach the world to beware of information which they receive through such channels, and rather to trust the narratives of those persons who form them with plain good sense, and an attention to facts, without having systems to establish, or interests to serve. In judging of a calamity so awfully afflicting to a country with whom we are allied by so many ties, every humane mind will listen to those opinions which are founded on facts, bear a near resemblance to our own former experience, and, above all, appear the most likely to be remedied. The unhappy inhabitants of America have already exhausted almost every effort in perfecting the internal police of their cities, until attention to cleanliness can do little more; had they been equally attentive to establish general and rigorous quarantines, in all probability they would have been ere this free from the attacks of this dreadful

diſeaſe. Inſtead, therefore, of calling away their attention to deluſive theories, we ought to ſtrengthen them in the reſolution to adopt regulations which we found effectual ourſelves, and to cheer them by the hope that theſe will, under Providence, enſure their future ſafety.

EXTRACT FROM DR. JOHNSON'S SERMON ON THE DEATH OF HIS WIFE.

TO Chriſtians the celebration of a funeral is by no means a ſolemnity of barren and unavailing ſorrow, but eſtabliſhed by the church for other purpoſes.

Firſt, for the conſolation of ſorrow. Secondly, for the enforcement of piety. The mournful ſolemnity of the burial of the dead is inſtituted, firſt, for the conſolation of that grief to which the beſt minds, if not ſupported and regulated by religion, are moſt liable. They who moſt endeavour the happineſs of others, who devote their thoughts to tenderneſs and pity, and ſtudiouſly maintain the reciprocation of kindneſs, by degrees mingle their ſouls in ſuch a manner, as to feel, from ſeparation, a total deſtitution of happineſs, a ſudden abruption of all their proſpects, a ceſſation of all their hopes, ſchemes, and deſires. The whole mind becomes a gloomy vacuity, without any image or form of pleaſure; a chaos of confuſed wiſhes, directed to no particular end, or to that which, while we wiſh, we cannot hope to obtain; for the dead will not revive; thoſe, whom God has called away from the preſent ſtate of exiſtence, can be ſeen no more in it; we muſt go to them; but they cannot return to us.

Yet, to ſhew that grief is vain, is to afford very little comfort; yet this is all that reaſon can afford; but religion, our only friend in the moment of diſtreſs, in the moment when the help of man is vain, when fortitude and cowardice ſink down together, and the ſage and the virgin mingle their lamentations; religion will inform us, that ſorrow and complaint are not only vain, but unreaſonable and erroneous. The voice of God, ſpeaking by his Son and his Apoſtles, will inſtruct us, that ſhe, whoſe departure we now mourn, is not dead, but ſleepeth; that only her body is committed to the ground, but that the ſoul is returned to God, who gave it; that God, who is infinitely merciful, who hateth nothing that he hath made, who deſireth not the death of a ſinner; to that God, who only can compare performance with ability, who alone knows how far the heart has been pure, or corrupted, how inadvertency has ſurpriſed, fear has betrayed, or weakneſs has impeded; to that God who marks every aſpiration after a better ſtate, who hears the prayer which the voice cannot utter, records the purpoſe that periſhed without opportunity of action, the wiſh that vaniſhed away without attainment, who is always ready to receive the penitent, to whom ſincere contrition is never too late, and who will accept the tears of a returning ſinner.

Such are the reflections to which we are called by the voice of truth; and from theſe we ſhall find that comfort which philoſophy cannot ſupply, and that peace which the world cannot give. The contemplation of the mercy of God may juſtly afford ſome conſolation, even when the office of burial is performed to thoſe who have been ſnatched away without viſible amendment of their lives; for who ſhall preſume to determine the ſtate of departed ſouls, to lay

open what God hath concealed, and to search the counsels of the Most Highest?—but with more confident hope of pardon and acceptance, may we commit those to the receptacles of mortality, who have lived without any open or enormous crimes; who have endeavoured to propitiate God by repentance, and have died at last with hope and resignation. Among these she surely may be remembered whom we have followed hither to the tomb, to pay her the last honours, and to resign her to the grave; she, whom many who now hear me have known, and whom none who were capable of distinguishing either moral or intellectual excellence could know without esteem or tenderness. To praise the extent of her knowledge, the acuteness of her wit, the accuracy of her judgment, the force of her sentiments, or the elegance of her expression, would ill suit with the occasion.

Let us therefore preserve her memory for no other end but to imitate her virtues; and let us add her example to the motives to piety which this solemnity was, secondly, instituted to enforce.

It would not indeed be reasonable to expect, did we not know the inattention and perverseness of mankind, that any one who had followed a funeral, could fail to return home without new resolutions of a holy life: for who can see the final period of all human schemes and undertakings, without conviction of the vanity of all that terminates in the present state? For, who can see the wise, the brave, the powerful, or the beauteous, carried to the grave, without reflections on the emptiness of all those distinctions which set us here in opposition to each other? And who, when he sees the vanity of all terrestrial advantages, can forbear to wish for a more permanent and certain happiness? Such wishes, perhaps, often arise, and such resolutions are often formed: but before the resolution can be exerted, before the wish can regulate the conduct, new prospects open before us, new impressions are received; the temptations of the world solicit, the passions of the heart are put into commotion; we plunge again into the tumult, engage again in the contest, and forget, that what we gain cannot be kept, and the life, for which we are thus busy to provide, must be quickly at an end.

But, let us not be thus shamefully deluded! Let us not thus idly perish in our folly, by neglecting the loudest call of Providence; nor, when we have followed our friends, and our enemies, to the tomb, suffer ourselves to be surprised by the dreadful summons, and die at last amazed and unprepared! Let every one whose eye glances on this bier, examine what would have been his condition, if the same hour had called him to judgment, and remember, that, though he is now spared, he may, perhaps, be to-morrow among separate spirits. The present moment is in our power; let us therefore, from the present moment, begin our repentance! Let us not, any longer, harden our hearts, but hear this day the voice of our Saviour and our God, and begin to do, with all our powers, whatever we shall wish to have done when the grave shall open before us! Let those who came hither weeping and lamenting, reflect, that they have not time for useless sorrow; that their own salvation is to be secured, and that the day is far spent, and the night cometh, when no man can work; that tears are of no value to the dead, and that their own danger may justly claim their whole attention! Let those who entered this place unaffected and indifferent, and whose only purpose was

to

to behold this funeral spectacle, consider that she, whom they thus behold with negligence, and pass by, was lately partaker of the same nature with themselves; and that they likewise are hastening to their end, and must soon, by others equally negligent, be buried and forgotten! Let all remember, that the day of man is short, and that the day of grace may be much shorter; that this may be the last warning which God will grant us, and that, perhaps, he who looks on this grave unalarmed, may sink unreformed into his own!

Let it, therefore, be our care, when we retire from this solemnity, that we immediately turn from our wickedness, and do that which is lawful and right; that, whenever disease or violence shall dissolve our bodies, our souls may be saved alive, and received into everlasting habitations.

On CONTENT. An Eastern Tale.

THAT universal discontent and disquietude, which runs through every rank and degree of life, hath been deservedly condemned by the philosophers of all ages, as one of the bitterest reproaches of human nature, as well as the highest affront to the divine Author of it. If, indeed, we look through the whole creation, and remark the progressive scale of beings as they rise into perfection, we shall perceive, to our shame and confusion, that every one seems satisfied with that share of life and happiness which its Master hath appointed for it, man alone excepted, who is pleased with nothing that his bounty imparts, unless blessed with every thing that his bounty can bestow; perpetually repining at the decrees of Providence, and refusing to enjoy what he *has*, from a ridiculous and never-ceasing desire for what he *has not*.

That object which is at a distance from us is always the most inviting: and that possession the most valuable which we cannot acquire.—With the ideas of affluence and grandeur we are apt to associate those of joy and pleasure; and, because riches and power may conduce to our happiness, we hastily conclude they must do so. The pomp, splendour, and magnificence, which attend the great, are visible to every eye; whilst the sorrows which they feel, and the dangers they are obnoxious to, escape observation.

Hence it arises, that almost every condition and circumstance of life is considered as preferable to our own; that we so often fall in love with ruin, and beg to be unhappy; we weep, in short, when we ought to rejoice, and complain when we ought to be thankful.

The sun, says an eastern sage, was sinking behind the western hills, and with departing rays gilded the spires and turrets of Golconda, when the captive Selima, from the window of the son of Nourdin's seraglio, casting a mournful look at the country which she saw at a distance, beyond the boundary of her confinement, fixed her eyes on some cottages which she could distinguish by the thin smoke ascending from them, and seemed to envy the humble condition of the lowly inhabitants. She longed to exchange her own situation for that of innocent poverty and cheerful tranquillity. Little by little the envied prospect faded on her sight, and she listened with horror to the crashing of iron bars, and the closing of the gates that surrounded her; till at length all was hushed: all became quiet as the hours of night. She then burst forth into the following soliloquy.

"And

"And was I formed a reasonable being," she cried, "for this? to be excluded for ever from society, and doomed to add one more to the slaves of the monarch of the east; have I deserved this at the hand of Providence, or merited this unequal lot from the genius of distribution? Did I ever turn my ears from the cries of the needy, or shut the open hand of mercy from the poor? Why then am I punished in this manner? Why for ever denied the blessing of mutual love, and fated to weep in vain to the walls of a prison-house? While I was a child, the angel of death closed the eyes of my parents, when as yet I knew not their loss; and a few moons ago the same minister of terror bore from my arms a sister whom I loved, to the land of silence and shadows; the rest of those that were dear to me, groan under the bonds of servitude in the mines of Agra, or traverse the great waters in the ships of India; some happier few, who have found favour in the eyes of the sultan, live only to shew me the difference between what I was and what I am; yet the remembrance of those I lost, I bore with resignation; I wept, indeed, and retired; but, as yet, I repined not. But to know no end of misery, to be kept as a witness to the luxury of those who were once our equals, is surely the worst suffering that can be inflicted. I have said to the slaves, Why will not my lord the sultan dismiss the maid whom he thinks unworthy his embraces, and whose presence will rather cast a cloud over his pomp than increase it? But they treat my tears and my remonstrances with scorn, nor are their hearts melted in them with pity: night and silence are over all the seraglio; even the horrid guards, to whose care we are resigned, are fast locked up in sleep: when, oh! when, shall I enjoy that sweet oblivion? Discontent and perpetual uneasiness of mind banish from my eyes all propensity to rest; the night only affords me an opportunity to vent my complaints, and my greatest happiness is this hour of universal repose, when I can, undisturbed and unmolested, give utterance to the sorrows of my heart."

As she pronounced these last words, the shades of darkness were suspended on a sudden, and a light diffused itself around her like the flash of mid-day. She looked up, and beheld, when Azazel, the angel of reproof, became visible to her sight. She bowed her head in the dust, and humbled herself before him. "Selima," he cried, "arise, thou misguided child of affliction! I am that genius who was with thee when thou wast as yet a child, and in my book were thy future fortunes written. I was with the angel whose ministry it was to seal the eyes of thy parents, and who laid his hands on thy sister. Under my influence wert thou brought as a captive unto Amurath from the banks of Oxus, and immured in the walls of his seraglio. Thou hast complained of thy fate; thou hast said that the eye of thy genius frowned on thy birth, and that misfortune has marked thee for her daughter: but I am come to clear thy doubts, and to direct thee where thou mayest find the mansions of rest. Let my words sink deep in thee, and engrave them in living characters on thy heart. I will take away the mist from before thine eyes, for thou knowest not what thou hast said. Thou hast lamented the fate of thy sister, who is happier than thou art, and who has her station assigned her in the realms of bliss. The situation of thy companions, who have appeared pleasing to the sultan, has been the object of thine envy; but, alas! thine is a paradise to theirs. Thou hast repined

pined at that ſolitude which, hadſt thou made a right uſe of it, would have taught thee to know thyſelf; and haſt grieved that thou wert not born to that beauty which thouſands poſſeſs, and which would have been to thee a puniſhment inſtead of a bleſſing. I will now ſhew thee what, but for my interpoſition, would have been thy own deſtiny, had this thy laſt, thy preſumptuous, wiſh been crowned with ſucceſs; hadſt thou been bidden in thy turn to deck with oriental pomp the bed for Amurath, and repoſe on the ſilken pavilions in the inner chambers of the palace. Turn thyſelf to the eaſt, and view there what I ſhall explain to thee."

She turned, and beheld a woman ſeated on a throne, ſurrounded with every circumſtance of eaſtern magnificence. She was as fair as one of the Houries, and ſparkling in the gold of Hindooſtan, and the diamonds of Surat. In her preſence every tongue was dumb, every knee bended with fear, and every eye was fixed on the ground; yet ſhe ſeemed to receive the adorations of the crowd with coldneſs, nor was her eye glad at the approach of her lord; ſhe ſeemed alone as to herſelf, though amidſt wondering thouſands, and with ten thouſands at her feet.—"View her yet again," he ſaid, "Selima, as the crowd retiring leaves her in her cloſet; and what happineſs does ſhe ſeem poſſeſſed of, that thou wouldſt wiſh to be thine. Does not that gloom that hangs on her brow owe its being to fear? Is ſhe not conſcious that treachery or chance can in a moment bring her licentious happineſs to an end? and guilt, that viper in her boſom, deſtroys all reliſh for pleaſure, and points out to her the vanity of all joys that have not virtue for their foundation. But ſee, the guards ruſh in at this moment to ſeize her, and accuſe her of having conſpired the death of her lord.—Mark how the ſplendid apartments and alcove of pleaſure diſappear, and in their ſtead the joyleſs gloom and grated windows of a priſon.—Now ſhe is hurried in, they throw the black robe of death upon her; in vain does ſhe now think of command, in vain wave that hand, which a few hours before would have ſtilled the raging of the people, and humbled the rulers of the world. She now begs to be heard, and has recourſe, as her laſt aids, to intreaty, tears, and proſtration, but in vain: ſhe is dragged down on the rocky pavement by the hands of ſlaves, who offer her the diſmal alternatives of the poiſoned cup, or the ſabre.—She drinks; and ſee, ſhe ſinks, yet and yet paler, to the earth.—See the laſt convulſive ſtruggle, the dying gaſp, and the ſigh that rends the heart in the laſt agony.—Scarcely is there a pauſe: they ſtrip the yet warm body, denied to be joined in burial with the queens of the land, and expoſe it for a prey to the eagle and vulture.—Such, ſhort-ſighted maid, would have been thy lateſt hour; and thy end would have reſembled hers. Bear, then, thy preſent fate without repining, nor daſh the cordial which hope preſents thee to the ground, but wait with patience for a happier hour. Their lot only may be called miſerable whoſe faces were never covered with ſhame, and who go down unrepenting to the grave.—Hope is yet thine, which can turn the walls that confine thee to the bower of content; then ſay not in thine heart, that thy portion here is with the wretched, nor, by wiſhing to alter the allotment of Providence, provoke the anger of a power infinitely greater than mine, which can cruſh thee to atoms at a blow."

When

When the genius had spoken these words, he stretched out his arm over her, and she sunk down on a sofa into the arms of sleep, from which she awoke in the morning with a conviction of the injustness of her repinings, and with a perfect resignation to the lot which had been assigned to her in the terrestrial abode of life.

ACCOUNT OF THE ZEBRA.

THE zebra has been mistaken by many authors for the wild ass, though it is quite a different animal. They are very common in the southern parts of Africa, even as far as the Cape of Good Hope; but there are none in the northern. They are by some esteemed the most beautiful quadruped yet known.

The male zebra is about the size of a mule, and its general shape is like that of a well-made horse; except the ears being a little longer, but not quite so long as those of the ass; the mane short, not hanging down like a horse's, but erect; and the muzzle of a dusky colour. The head is streaked with fine stripes of black and white, which in a manner centre in the forehead; the ears are also variegated with white and dusky brown; and the neck has broad stripes of the same dark brown running round it, which takes in the mane, leaving narrow white stripes between them. The body is striped also across the back with broad bars, leaving narrow spaces of white between them, and ending in points on the sides of the belly, which is white, except a black line pectinated on each side, reaching from between the fore-legs along the middle of the belly two thirds of its length. There is a line of separation between the trunk of the body and the hinder quarters on each side, behind which, on the rump, is a plat of narrow stripes joined together by a stripe down the middle of the rump to the end of the tail, forming the figure of a fish-bone. The tuft at the end of the tail is dark brown; and on the outsides of each thigh are drawn obliquely three bars of brown ending roundish at both ends. The tail is rather like the ass's than the horse's; having short hair on it, except that at the end it has a long tuft; its under side is white; the legs are all encompassed with rings of white and brown, alternately in an irregular and broken manner. It is hoofed like a horse, and the feet are brown a little way above the hoofs; all the marks are of a dark blackish brown, and all the spaces between them are white; they herd together in great droves, and are not very easily caught or tamed; however, some have actually been tamed, as appears from the female zebra that was in the possession of the late Prince of Wales, at Kew; of which here follows the description. This animal was brought alive, together with the male, from the Cape of Good Hope, and her general colour, exclusive of the stripes, which were all black, was of a bright bay on the head, neck, upper part of the body, and thighs; but the belly, legs, and the end of the tail, were white. On the joints of the legs it had such corns as we see on horses, and the hoofs were blackish. The head was striped a little different from that of the male, and the mane was black and white; the ears were of a bay colour, and there was a little white on the forehead, with several broad stripes round the neck, which became narrow on its under side; it had a black list running along the ridge of the back and part of the tail, and another along the

middle of the belly; the ſtripes on the body proceeded from the lift on the back, and ſome of them ended in forks on the ſides of the belly, others in ſingle points, and theſe had ſome longiſh ſpots between them. The upper part of the body was ſpotted in a more irregular confuſed manner, and the two ſides were marked very uniformly. The noiſe it made was much different from that of an aſs, reſembling more the confuſed barking of a maſtiff-dog: it ſeemed to be of a ſavage and fierce nature; for no one would venture to approach it, but a gardener in the prince's ſervice, who was uſed to feed it, and could mount on its back: it would eat fleſh, or any kind of food they offered it; and though it feeds naturally, as horſes and aſſes do, on vegetables, yet this, like them, was taught to live upon different food; and it is remarkable enough, that horſes themſelves may eaſily be taught to drink milk, eat eggs, and ſuch-like ſubſtances.

HISTORY OF POETRY.—*Suppoſed to have been written by Dr. Swift.*

SIR, in obedience to your commands, I here ſend you the following ſhort Eſſay towards a Hiſtory of Poetry in England and Ireland. At firſt it was a ſcience we only began to CHAW SIR. A hundred years after, we attempted to tranſlate out of the Pſalms, but could not our STERN-HOLD. In Queen Elizabeth's reign, I think, there was but one DI-SPENCER of good verſes; for his patron, though a great man, IS HID NIGH by the length of time. Yet, a little before her death, we attempted to deal in tragedy, and began to SHAKE SPEARS; which was purſued under King James I. by three great poets, in one of them in many a line ſo ſtrong, that you might make a BEAM ONT; the ſecond, indeed, gives us ſometimes but FLAT CHEER, and the third is BEN-ding a little to ſtiffneſs.

In the reign of King Charles I. there was a new ſucceſſion of poets; one of them, though ſeldom read, I am very fond of; he has ſo much ſalt in his compoſitions, that you would think he had been uſed to SUCK-LING: as to his friend, the author of Gondibert, I'D AVE AN AUNT write better. I ſay nothing againſt your favourite, though ſome cenſure him for writing too COOLY; but he had a rival whoſe happier genius made him ſtand like a WALLOR a pillar againſt cenſure.

During the Uſurpation we fell into burleſque; and I think whoever reads Hudibras, cannot BUT LEER. I have COT ONE more, who traveſtied Virgil, though not equal to the former.

After the Reſtoration, poets became very numerous; the chief, whoſe fame is louder than a MILL-TONE, muſt never be forgot. And here I muſt obſerve, that poets in thoſe days loved retirement ſo much, that ſometimes they lived in dens. One of them in a DRY DEN: another called his den his village, or DEN-HAM; and I am informed that the ſorry fellow, who is now Laureat, affects to USE-DENS ſtill: but, to return from this digreſſion, we were then famous for tragedy and comedy; the author of Venice Preſerved is ſeldom O'T AWAY; yet he who wrote the Rival Queens, before he loſt his ſenſes, ſometimes talked MAD-LEE. Another, who was of Ireland, went into England, becauſe it is more SOUTHERN, and he wrote tolerably well. I ſay nothing of the Satiriſt, with his OLD-DAM' verſes. As for comedy, the Plain Dealer, WHICH EARLY came into credit, is allowed on all hands an excellent piece: he had a dull contemporary, who

who sometimes shewed humour, but his colouring was bad, and he could not SHADE-WELL. Sir George, in my opinion, out-did them all, and was sharp at EITHER-EDGE. The Duke is also excellent, who took a BOOK IN GAME, and turned into ridicule, under the name of the Rehearsal. It is, indeed, no wonder to find poetry thrive under the reign of that prince; when, by one of his great favourites who was likewise an excellent poet, there was a DORE-SET open for all men of wit. Perhaps you WILL-MUTT'er, that I have left out the Earl of Rochester; but I never was one of his admirers.

Upon the Revolution, poetry seemed to decline; however, I shall FRY O'R as many poets as I can remember. Mr. Montague affected to be a patron of wit, and his house was the poets HALL-I-FAX for several years, which one of them used to STEP-NIGH every day. Another of them, who was my old acquaintance, succeeded well in comedy, but failed when he began to CON GRAVE subjects. The rest came in a ROW.

The author of the Dispensary had written nothing else valuable, and therefore is too small in the GARTH. But may not a man be allowed to ADD IS OWN friend to the number? I mean the author of Cato.

To mention those who are now alive, would be endless; I will therefore only venture to lay down one maxim, that a good poet, if he designs to TICKLE the world, must be GAY and YOUNG; but, if he proposes to give us rational pleasure, he must be as grave as a POPE.

OF THE PRIMITIVE GRECIAN ARCHITECTURE.

THIS style of architecture is commonly called *Doric*, but might more properly be called *Grecian*, as being the only style employed, either in Greece, or its European colonies, prior to the Macedonian conquest; when all the distinctive characteristics of the different nations, which became incorporated in that empire, were, by the policy of the conqueror and his successors, gradually blended and lost in each other. Hence, from the combined tastes and habits of different countries, arose fanciful and capricious designs and compositions; and that restless desire of novelty, which has always been the bane of true taste. Prior to that period, all the temples of Greece, Sicily, and Italy, appear to have been of one order, and of one general form; though slightly varied in particular parts, as occasional convenience or local fashion might chance to require.

This general form was an oblong square, of six columns by thirteen, or eight by seventeen, inclosing a walled cell, small in proportion, which, in some instances, appears to have been left open to the sky, and in others, covered by the roof which protected the whole building. When the span of this roof was very wide, there appears in early times to have been a row of columns in the middle to support the rafters; the art of constructing any thing on the principle of an arch, even in wood, being then unknown. This seems to have been the case with all buildings of considerable magnitude in the time of Homer; who, in the Odyssey, frequently speaks of columns in the middle of the room; though, in a passage of the Iliad, he mentions the fixing of rafters for a roof, so as to form an angle, and support each other.

The ornamental part of this architecture (the Doric), or that which properly distinguishes it as an order, is extremely simple, and such as necessarily resulted from the mechanism of the structure. The columns represented posts, or trunks of trees, placed on a basement of stone, to prevent them from sinking into the ground, or being decayed by the wet, and they were regularly tapered from the bottom to the top, as trees are by nature: channels, or flutes, were cut in them, to hold the spears or staves which the early Greeks always carried: and on the tops were placed round stones, to protect them from the rain; and above, square ones, to receive the beam which supported the rafters of the ceiling. This beam became the architrave; while the ends of the rafters resting upon it, being scored or channelled to prevent the rain from adhering to them, became the triglyphs; the drops of which represent the drops of water distilling from them. The cornice was the projecting part of the roof; and the blocks, the ends of the rafters which supported it. Some of these decorations, indeed, though employed at first merely as the natural result of the most obvious and primitive mode of building, were afterwards adapted, by slight alterations, to that symbolical language, which all the ornaments of the sacred buildings of antiquity were intended, in different modes, to express; but as the explanation of this belongs rather to the religion than the architecture of those times, it forms no part of the present subject. Our modern sophists have questioned all the accounts of the energy, power, and population, of the ancients; and thus endeavoured to subvert all the authority of ancient history. The learned and elaborate essay of a late very acute and ingenious sceptic (Hume) on this subject, is well known; but without entering into any critical discussions concerning the corruptions of texts, or the uncertainty of numerals in the Greek historians; or repeating any of the common-place accusations of their dispositions to exaggerate; we may, in answer to all the sceptical reasoning that human ingenuity can produce, point to the vast remains of splendour and power in the mouldered ruins of their public buildings; not only in the great ruling states, such as Athens, Corinth, and Syracuse; but in little obscure republics, such as Pæstum, Segesta, and Selinus, whose names alone can be gleaned from history by the diligence of the antiquary; yet has the last and most obscure of these little states, left buildings, which surpass in size, strength, and solidity of the construction, not only all that the greatest potentates of modern times have been able to accomplish; but all that was ever produced by the unlimited resources and unlimited despotism of the Roman emperors. The portico of the great temple of Selinus, in Sicily, which is one of the six still remaining, prostrate and in ruins, on the site of that city, consisted of a double peristyle of eight columns in front, and seventeen in depth; each of which was ten feet in diameter, and fifty feet high.

Were it not for such remaining testimonies as these, of which we now offer examples to the public, the measurements of buildings, given by Herodotus and Diodorus, would have been deemed as fabulous as their military musters or civil computations. We should have been asked triumphantly, Whence came the artists, tools, and provisions? or from what resources did little barren states, destitute alike of any foreign trade, or foreign dominions, that we know or ever heard of, find means to maintain, in unproductive labour, such

such immense numbers of hands as such buildings must necessarily have required?

To this we could have given no answer; and can give none now, but by pointing to the vast piles that still resist the destructive waste of time, and more destructive malignity of man; and bidding them attest the truth, and vindicate the character of venerable historians from the cavils of that petulant ingenuity, which is ever labouring to perplex where it cannot instruct, and to thicken darkness where it cannot diffuse light. We do not pretend, however, to assert that all these great structures were the separate works of the particular states, in whose territory we find them: on the contrary, we know that the Greeks had many cathedral or amphictyonic temples, each built and kept up at the common expence of several confederate states; who at stated times offered joint sacrifices at it, and held meetings to confer on their joint interests. Such were those of Delphi, Delos, Ephesus, Olympia, Eryx, &c. and perhaps that of Jupiter Nemæus, of which the remains, situated in the ancient territory of Argos, are here published. The first belonged to all Greece; and, by the fame of its oracle, collected contributions from all the neighbouring countries both of Europe and Asia. The second belonged to the Ionians; who in the earliest times held their general assemblies there, under the protection of the guardian deity Apollo, for the purposes of business, devotion, and pleasure. All complaints and accusations of one state against another, were heard and settled by arbitrators; joint sacrifices and votive presents were offered to the gods; and feats of strength, trials of skill, and efforts of genius, were displayed by the pugilists, the wrestlers, and the poets.

OF THE ANCIENT GREEK AND ROMAN THEATRE.

ARISTOPHANES reflects on the Athenians for tumultuously crowding and pushing each other to obtain a seat on the front rows or places nearest to the orchestra, which in the Grecian theatre was the place for the chorus; and adjoining to this, somewhat elevated, the proscenium, answering to our stage, on which in early times a platform was raised, where the responses of the actors replying to the chorus were delivered. This part of the theatre was covered. Beyond the stage was the scene itself, richly decorated with ornaments of architecture, bas relievos, and painting. Near to the theatre were usually porticoes, temples, and basilicas. At Rome, for many ages, the theatres were temporary structures of wood, raised at the expence of the ædiles, or other candidates for popular favour, and renewed as occasion required. Even the permanent theatres of Pompey, Balbus, and Marcellus, seem to have been constructed for the exhibitions of the gladiators, rather than for the use of the stage. Suetonius, in the life of Augustus, relates, that, when the emperor assigned to each order its place, the women were allowed to see the games only from the upper portico; and that afterwards they were absolutely prohibited from entering the theatre; it not being decent for them to assist at such representations. These regulations were however soon laid aside. Juvenal, in his sixth satire, speaks of the ardour with which the women in his time crowded to the gymnastic exercises.

Calphurnius

Calphurnius Siculus, in an eclogue which has been preſerved entire, introduces a country-man, who for the firſt time having been preſent at the games, on his return to Rome relates to a neighbour the wonderful ſights with which he had been entertained. Many particulars worthy of notice, and explanatory of theſe ſtructures, are to be met with in his poem.

In the amphitheatre of Veſpaſian the entrances were diſtinguiſhed by numbers cut on the ſtone over each arch. Of theſe arches, eighty in number, thirty ſtill remain on the north ſide with the figures entire, excepting on one arch only, where they are wanting. It has been ſuppoſed that this entrance was reſerved for the emperor and his ſuite. At the dedication of the building by Titus, each order of the ſtate had its fixed place. To the college of the Arvals, or prieſts of Romulus, were certain ſeats appropriated, which are noticed in an inſcription publiſhed by Marangoni, in his deſcription of this amphitheatre, which was already verging to a ſtate of decay in the time of Theodoric; the ſtones which had fallen being uſed as materials for repairing the walls of Rome.

CULTIVATION OF THE RUTA BAGA, OR SWEDISH TURNIP.

RUTA baga is a moſt valuable vegetable, notwithſtanding all that has been ſaid and written to the contrary. Hitherto the failure of the crop may be aſcribed to the mode in which it has been attempted to be cultivated; having been, for the moſt part, ſown on a ſmall plot of ground, and afterwards tranſplanted like cabbages. The abſurdity of this method is extremely obvious, as the time of removing the plants falls to be about the latter end of June, when there is commonly a ſevere drought; they are long in taking root, and from the check they receive they ſeldom recover throughout the whole ſummer. This is beſides an expenſive mode of proceeding, and it is frequently altogether impracticable from ſcarcity of hands. Theſe objections ſuggeſted the idea of ſowing them in every reſpect as is commonly done with the field-turnip, only a few days earlier; the reſult for years has uniformly demonſtrated the utility of this method. We always ſow them about the firſt of June, on drills twenty-ſeven inches apart, and allow them ultimately ten inches aſunder in the drills.

We have often ſeen crops that might be ſaid to be entirely loſt, upon fields admirably adapted to the growth of turnip, for no other reaſon than too thin ſowing. This appears to be not only a great, but alſo a general, error. It has been often ſaid, that one pound of ſeed is ſufficient to ſow an acre; but after repeated trials, and the faireſt experiments. I have uniformly found, that three time this quantity is little enough. There cannot be a doubt, that, if all the ſeeds contained in one pound were to grow, there would be great abundance; but they are liable to fail from ſo many cauſes, that ſo ſmall a quantity can never be depended on; beſides, the value per lb. is ſuch a trifle, that it ſeems abſurd in the higheſt degree to be ſparing of it, when it can be the mean of ſecuring ſuch a valuable crop.

It may not be unneceſſary here to obſerve, that the ſame machine that ſows the common will not anſwer for ſowing the Swediſh turnip: the reaſon is, the ſeeds of the former being ſmaller, require the apertures, or holes, to be leſs than that for ſowing the latter. Hence, what

what would sow the one too thick, would sow the other too thin. To avoid the perplexity, therefore, attending the altering the machine to accommodate either of the seeds, we have two exactly similar, except the width of the apertures.

So soon as the turnips begin to appear, they are always, more or less attacked by the fly;—a most destructive vermin! Many remedies have been recommended for destroying this insect. Thick sowing, however, seems to be as rational a one as any I have ever seen, and the only one I ever apply, together with rolling the ridges when the plants are five or six days above ground. This is but seldom performed, having never known an instance of it; but nevertheless is very necessary, as it not only displaces many of the insects, but destroys others, and renders the surface perfectly smooth, which tends to keep out the drought, whereby the growth of the plants is greatly promoted.

The Swedish turnip appears to possess three great advantages, to which the common seems to have no claim, viz. 1. They resist the utmost severity of the winter; 2. Are longer in running to seed; and, 3. The produce is more abundant.

They resist the utmost severity of the winter rains and frost. A complete proof of this we had in winter 1795. Seven acres of turnip were all in one field, of which one, exactly in the centre, was Swedish. The whole six acres of common, may be said to have been totally destroyed by the frost, while not one of the ruta baga was in the smallest degree damaged. A more substantial proof of their durability cannot reasonably be expected.

They are longer in running to seed, in spring, than the common turnip, which may be considered a great advantage, as thereby the green food for cattle is continued till the grass. I am writing this paper on the 16th of April 1798,—the grass considerably advanced, and have still on hand upwards of forty tons of the Swedish turnip in high perfection.

Any given quantity of the Swedish turnip, not only feeds better than the common, but their produce is also greater, upon a given quantity of ground. We have frequently from forty to fifty tons per acre, of the field turnip; but have seldom less than sixty of the Swedish, and in 1797 the whole crop was upwards of 72 tons.

It seems to be an opinion founded in error, that black cattle are not fond of this kind of turnip; and that the hardness of their texture is produced as a proof by those who maintain this doctrine. That they are longer in eating as much as satisfies them, we allow; but that they are less fond of them ultimately, we never could discover.—These observations equally apply to sheep.

Whilst we are anxiously endeavouring to excite attention to the more extensive cultivation of this vegetable, by enumerating some of its advantages, we are not inclined to ascribe virtues to it which by no means it is entitled to. To assert, as has been done, that this, or indeed any other of the same tribe, is as fit for the purposes of nutrition, after it has been exhausted by running to seed, appears altogether incomprehensible, and not warranted by experience.

BARNTON, *Sept.* 3, 1798.

CAUSES

CAUSES AND CURE OF BALDNESS.

THE word used by the learned for the falling off of the hair is *alopecia*, from αλωπηξ, *a fox*, because a fox is subject to a distemper which resembles it. It is called also *capillorum defluvium*, *athrix*, *depilis*, and *phalacrotis*; when particularly on the sinciput, *calvities* and *calvitium*; which Galen says is owing to a defect of moisture. When the bald part is smooth and winding, like the track of a serpent, it is called *ophiasis*; but the general name of all the different appearances of bald places is *area*, which name is taken from the area in a garden, a spot on which not any thing grows; though Blanchard says, that the hair falls off areatim, by shedding; whence, in general, this disease is called *area*.

These disorders seem to have been more common among the ancients than they are in our days. Celsus says, that the alopecia comes at any age, but the ophiasis only affects infants; and Sennertus observes, that they both are common to all ages, though they are most frequently met with in childhood, and often succeed the tinea, achores, and favi. The cause is a faulty humour that destroys the roots of the hair, and that sometimes only perverts the humour that nourishes them, in which case the hair turns white, yellow, &c. according to the different quality of the morbid humour. Galen says, that eating mushrooms may cause that bad quality in the humours which produces these disorders; and also that malignant and contagious diseases of various kinds may produce the same effect.

The alopecia spreads itself on the beard, as well as on the hairy scalp, and is irregularly formed. The ophiasis usually begins at the back part of the head, and creeps about the breadth of two fingers, till it hath extended its two heads to both the ears, and sometimes to the forehead, till both heads meet in one. The ophiasis seems to be more malignant than the alopecia, since that in it not only the roots of the hair, but also the cuticle is corroded as far as the roots reach; the skin also changes its colour, and is sometimes pale; at others, darker coloured; and, if pricked, a serous blood issues out. These disorders differ from the tinea: in the latter the excoriations and exulcerations are deeper, and often the hair does not grow again. In infants these disorders commonly go off as age advances; but in adults, the cure, especially of the ophias, is very difficult. If the part does not grow red by friction, a cure is vainly attempted; but, in proportion as a redness appears readily on rubbing the part, the cure may be expected to be easy and soon effected. If a leprosy is the cause, the case is incurable. The best prognostic is when hairs begin to push out on the edges of the areas.

As to the cure, if any other disease attends, begin by removing it; which done, it often falls out that the alopecia, &c. depending thereon, is removed also. Before the hair falls off, if signs of the approaching disease attend, gentle repellents and corroborants may be used; but if the disease is formed, repellents must be omitted; the head must be shaved, then washed with ley in which is infused the abrotanum and such-like herbs, after which let the part be rubbed with a flannel or other coarse cloth until the skin grows red; this done, applications of mustard, white lily roots, nitre, tar, and ashes of southern-wood, may be directed; or, wash the head every

night at going to bed with a ley prepared by boiling the ashes of vine-branches in red wine. A powder made by reducing hermodactyls to fine flour, is also recommended for the same purpose. In cases where the baldness is total, a quantity of the finest burdock roots are to be bruised in a marble mortar, and then boiled in white wine until there remains only as much as will cover them. This liquor, carefully strained off, is said to cure baldness, by washing the head every night with some of it warm. A ley made by boiling ashes of vine-branches in common water is also recommended with this intention. A fresh-cut onion, rubbed on the part until it be red and itch, is likewise said to cure baldness. A multitude of such remedies are every where to be found in the works of Valescus de Taranta, Rondeletius, Hollerius, Trincavellius, Celsus, Senertay, and other practical physicians.

STRICTURES ON ALPHABETS.

THE word *alphabet* is derived to us from the French, who spell it just as we do; and comes from *alfabeto*, Ital. *alfhabëto*, Sp. of *alphabetum*, Lat. q. d. alpha, αλφα, beta, βητα, Gr. of אלף, Heb. he taught, whence אלוף, a leader or first of a company. The number of letters is different in the alphabets of different languages. The English alphabet contains 24 letters; to which if we add *j* and *v* consonant, the sum will be 26: the French contains 23; the Hebrew, Chaldee, Syriac, and Samaritan, 22 each; the Arabic, 28; the Persian, 31; the Turkish, 33; the Georgian, 36; the Coptic, 32; the present Russian, 41; the Greek, 24; the Latin, 22; the Sclavonic, 27; the Dutch, 26; the Spanish, 27; the Italian, 20; the Ethiopic and Tartarian, each 202; the Shanscrit, 50; the Indians of Bengal, 21; the Bramese, 19. The Chinese have, properly speaking, no alphabet, except we call their whole language by that name; their letters are words, or rather hieroglyphics, amounting to about 80,000. The Americans had no letters when that country was discovered by the Spaniards. The Acaanibas engrave a representation of their memorable events and epochas on stones and metals; their songs supply the rest. In Peru, and Chili, to keep an account of their goods and chattels, and to preserve the memory of their particular affairs, the Indians have recourse to certain knots of wool, which, by the variety of their colours and ties, serve instead of characters and writing. The knowledge of these knots, which they call *quipos*, is one of their great sciences; but which is always kept as a secret, and never revealed to the children till the fathers think themselves at the end of their days.

It has been a matter of considerable dispute whether the method of expressing our ideas by *letters*, be really a human invention; or whether we ought to attribute an art so exceedingly useful to an immediate revelation from the Deity; an enquiry into which we shall not enter here. Alphabets were not contrived with design, according to the just rules of reason and analogy; but have been successively framed, altered, &c. as occasion offered. And hence many grievous complaints as to their deficiencies, and divers attempts to establish new and more adequate ones in their places. Bishop Wilkins charges all the alphabets extant with great irregularities, with respect both to the order, number, figure, power, &c. As to the order, it appears inartificial,

inartificial, precarious, and confused; because the vowels and consonants are not reduced into classes, with such orders of precedence and subsequence as their natures will bear. Even the Hebrew order is not free from this imperfection. As to number, they are both redundant and deficient. Redundant either by allotting several letters to the same power and sound, as in the Hebrew ס and ש, and the ordinary Latin *c* and *k*, *f* and *ph*; or by reckoning double letters among the simple elements of speech, as in the Hebrew ע, the Greek ξ and ψ, the Latin *q* (cu), *x* (cs), and the *j* consonant, or jod. Deficient in divers respects, especially in regard of vowels, of which there are seven or eight kinds commonly used, though the Latin alphabet only takes notice of five, whereof *i* and *u*, according to our English pronunciation, are not properly vowels, but dipthongs. Add to this, that the difference among vowels, in respect of long and short, is not sufficiently provided for. The ancients, we know, used to express a long vowel by doubling its character, as *amaabam*, *naata*, *ree*, *seedes*, *sanctissimiis*; though the vowel *i*, instead of being doubled, was frequently lengthened, as ÆDILIS, PISO, VIVUS. The ways used in English for lengthening the abbreviating vowels, viz. by adding *e* mute to the end of a syllable in order to prolong it, and doubling the following consonants for the shortening of a vowel, as *wane wann*, *ware warr*, &c. or else by inserting some other vowel for the lengthening of it, as *meat met*, *read red*, &c. are all improper, because the sign ought ever to be where the sound is. As to their powers, again, these are not always fixed to the same signification: the vowels, for instance, are generally acknowledged to have each of them several sounds. Thus the power of the vowel *e* is expressed in writing no less than six different ways, viz. by *e*, as in *he*, *me*, *she*; by *ee*, in *three*, *free*; by *ie*, in *field*, *yield*, *chief*; by *ea*, in *near*, *dear*, *hear*; by *eo*, in *people*; by *i*, in *privilege*. So is the power of the vowel *a*; as in *all*, *aul*, *aw*, *fault*, *caught*, which are only various ways of writing the same long vowel; besides the other distinct ways of expressing the same vowel when used short. The power of *o* is written five ways; *o*, as in *to*, *who*, *move*; *oe*, as in *doe*; *oo*, in *moon*, *noon*; *ou*, in *could*, *would*; *wo*, in *two*; and so of the rest. Nor are the consonants of more determinate powers; witness the different pronunciation of the same letter *c* in the same word *circo*, and of *g* in *negligence*. To say no more, the letters *c*, *s*, and *t*, are used alike to denote the same power; and the letter *s* is commonly used for *z*; and, which is yet worse, some letters of the same name and shape are used at one time for vowels, and at another for consonants, as *j*, *v*, *w*, *y*. From this confusion in the power of letters there arise divers irregularities; as, that some words are distinguished in writing which are the same in pronunciation, as *cessio* and *sessio*, &c. and others are distinguished in pronunciation which are the same in writing. Hence also the Latin *malé* is a dissyllable, and the English *male* a monosyllable. The names also in most alphabets are very improperly expressed by words of divers syllables, *alpha*, *beta*, &c. in which respect the Roman and English alphabets, which only name the letters by their powers, have greatly the advantage over the rest. Lastly, their figures are not well concerted; there being nothing in the characters of the vowels answerable to the different degrees of apertion; nor in the consonants analogous to the agreements or disagreements thereof.

The

The learned author of Hermes informs us, that to about twenty plain elementary ſounds we owe that variety of articulate voices which have been ſufficient to explain the ſentiments of ſuch an innumerable multitude, as all the paſt and preſent generations of men. Mr. Sheridan ſays, that the number of ſimple ſounds in our tongue are twenty-eight; while Dr. Kenrick inſiſts, that we have only eleven diſtinct ſpecies of articulate ſounds, which even by contraction, prolongation, and compoſition, are increaſed only to the number of ſixteen; every ſyllable or articulate ſound in our language being one of the number. Biſhop Wilkins and Dr. William Holder ſpeak of thirty-three diſtinct ſounds.

After the decompoſition of language into the elementary ſounds, the next ſtep towards the notation of it by alphabetical characters, would be the delineation of a ſeparate mark or letter to repreſent each ſound; which marks, though few in number, would admit of ſuch a variety of arrangements and combinations, as might be capable of producing that infinity of articulate ſounds which compoſe language. The ingenious Wachter, in his Natura et Scriptura Concordia, p. 64, endeavours to ſhew, that ten marks or characters are ſufficient for this purpoſe. His ſcheme is as follows:

Genus.	*Figura.*	*Poteſtas.*
Vocal	O	a. e. i. o. u.
Guttural	O |	k. e. ch. q. g. h.
Lingual	∠	l.
Lingual	Γ	d. t.
Lingual	⊃	r.
Dental	⊓	f.
Labial	3	b. p.
Labial	ᗰ	m.
Labial	⊏	s. ph. v. w.
Naſal	Λ	n.

If this be the caſe, then the moſt ſimple alphabet, which conſiſted only of thirteen letters, muſt have been abundantly ſufficient to anſwer all the purpoſes of mankind, and much of our twenty-four letter alphabet may appear ſuperfluous. That able mathematician Tacquet has calculated the various combinations of the twenty-four letters, even without any repetition, to amount to no fewer than 620,448,401,733,239,439,360,000; while Clavius makes them only 5,852,616,738,497,664,000. Either of theſe numbers, however, is

infinite to the human conceptions, and much more than sufficient to express all the sounds that ever were articulated by man. As there are more sounds in some languages than in others, it follows of course, that the number of elementary characters or letters must vary in the alphabets of different languages. The following is the scheme of the English alphabet, as given by Mr. Sheridan in his Rhetorical Grammar, p. 9.

Number of simple sounds in our tongue, 28.

3	1	2	3	2	3	1	1	1		
a	a	a	e	o	o	e	i	u	w	y
hall	hat	hate	beer	note	noose	bet	fit	but	short oo	short ee

19 *Consonants*, { eb ed et eg ek el em en ep er es et ev ez eth eth esh ezh ing

2 *Superfluous*, *c*, which has the power of *ek*, or *efs*; *q*, that of *ek* before *u*.

2 *Compound*, *j*, which stands for *edzh*; *x*, for *ks* or *gz*.

1 *No letter*, *h*, merely a mark of aspiration.

Consonants divided into Mutes and Semivowels.

6 *Mutes* eb ed eg ek ep et.

3 *Pure Mutes*, ek ep et. 3 *Impure*, eb ed eg.

13 *Semivowels, or Liquids.* } ef el em en er efs ev ez eth eth esh ezh ing.

9 *Vocal*, el em en er ev ez eth ezh ing.

4 *Aspirated*, ef efs eth esh.

Divided again into

4 *Labial*, eb ep ev ef.

Dental, ed et eth eth ez efs ezh esh.

4 *Palatine*, eg ek el er.

3 *Nasal*, em en ing

Mr. Sheridan observes, that our alphabet is ill calculated for the notation of the English tongue, as there are many sounds for which we have no letters or marks: and there ought to be nine more characters or letters to make a complete alphabet, in which every simple sound ought to have a mark peculiar to itself. The reason of the deficiency is, that the Roman alphabet was formerly adopted for the notation of the English language, though by no means suited to the purpose.

Many authors are of opinion, that letters derive their forms from the positions of the organs of speech in their pronunciation. Van Helmont has taken great pains to prove, that the Chaldaic characters are the genuine alphabet of nature; because, according to him, no letter can be rightly founded without disposing the organs of speech into an uniform position with the figure of each letter; and, in support of this system, he has anatomised the organs of articulation.

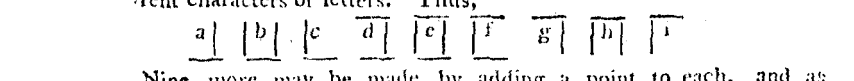
The learned Bishop Warburton, however, ascribes the origin of alphabetical writing to hieroglyphics, or to a series of objects or figures so delineated as to represent the ideas of the human mind. And that, when philosophy advanced, and learned men wrote, the exact delineation of hieroglyphic figures becoming too tedious and too voluminous, they then, by degrees, perfected another character, which he calls the cunning hand of hierogyphics; these, being at first formed only by the outlines of each figure, became at length a kind of marks, which led to the construction of letters, and consequently to the formation of an alphabet.

Mr.

Mr. Nelme, on the contrary, has endeavoured to shew that all elementary characters or letters derive their from form the line and the circle. His alphabet consists of thirteen radical letters, four diminished, and four augmented. The radicals are L, O, S, A, B, C, D, N, U, I, E, M, R. H, according to him, is derived from A; P from B; T from D; and F from U; these are called diminished letters. The augmented ones are, Z from S; G from C; W from U; and Y from I. He proves that his characters are very similar to those of the ancient Etruscans: but all characters are composed either of lines and circles of the former, and of parts of the latter. Mr. Gebelin again, deduces them from hieroglyphic representations; and has given several delineations of human figures, trees, &c. in confirmation of this hypothesis.

One of the most simple alphabets has been formed by making two perpendicular and two horizontal lines:

Thus, $\begin{array}{c|c|c} a & b & c \\ \hline d & e & f \\ \hline g & h & i \end{array}$ From which may be deduced nine different characters or letters. Thus,



Nine more may be made by adding a point to each, and as many more as $\begin{array}{c|c|c} k & l & m \\ \hline n & o & p \\ \hline q & r & s \end{array}$ may be sufficient for the notation of any language, by adding two or more points to each character.—Though these square characters are not calculated for dispatch; yet they may be made as expeditiously, or more so, than the Tartar, the Bramin, the Cashmirian, or many others. Writing composed of these characters, is at first sight somewhat like the Hebrew. Mr. Dow, author of the History of Hindoostan, lately formed a new language and alphabet. This language, and the characters formed for its notation, were so easy, that a female of his acquaintance acquired the knowledge of them in three weeks, and corresponded with him therein during their intimacy.

YEAST, A REMEDY IN PUTRID DISEASES.

IN this philosophic age, when diseases so often change their appearance from what physicians had any former experience of, it is a pleasing reflection that the study of medicine has of late been so much simplified, and almost every distemper incident to the human body so fully explained, as to come within the common apprehension of mankind. The following facts, communicated to the world by a worthy clergyman, afford an antidote for the most dangerous disease with which the human body can be afflicted: so that it is hoped one of the most crowed avenues to the grave is at length in a great measure closed.

Seventeen years ago I went (says he) to reside at Brampton, a populous village near Chesterfield. I had not been there many months before

before a putrid fever broke out among us. Finding by far the greater number of my parishioners too poor to afford themselves medical assistance, I undertook, by the help of such books on the subject of medicine as were in my possession, to prescribe for them. I early attended a boy about fourteen years of age, who was attacked by the fever. He had not been ill many days before the symptoms were unequivocally putrid. I then administered bark, wine, and such other remedies as my books directed. My exertions were however of no avail; his disorder grew every day more untractable and malignant, so that I was in hourly expectation of his dissolution. Being under the necessity of taking a journey, before I set off I went to see him, as I thought, for the last time, and I prepared his parents for the event of his death, which I considered as inevitable, and reconciled them in the best manner I was able, to a loss which I knew they would feel severely. While I was in conversation on this distressing subject with his mother, I observed, in a small corner of the room, a tub of wort working. The sight brought to my recollection an experiment I had somewhere met with, "of a piece of putrid meat being made sweet by being suspended over a tub of wort in the act of fermentation."—The idea flashed into my mind, that the yeast might correct the putrid nature of this disease, and I instantly gave him two large spoonfuls. I then told the mother, if she found her son better, to repeat this dose every three hours. I then set out for my journey; upon my return, after a few days, I anxiously enquired after the boy, and was informed he was recovered. I could not repress my curiosity, though I was greatly fatigued with my journey, and night was come on; I went directly to where he lived, which was three miles off, in a wild part of the moors. The boy himself opened the door, looked surprisingly well, and told me he felt better from the instant he took the yeast.

After I left Brampton, I lived in Leicestershire. My parishioners being there few and opulent, I dropped the medical character entirely, and would not prescribe for my own family. One of my domestics falling ill, accordingly the apothecary was sent for. His complaint was a violent fever, which in its progress became putrid. Having great reliance, and deservedly, on the apothecary's penetration and judgment, the man was left solely to his management. His disorder, however, kept daily gaining ground, till at length the apothecary considered him in very great danger. At last, finding every effort to be of service to him baffled, he told me he considered it to be a lost case, and that in his opinion the man could not survive twenty-four hours. On the apothecary thus giving him up, I determined to try the effects of yeast. I gave him two large spoonfuls, and in fifteen minutes from taking the yeast, his pulse, though still feeble, began to get composed and full. He, in thirty-two minutes from his taking it, was able to get up from his bed and walk in his room. At the expiration of the second hour, I gave him a bason of sago, with a good deal of lemon, wine, and ginger in it; he ate it with an appetite; in another hour I repeated the yeast; an hour afterwards I gave the bark as before; at the next hour he had food; next had another dose of yeast, and then went to bed; it was nine o'clock; he told me he had a good night, and was recovered. I

 however

however repeated the medicine, and he was soon able to go about his business as usual.

About a year after this, as I was riding past a detached farm-house, at the outskirts of the village, I observed a farmer's daughter standing at the door, apparently in great affliction. On enquiring into the cause of her distress, she told me her father was dying: I dismounted, and went into the house to see him; I found him in the last stage of a putrid fever. His tongue was black, his pulse was scarcely perceptible, and he lay stretched out like a corpse, in a state of drowsy insensibility. I immediately procured some yeast, which I diluted with water, and poured down his throat; I then left him with little hopes of recovery; I returned, however, in about two hours, and found him sensible and able to converse; I then gave him a dose of bark; he afterwards took at a proper interval some refreshment. I staid with him till he repeated the yeast, and then left him, with directions how to proceed; I called upon him the next morning at nine o'clock; I found him apparently well, and walking in his garden. He was an old man upwards of seventy.

I have since administered the yeast to above fifty persons labouring under putrid fevers; and what is singular (continues this benevolent man), I have not lost a patient.

The above has been handed to us by a gentleman in Edinburgh, who lost two children by the fever which has been so prevalent and so fatal of late.—He had a third child who was taken ill; and, this prescription having come to his knowledge, he made the experiment, which was happily crowned with success.

PRESENT STATE OF ITALY.

AT the moment that Italy is about to be convulsed by the renewal of hostilities, on the termination of which depends the deliverance of eighteen millions of people, or their confirmed submission to the imperious dictates of the cruel tyranny, it cannot be uninteresting to take a short review of the situation to which the different parts of that country are at present reduced.

Every one is aware of the oppressive means, the perfidious conduct, and the base intrigues, adopted by the French directory to revolutionize Piedmont. One fact, not sufficiently known, remains yet to be added to the black catalogue of crimes, which consigns to everlasting infamy the name of French republicanism. When his Sardinian majesty received information of the surprise of his fortresses of Navarra, Alexandria, and Suza, and that the avenues to Turin were in possession of the French, he issued a proclamation, stating his punctual observance of every article of the treaties concluded between him and the republic, declaring his determination to maintain the interests of his people and crown, and assuring his faithful subjects, that he had in no instance given occasion to the measures which had recently taken place. The proclamation, though mild and moderate, immediately excited the apprehensions of the chief agents of France, and was considered by them as sufficiently strong to induce the Piedmontese to take arms against the enemy. Joubert and his adjutant Cloubel, fearful of the result of the proclamation, immediately compelled the king, with the dagger and firebrand of intimidation in their hands, to retract and suppress it. They threatened

tened to bombard and set fire to Turin; and the unfortunate monarch was forced, from the love of his subjects, to sign the act of his own degradation and their slavery.—Piedmont cannot be kept in a state of tranquillity by its new masters, and the moment in which hostilities shall be renewed in Italy, they will find it necessary to employ an army of 30,000 men to retain the inhabitants in subjection. The infamous pretence of communicating the engagement of liberty to the people, can have but little effect on the minds of men who have suffered so much from the persecutions and oppressions of their *deliverers*, and the small number and contemptible character of the native revolutionists prevent them from possessing any influence over the nation.

The republic of Genoa, exhausted by plunder, forced loans, and contributions, and convulsed by the anarchy of its own government, and by the military and fiscal despotism of the directory, will not suffer any favourable opportunity to pass which may afford a chance of restoring its ancient constitution. The Genoese, however, do not wish merely to change one oppression for another; and it cannot be supposed that they will interest themselves for the success of the Austrians, in whose designs they can have no confidence, and on whose cordial assistance they can place no just reliance.

The inhabitants of Lombardy are of a very different character from the Piedmontese and Genoese, and no spirited exertions against the French can be looked to from them. The treaty of Campo Formio has extinguished every hope in that quarter, and the system of French *morality* and irreligion has made so many proselytes, as to suppress every hope of a vigorous co-operation with the Imperial forces.—The people of the territories of Bologna and Romagna, are animated by opposite sentiments to those of their neighbours the Lombards. They are decidedly averse to the usurpations of the directory, and are only kept in subjection by a considerable body of troops.

The fall of Tuscany has, very probably, already been, or soon will be, decided; and in that case the French, after plundering that beautiful and happy country of all the riches which have been the fruits of a wise government for forty years past, will find it necessary to maintain a strong army in order to reconcile the inhabitants to the blessings of the fraternity which they have been forced to accept. In this part of Italy, appearances in general are not very favourable to the republicans. On the frontier of Tuscany, and from the center of the Appenines, as far as Civita Vecchia, an obstinate insurrection was still in a formidable state at the end of February. The insurgents had cut off all communication between the enemy and Rome, while Civita Vecchia was preparing to undergo a regular siege. At the other extremity of the line, on the Adriatic Gulph, the March of Ancona was involved in continual tumults; while the whole interior of the Ecclesiastical State presents but one scene of assassination, ruin, famine, the most horrible tyranny, avarice, revenge, and despair. Every kind of business, industry, and social habit, is at an end, while the revolutionary banditti who ravaged the country and plunged it into misery, begin to feel the effects of the penury and distress which has been produced by their crimes.

The kingdom of Naples is on the point of being precipitated into, into an abyss equally dreadful in horror and wretchedness. The capture

capture of Naples, which was attended with circumstances so shocking to humanity, has been followed by a system of rapine and devastation in which the French generals, commissioners, comptrollers, receivers, contractors, &c. rival each other in infamy. The new republic may now be justly termed *Vesuvian*, and the wreaths of Neapolitan liberty are composed of the torches and cannon of Championnet. The domiciliary visit made by the French troops at Naples, on the 7th February, furnishes a sufficient criterion to enable the public to form a just opinion of the eagerness of the people to be revolutionized, and of their future exertions in support of their deliverers.

The emperor has certainly much to hope from the disaffection manifested by the mass of the people of Italy to the measures and views of the directory; but the French possess great advantages over him by the superiority of their military positions, and the number of their troops is equal to that of the Austrians. It is only left for his Imperial majesty to re-establish the influence which he once possessed over the public mind, and which has been so considerably impaired by his defeats, and still more by his treaties. The appointment of General Suwarrow to the chief command in Italy may prove highly beneficial to the common cause, and the reinforcements which he brings to the emperor's armies must be truly formidable to France. But it is the opinion of some of the most experienced men in military affairs in Germany, that it would have been wiser not to have blended together the Austrian and Russian armies. They are so essentially different in a variety of considerations, that they cannot be well united without making the spirit and proceedings of the one entirely subordinate to those of the other; and the inconveniencies which must arise from such subordination are too evident to require any comment.

APRIL, 1799.

TRAVELS OF CITIZEN B. FAUJAS SAINT-FOND.

M. FAUJAS SAINT-FOND, who travelled through a considerable part of England and Scotland several years ago, has lately published an account of his tour at Paris. The character of the author and his former writings are too well known to the learned naturalists of this and every country of Europe to require any comment on our part; and whatever expectation, from this journey, his merited reputation may have raised, will, we are convinced, be amply gratified by the perusal of the work before us.

This tour was undertaken by M. Faujas, for the purpose of examining the state of the sciences, the arts, natural history, and manners, in Great Britain; and it must be confessed that it would be difficult to find a writer whose knowledge or whose candour would have been better adapted to the execution of so important a task. His observations on our manufactures, particularly those which depend upon chemical or mechanical processes, and the manner in which he contrasts them with those of his own country, afford much useful information respecting the comparative situation of the commercial arts in France and in England, and deserve to be studied with attention by all who wish well to those improvements that supply the wants, or add to the enjoyments, of human life.

A considerable portion of these volumes is occupied with an account

count of the geology and lithology of the places which the author visited, among which we would chiefly recommend to the notice of the learned reader, his description of the mountains of Derbyshire—of the country round Newcastle, Edinburgh, Glasgow, Perth, and St. Andrew's—of Inverary, Dalmaly, Oban, and other parts of Argyllshire—and of the celebrated Cave of Fingal, in the Island of Staffa. This is a subject which is but imperfectly treated by the great British traveller, Mr. Pennant, whose Tour, in other respects, contains so much useful and important information; and, as M. Faujas often goes over the same ground which was before trod by the illustrious describer of the antiquity and the manners of Caledonia, his work forms not only a valuable, but a necessary, companion to that of his learned predecessor.

We are happy in this opportunity of announcing a publication which is calculated to promote the study of British mineralogy, which has unfortunately been too much neglected amongst us. We know little of the structure of our own country, and are chiefly indebted to foreigners for pointing out the rich field of observation it presents; while we often pant for mere hear-say accounts of distant curiosities, we never think the real wonders that nature has placed within the reach of our personal observation.

Indeed natural history, in all its branches, is so interesting, and affords so many sources of innocent pleasure, and useful instruction, that its study can never be too earnestly recommended. He who has devoted some of his leisure hours to the science of nature, has secured to himself a *property*, of which no change of fortune is likely to deprive him—that property exists in the enjoyment which every object that surrounds him affords; not a blade of grass that springs under his foot, not a leaf that waves in the forest, not an insect that crawls on the ground, not a pebble that lies on the shore, but is to him an interesting subject of delight and meditation.

But to return to our author. He has not confined himself to the sciences only. His observations on life and manners are very entertaining, and form an agreeable relief to the severer parts of the work, though he may, perhaps with some justice, be accused of occasionally descending to too great a degree of minuteness, particularly in what relates to the customs of the English table. His remarks, however, are almost always pleasing from their novelty, and they are frequently profound, even when they arise out of the most trivial subjects.

The scene of the commencement of this instructing tour is London, where the author's intercourse with Sir Joseph Banks, Doctors Whitehurst, Cavallo, Lettsom, Sheldon, and other distinguished men of letters, gives rise to very important observations, and renders this one of the most interesting parts of the work. He slightly notices Mr. Arthur Young's comparison of the population of London and Paris, which he considers as erroneous; but it is not on subjects of this kind that he chuses to dwell; natural history, the sciences, the arts, and objects of commercial economy, principally engage his attention.

Among some curiosities of natural history, with which Sir Joseph Banks presented M. Faujas, was a small quantity of Chinese hemp-seed. The exportation of this seed is very severely prohibited in China; but a pound of it had reached London, concealed in a box, addressed

addressed to the President of the Royal Society. Sir Joseph Banks divided two ounces of this valuable seed between Broussonet, who was also then in London, and the author, in order that they might make a trial of it in France, particularly in the southern departments, where both of them had estates. The cultivation of the Chinese hemp has, we believe, failed in England; but we learn from M. Faujas that is has perfectly succeeded in several parts of France, where it produces execellent seed. It is found to be of very great importance to avoid sowing it near the common hemp. "I wait for peace," says our author, "to repay my obligation to the English; for it is no more than just to return that which they have so generously lent us."

M. St. Fond regrets that he had not the good fortune of seeing that celebrated anatomist Dr. Hunter, who was then in the country; but he visited some other distinguished professors of that art. In mentioning Mr. Sheldon, he gives the following account of a very singular preparation of a human body in his possession, which, though perhaps still in this city, is, we imagine, very little known. The description cannot fail to prove interesting to a number of our readers.

"The anatomical cabinet of Sheldon contains a great variety of curious preparations. I dedicated several mornings to visiting it, and examining a great number of valuable designs made by able artists; but nothing in this collection interested me so much as a kind of mummy, which was very remarkable in two respects: first, on account of the subject itself, of which I shall soon speak; secondly, with relation to the manner of the preparation, and the particular care with which it had been made. It occupied a distinguished place in the chamber where this anatomist usually slept; and he was particularly fond of this work.

"I was introduced into a very handsome bed-room; a mahogany table, of an oblong form, stood in the midst of it, facing the bed. The top of the table opened by a groove; and under a glass frame I saw the body of a young woman, of nineteen or twenty, entirely naked. She had fine brown hair, and lay extended as on a bed. The glass was lifted up, and Sheldon made me admire the flexibility of the arms, a kind of elasticity in the bosom, and even in the cheeks, and the perfect preservation of the other parts of the body. Even the skin partly retained its colour, though exposed to the air. It appeared to me, however, that the fleshy parts were rather dry, and that there was too great a tenseness of the muscles. This gave to the figure, though it still possessed the remains of beauty, a meagre and feeble air, which considerably diminished the delicacy of its traits. Sheldon informed me that this was partly occasioned by the long sickness of which the young woman died.

"He explained to me the manner in which this preparation had been made. He injected several parts of the body with strong spirits of wine, saturated with camphire, and mixed with a small quantity of turpentine. The skin was prepared and tanned, as it were, with finely powdered alum; rubbed on with the hand. The intestines were taken out, and covered with a varnish, composed of a mixture of camphire and the common rosin. The same thing was done to all the internal parts of the body, which were afterwards passed over with alum. Sheldon assured me, that pulverized camphire, mixed with rosin, formed an excellent composition for preserving

the flesh, and other soft parts. After having placed all the viscera thus prepared in the body, he then injected the crural artery with a strong solution of camphire, in rectified spirit. Wishing afterwards to imitate the natural tint of the skin of the face, a coloured injection was pushed through the carotides, to produce that effect. In this state of things, the body was placed on the table of which I have spoken; but within a double case of timber. The first is made of Virginia cedar, *(Juniperus Virginia.)* The inner bottom was covered with calcined chalk, to the thickness of one inch, in order to absorb all humidity. Upon this bed the body was extended. The box or case was then carefully shut up, to secure the body from the impression of the external air. The box was not opened until five years after the preparation was made. It was then observed to be in the same state of preservation in which it was first inclosed. No mark of decay appeared, and no insect had introduced itself near the body. The box had been several times opened when I saw it; and, though this mummy at that time still possessed elasticity in several parts, it is supposed that the action of the air will at last completely wither it.—A sentiment of curiosity made me ask Sheldon, at the moment he was closing up the table, who this young woman was, whose remains he had preserved with so much care. He replied frankly, and without any hesitation, 'It is a mistress whom I tenderly loved: I paid every attention to her during a long sickness; and, a short time before her death, she requested that I would make a mummy of her body, and keep her beside me: I have kept my word to her.'

The author visited Newcastle on his way to Scotland; and his remarks on the coal-mines, and the manufactures of that town, form one of the most instructive parts of the work. Arrived in Scotland, he presents through the whole of his route a correct picture of the geological structure of the country, investigates its antiquities, describes the manners and customs of its inhabitants, and intermixes the whole with curious anecdotes. The poems of Ossian and the ancient Caledonian music engaged his attention: he informs us, that Dr. Adam Smith took him to the annual competition for a prize given at Edinburgh, by the Highland Society, to the best player on the bagpipe; and he gives a very curious account of the impression which this singular exhibition made upon him. He speaks very respectfully of this celebrated author of the Wealth of Nations:—"That venerable philosopher, Dr. Adam Smith, was one of those whom I visited most frequently: he received me on every occasion in the kindest manner, and studied to procure for me every information and amusement that Edinburgh could afford. He had travelled in France, and resided for some time in Paris: his collection of books was numerous and excellently chosen; and the best French authors occupied a distinguished place in his library, for he was very fond of our language. In conversation with me, he spoke thus of Voltaire: He sought to correct the vices and follies of mankind by laughing at them, and sometimes by treating them with severity. Reason owes him incalculable obligations: the ridicule and the sarcasms which he so plentifully bestowed upon fanatics and hypocrites of all sects, have enabled the understandings of men to bear the light of truth, and prepared them for those enquiries to which every intelligent mind ought to aspire. He has done much more for the benefit of

mankind than those grave philosophers whose books are read by a few only: the writings of Voltaire are made for all, and read by all. —On another occasion he said, I cannot pardon the Emperor Joseph II. who pretended to travel as a philosopher, for passing Ferney without paying homage to the historian of the Czar Peter I. from this I concluded that Joseph was a man but of an inferior mind."

The following interesting extract relative to pearls, contains some important facts in natural history which we believe are little known.

"The master of the inn, who obligingly exerted himself respecting every thing that could gratify my curiosity, brought me two fishermen whose particular employment was searching for pearls. They conducted us to the river, which runs in a very pure stream upon a bottom of sand or pebbles; and they soon brought up several dozens of shells, from three and a half to four inches long, and a little more than two broad; their exterior colour was a deep brown, inclining a little to green; the upper shell was thick, and of a fine mother-of-pearl colour within, slightly tinged with rose-colour. I regarded this species as belonging to the *mia pictorum* of Linnæus, or at least as very nearly resembling it. The fishermen, in consequence of a handsome reward which we promised them, engaged to open these shells in our presence upon the bank; but they stipulated for the reservation of the pearls, if any should be found, that they might sell them to us at a separate price: and to this proposition we acceded.

"Imagining from this that we should put a higher value on those pearls which might be found while we were present, these artful practitioners brought some with them, which they dexterously introduced into several of the shells in opening them: they appeared to be well exercised in this petty sort of imposition, which however I detected in a manner that astonished and perplexed them, and which deserves to be mentioned, as it depended upon a memorable fact respecting one of the causes which contribute to the formation of pearl.

"I desired them to open the muscles before my fellow-travellers, whilst I went to amuse myself with fishing some of them; but they were to inform me when they discovered any pearls. I was soon called, and shewn a very fine pearl, perfectly round, and of a good colour: I looked at the shell and the pearl, and then told them that the pearl was not found in the muscle shewn to me. The fishers assured me that it was, and appealed to the testimony of my companions, who confirmed their assertion: I assured my friends, however, that they were deceived, and begged them to watch the fishers more narrowly the next time. I retired a few steps, and in a minute or two I heard one exclaim, 'We have found another.' I went up; and, on examining the muscle, pronounced that the pearl had for that time also been slipped into the shell. The pearl was beautiful; but the price they demanded for it was six times its value.

"The fishers exhibited the utmost astonishment; for, as I was at some distance from them, it was clear I could not have observed their motions: my fellow-travellers, who attentively watched them, were themselves deceived, or at most entertained only a vague suspicion; so well skilled were these men in an art which procured them a few additional shillings from travellers.

"My art was so supernatural in their estimation, that they confessed the imposition, and frankly shewed us some other pearls which they had in reserve for the same purpose. They were very anxious

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to learn my secret, which would save them the pains of frequently opening a vast number of shells to no purpose, for they seldom found above one or two pearls in a week. But, as they knew no other language than the Earse, and not even so much as a word of English, I could explain myself only by signs and gestures; and, though my instructions were not very difficult, I doubt whether they were completely intelligible in a conversation of this sort.

"My secret consisted merely in examining attentively the outside of the muscles, and when neither of the parts had any cavity or perforation, but presented a surface smooth and free from callosities, I could pronounce, without any apprehension of being deceived, that there was no pearl in such a shell. If, on the contrary, the shell was pierced with auger-worms, and indented by other worms of the same kind, there were always found pearls more or less valuable, or, at least, the embryos of pearls.

"This observation, which I have found invariably true hitherto, was the result of some enquiries, in which I had been engaged a long time before, respecting the formation of that beautiful animal product. Buffon introduces the information, which I communicated to him upon this subject, in his article upon pearls, p. 125, vol. iv. of the 'Natural History of Minerals.' At that time I discovered that the pearl-fish is attacked by two classes of enemies. One is a very small auger-worm, which penetrates into the inside, near the edge of the valve, by working a longitudinal passage between the different laminæ that compose the cover. This small channel, on extending to an inch or an inch and an half in length, doubles back in a line parallel to the first, and is separated from it by a very thin partition of shelly matter. These two parallel lines discover the direction of the worm in entering and returning, which is also distinguishable on the surface by two small holes, close to the edge, and in general near the mouth of the shell. The parallelism of the two passages may be demonstrated by introducing a pin into each orifice. At the inner extremity, however, there is a small circular portion, formed by the worm in turning round. As these small channels or covert-ways are excavated in the part nearest the mother-of-pearl, or silvery internal coat, the pearly juice soon extravasates, and produces protuberances in that direction. The cylindrical bodies thus formed may be considered as elongated pearls, adhering to the internal lining of the shell. When several worms of this kind penetrate near each other, and unite their labours, the result is a sort of pearly wen, with irregular protuberances, in which the issues of the passages which they have formed are easily distinguishable.

Another sea-worm, much larger, and of the family of the multivalvous shell-fish, attacks the pearl-shells in a much more ingenious manner. This worm is a pholas of the species of sea-dates. I have in my cabinet an oister from the coast of Guinea pierced by one of these pholades, which are still as they were found in the heel of the oister. The shells of these singular pholades are hinged in the form of a crooked bill: the small holes which they bore are in the figure of a pear; and pearls of this shape are sometimes found, which were in high estimation among the ancients, and are at present very valuable in the East Indies.—There are undoubtedly several other kinds of worms which pierce the shell, and form cavities more or less round, in which the juice consolidates into pearls.

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"It is this obſervation, which has no doubt been made by others beſides me, that probably firſt ſuggeſted to ſome perſons concerned in the pearl-fiſhery, the trick of making artificial perforations in the ſhells, and thus forcing them to produce pearls. At London I ſaw ſome ſhells brought from China, which muſt have undergone this operation: for the artificial hole was filled up with a piece of braſs wire, rivetted on the outſide of the ſhell like the head of a nail, and the part of the wire which pierced the interior ſhining coat was covered with a well-ſhaped pearl, which ſeemed as if ſoldered to its extremity. It is probable that, with the Chineſe, who have been ſo long ſkilled in the arts, and whoſe aſtoniſhing and multiplied induſtry teaches us that we are but a comparatively new people, this is not a diſcovery of a very modern date.

"Brouſſonet, with whom I had a converſation upon this ſubject in London, at the houſe of Sir Joſeph Banks, told me that a perſon had aſſured him, that there is ſtill another method of obtaining pearls. The ſhell, on which the experiment is to be made, muſt be opened with the greateſt care, in order to prevent the animal from being injured. A ſmall portion of the inner ſurface is then ſcraped off, and in its room is inſerted a ſpherical piece of mother-of-pearl about the ſize of a very ſmall grain of lead-ſhot. This globule ſerves as a nucleus to the pearly juice, which concretes around it, and, at a certain diſtance of time, produces a fine pearl. He ſaid, that experiments of this nature had been tried in Finland, and repeated alſo in other countries.

"From theſe obſervations, it may be inferred that the production of pearls depends, perhaps, much more upon an external and accidental cauſe than upon a natural ſuperabundance or extravaſation of the juice of which they are formed.

"There are very excellent pearls found in the river ſhells of Loch Tay, if we may judge from ſome which the fiſhers of Killin offered to ſell us at more than double the price of thoſe which are in current ſale. But theſe fine pearls are far from numerous; on the contrary, a very great number are found which the jewellers reject, but which, though they may be not well calculated to form decorations for the ladies, are yet very intereſting for the cabinet of the naturaliſt, ſince they afford a confirmation of the theory which I have now mentioned. The greater part of theſe pearls have little or no luſtre; ſome are round, oval, or elongated and cylindrical; others are hemiſpherical, reſembling a button; ſeveral oblong ones have a contraction towards the middle, which gives them the appearance of two joined together; others alſo are ſomewhat conical; and all are of a pretty large ſize, and of a pale and red or brown colour. The end of the pearl touching the tegument of the ſhell, which forms what is called mother-of-pearl, is ſo deeply impregnated with the ſhining ſubſtance, that it exhibits a ſingular contraſt with the ſurrounding brown colour of the other parts, and ſeems to derive additional ſplendour from it. This coating is of an orient bordering on roſe colour, which is extremely agreeable to the eye, and is therefore heightened in its effect by the contraſt.

"Pearls of this kind are ſo ſeldom met with, that they might at firſt be taken for oculated agates prepared for being ſet, or rather for *buſſonites*, particularly thoſe which have no mother-of-pearl. Their texture is very hard, and yields with great difficulty to the file.

"The

"The auger-worm, which occasions the formation of the pearls of Loch Tay, pierces the whole thickness of the shell, which is of considerable density and of a sallow brown colour: and, as the shelly juice coozes out from all parts of the orifice which the worm has formed, it necessarily results, that the pearl must participate in the quality and colour of the substance of the shell, from the exterior layer to that which lines and embellishes its inner surface.

"Hence originate those rude but singular gems above-mentioned, which have only a thin coating of mother-of-pearl upon one side. There, however, some instances in which the pearl is pure and brilliant throughout; proceeding probably from an extravasation of the interior coating only; which may have been occasioned by another kind of auger-worm attacking the shell solely in the direction of that coating. It is the province of those naturalists, whose attention it has more particularly engaged, to investigate more profoundly this very interesting subject, our knowledge of which must yet be considered as nothing more than a rude outline."

YELLOW FEVER.—To the Editor.

SIR, The public is greatly obliged to your correspondent, who, in in your last (p. 343) gave a very enlightened account of the yellow fever, and has exhibited such a view of its origin, derived from history and common sense, as must be highly useful, if attended to, in suggesting the most effectual means of prevention. There is one particular, however, to which I beg to call his attention and that of the public. He alleges, that it originates in infection, which he has fully proved; but, it is not incompatible with this to conceive that a certain given state of the place to which it is imported is necessary to its taking effect. He has acknowledged the necessity of a certain given state of the air, inasmuch as it does not appear but at one season of the year in North America; but he denies that any thing depends on the state of places in point of cleanliness and the purity of the air. There is, however, a well-established fact, which alone is sufficient proof of the contrary. When the yellow fever was in New York last year, it did not prevail except in that part which is adjacent to the East River, and which is at the same time low and ill-drained, while that part of the town adjoining to the North River, which is more high and airy, was exempt from it. As it is of great importance, with a view to precautionary measures, that this should be well understood, as well as its being of a truly contagious nature, I am sure your candid and benevolent correspondent will give it due weight, and consider this part of the subject more fully in case he should favour the public with any farther communications.

DESCRIPTION of the VOLCANO at St. LUCIA.

MORE volcanoes are to be found in the West-India islands than in any other part of the globe; and, from the frequency of earthquakes, the abundance of hot springs, &c. in these islands, there is reason to conclude that those substances which are the cause of them still exist. On account of the great quantity of sulphur produced by the mountain where this crater is situated, the name of

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La Souffriere has been given to it and to the whole adjacent diſtrict. The mountain itſelf forms a part of a high ridge, which runs acroſs the whole iſland from north-eaſt to ſouth-weſt, and encloſes the crater like a baſon, which can be reached without great difficulty.—Thoſe who viſit it muſt put on thick-ſoaled boots, as the earth, before they have got to the diſtance of two miles from the town, becomes exceedingly hot; and they muſt carry nothing of metal with them, particularly ſilver, becauſe their ſplendour is deſtroyed by the vapour. The ſulphuriſed hydrogenous ſmell, which ſtill increaſes, begins at the diſtance of little more than half a mile from the town. But, however ſtrong this ſmell may be, it ſeems not to be prejudicial; for the inhabitants in the neighbourhood enjoy the beſt health, and attain to a conſiderable age. Though this diſtrict is mountainous and expoſed to inundations, it is very fruitful: its ſugar-canes produce the richeſt ſugar, as the diſtricts around Etna and Veſuvius produce the moſt celebrated wine. The nearer you approach the crater, the more numerous you find the volcanic productions. You paſs over various rivulets, the water of which has a ſulphureous ſmell, and the ſcum ſeems to contain ſaline and ochery matter. You ſoon after arrive at the ſide of the mountain which riſes over the volcano towards the ſouth-weſt. The road lies acroſs the declivity of the mountain, which is exceedingly ſteep; ſo that the traveller on one ſide ſees a terrible, almoſt perpendicular, abyſs filled with abundance of vapour from boiling water by which he is ſurrounded, and as it were enveloped: on the other ſide he is encloſed by a high ſteep rock, yet one can ride without danger to that part of the mountain which encloſes the volcano on the eaſt ſide; but, when you arrive there, you muſt procure a guide, and deſcend the mountain, by a very ſteep path, between low thick bruſh-wood. Throughout the whole way you muſt beat on both ſides with a ſtick, in order to guard againſt being bit by ſnakes. Scarcely have you reached the bottom of the mountain when you find the heat of the atmoſphere conſiderably increaſed, and the earth hot under the feet. The ſulphureous vapours which here ſurround the body ſoon occaſion an abundant perſpiration, and the ſulphuriſed hydrogenous ſmell is ſo powerful as to oblige many perſons to return. The valley which encloſes the volcano is about ſixty fathoms long, fifty broad, and lies ſixty fathoms higher than the level of ſea. It appears as if the volcano had long ago formed the hollow, in which it is ſituated, by ſplitting the mountain that ſurrounds the cavity, and by its eruption caſting to a diſtance on one ſide thoſe parts which covered the centre or focus. In looking down into the crater, great care muſt be taken that the ground, which rings below the feet, does not ſink, which would expoſe the legs to the danger of being burnt. For this reaſon it is uſual to ſend a guide before to point out the places that are ſecure, eſpecially when the weather is changeable; for people may then be ſpeedily ſurrounded by vapours that almoſt obſcure the ſun. It has alſo been remarked, that during rain the vapours are more abundant and thicker than at other times. It is difficult to ſay with any certainty what is the nature of the ſoil to be paſſed over in order to enter the crater; but it ſeems to conſiſt of decompoſed remains, or the ſcoriæ of different minerals, and particularly of pyrites, which however have changed their nature. As you advance farther, the ſurface of the earth appears more and more covered with ſulphur,

and you find a number of ſmall ſpiracles, from which ariſes a burning vapour, and which are covered on the ſides with ſublimed ſulphur that has a very beautiful appearance. All theſe apertures may be conſidered as ſo many apparatuſes for diſtillation, which nature has prepared, in order to purify the ſulphur. If you ſtrike your ſtick againſt the ground in this ſpot, it occaſions a vent of that kind, through which the vapour iſſues with a ſtrong hiſſing noiſe, and ſo hot that it raiſes the thermometer ten degrees above the boiling point. From theſe apertures, whether the work of nature or of art, it appears that the whole ſurrounding diſtrict below the ſurface is filled with boiling water; but this water does not proceed from rain or from ſprings in the crater, but, in all probability, from the mountain which riſes above the volcano on the eaſtern ſide. This is the more credible, as the top of this mountain ends in a kind of funnel, which is of great width, and conſiſts of very marſhy ground. Several ſmall ſtreams iſſue from it alſo at different heights, and, after traverſing the ſurface of the crater, purſue their way through the valley, and diſcharge themſelves into the ſea. The water of all theſe ſtreams is exceedingly warm, and is covered with a multitude of air-bubbles, ſo that it ſparkles like champagne: theſe bubbles exhibit all the phenomena of oxygenous gas, which probably is diſengaged from the oxydes of various kinds with which it was combined in the earth. What among the phenomena of the crater excites moſt wonder are, twenty-two large baſons full of boiling water, ſome of them twenty feet in diameter, and which may be conſidered as monſtrous caldrons placed over the moſt violent fire: the ebullition is ſo ſtrong that water-bubbles of four or five feet in height are thrown up, which raiſe the thermometer far above the boiling point; but this however is the caſe only in thoſe where the water is from one to two feet in depth, though the depth in general amounts to eight or ten feet. You may walk round the edge of them without any danger, and contemplate at leiſure this aſtoniſhing quantity of boiling water. It is of a black colour, oily, covered with ſcum at the edges, and diffuſes a vapour which obſcures the atmoſphere. From this ebullition, and the high ſtate of the thermometer, we might be induced to believe that there is a great quantity of heat in theſe baſons; but, if you put your hand into the water, you will find the heat leſs than that of boiling water. The ebullition alſo may proceed only from the vapours which riſe from the bottom of the excavations with ſo much ſtrength that they give the water a boiling movement; and, in the like manner, the riſing of the thermometer ought to be aſcribed to theſe vapours alſo. The ſurface of the ground is of a pale yellow colour, and beſprinkled with a multitude of ſmall ſhining cryſtals, for the moſt part cryſtals of ſulphur. The upper part of the crater, towards the ſouth-eaſt, riſes exceeding ſteep, and is covered with a great number of other cryſtals lying in a kind of earth, which is partly calcareous, and partly of an unctuous nature like clay. Among theſe cryſtals there are ſome ſhaped like flat needles, and which are real cryſtals of ſulphat of lime. Others exhibit all the properties of ſulphat of alumine; others appear like ſulphat of iron, greatly ſuperſaturated with the acid; and others like ferruginous pyrites covered with an efflorescence by the action of that atmoſphere and water. The above-mentioned ſubſtances muſt be conſidered as the principal cauſes of the violent commotions which

which appear in this crater. They are ſupplied from a large ſtratum of pyrites; and, from the violence of the combuſtion, we may conjecture that it muſt be very deep. It is probable alſo that this ſtratum is of conſiderable extent, for very hot ſprings are found at the diſtance of a mile both to the north and ſouth of the volcano. Such ſubſtances accumulated in different parts of the earth, when accidentally combined with other ſubſtances, ſuch as air, water, and inflammable bodies, produce earthquakes and other convulſions of nature. Though the internal re-action of theſe ſubſtances on one another ſeems to threaten danger, it however occaſions no damage to the colony, becauſe they have immediate communication with the atmoſphere, and the whole ſoil is penetrated by water ſo that it cannot take fire: neither are coal, bitumen, or ſuch inflammable bodies, found in the neighbourhood.

METHOD OF CATCHING WILD ELEPHANTS IN THE EAST INDIES.

IN the month of November, when the weather has become cool, and the ſwamps and marſhes, formed by the rains in the five preceding months, are leſſened, and ſome of them dried up, a number of people are employed to go in queſt of elephants.

At this ſeaſon the males come from the receſſes of the foreſt into the borders and outſkirts thereof, whence they make nocturnal excurſions into the plains in ſearch of food, and where they often deſtroy the labours of the huſbandman, by devouring and trampling down the rice, ſugar-canes, &c. that they meet with. A herd or drove of elephants, from what we can learn, has never been ſeen to leave the woods: ſome of the largeſt males often ſtray to a conſiderable diſtance; but the young ones always remain in the foreſt under the protection of the palmai, or leader of the herd, and of the larger elephants. The goondahs, or large males, come out ſingly, or in ſmall parties, ſometimes in the morning, but commonly in the evening; and they continue to feed all night upon the long graſs, that grows amidſt the ſwamps and marſhes, and of which they are extremely fond. As often, however, as they have an opportunity, they commit depredations on the rice-fields, ſugar-canes, and plantain-trees, that are near, which obliges the farmers to keep regular watch, under a ſmall cover, erected on the tops of a few long bamboos, about fourteen feet from the ground: and this precaution is neceſſary to protect them from the tigers, with which this province abounds. From this lofty ſtation the alarm is ſoon communicated from one watchman to another, and to the neighbouring villages, by means of a rattle with which each is provided. With their ſhouts and cries, and noiſe of the rattles, the elephants are generally ſcared and retire. It ſometimes, however, happens, that the males advance even to the villages, overturn the houſes, and kill thoſe who unfortunately come in their way, unleſs they have had time to light a number of fires: this element ſeems to be the moſt dreaded by wild elephants, and a few lighted wiſps of ſtraw or dried graſs ſeldom fail to ſtop their progreſs. To ſecure one of the males, a very different method is employed from that which is taken to ſecure a herd: the former is taken by koomkees, or female elephants trained for the purpoſe, whereas the latter is driven into a ſtrong enclouſure called a Kaddah.

As the hunters know the places where the elephants come out to feed, they advance towards them in the evening with four koomkees, which is the number of which each hunting party consists: when the nights are dark, (and these are the most favourable for their purpose,) the male elephants are discovered by the noise they make in cleaning their food, by whisking and striking it against their fore legs; and by moon-light they can see them distinctly at some distance.

As soon as they have determined on the goondah they mean to secure, three of the koomkees are conducted silently and slowly by their mahotes (drivers) at a moderate distance from each other, near to the place where he is feeding; the koomkees advance very cautiously, feeding as they go along, and appear like wild elephants, that have strayed from the jungle. When the male perceives them approaching, if he takes the alarm and is viciously inclined, he beats the ground with his trunk and makes a noise, shewing evident marks of his displeasure, and that he will not allow them to approach nearer; and, if they persist, he will immediately attack and gore them with his tusks; for which reason they take care to retreat in good time. But should he be amorously disposed, which is generally the case, (as these males are supposed to be driven from the herd at a particular period by their seniors, to prevent their having connection with the females of that herd,) he allows the females to approach, and sometimes even advances to meet them.

When, from these appearances, the mahotes judge that he will become their prize, they conduct two of the females, one on each side, close to him, and make them advance backwards, and press gently with their posteriors against his neck and shoulders: the third female then comes up and places herself directly across his tail; in this situation, so far from suspecting any design against his liberty, he begins to toy with the females and caress them with his trunk. While thus engaged, the fourth female is brought near, with ropes and proper assistants, who immediately get under the belly of the third female, and put a slight cord round his hind legs; should he move, it is easily broken; in which case, if he takes no notice of this slight confinement, nor appears suspicious of what was going forward, the hunters then proceed to tie his legs with a strong cord, which is passed alternately, by means of a forked stick and a kind of hook, from one leg to the other, forming the figure of 8; and, as these ropes are short, for the convenience of being more readily put around his legs, six or eight are generally employed, and they are made fast by another cord, which is passed a few turns perpendicularly between his legs, where the folds of the bundahs intersect each other. A strong cable with a running noose, sixty cubits long, is next put round each hind leg immediately above the bundahs, and again above them, six or eight additional bundahs, according to the size of the elephant, are made fast, in the same manner as the others were: the putting on these ropes generally takes up about twenty minutes, during which the utmost silence is observed, and the mahotes, who keep flat upon the necks of the females, are covered with dark-coloured clothes, which serve to keep them warm, and at the same time do not attract the notice of the elephant. While the people are busily employed in tying the legs of the goondah, he caresses sometimes one and sometimes another of the seducers, examining their

their beauties and toying with different parts, by which his desires are excited, and his attention diverted from the hunters, and in these amorous dalliances he is indulged by the females. But, if his passions should be so roused, before his legs are properly secured, as to induce him to attempt leaping on one of the females, the mahote, to insure his own safety and prevent him gratifying his desires any farther, makes the female run away, and at the same time, by raising his voice and making a noise, he deters the goondah from pursuing: this however happens very seldom, for he is so secured by the pressure of a koomkee on each side and one behind, that he can hardly turn himself, or see any of the people, who always keep snug under the belly of the third female, that stands across his tail, and which serves both to keep him steady and to prevent his kicking any of the people who are employed in securing him; but in general he is so much taken up with his decoyers, as to attend very little to any thing else. In case of accidents, however, should the goondah break loose, the people upon the first alarm can always mount on the backs of the tame elephants, by a rope that hangs ready for the purpose, and thus get out of his reach. When his hind legs are properly secured, they leave him to himself, and retire to a small distance: as soon as the koomkees leave him, he attempts to follow, but, finding his legs tied, he is roused to a proper sense of his situation, and retreats towards the jungle; the mahotes follow at a moderate distance from him, on the tame elephants, accompanied by a number of people that had been previously sent for, and who, as soon as the goondah passes near a stout tree, make a few turns of the phands, or long cables, that are trailing behind him, around its trunk: his progress being thus stopt, he becomes furious, and exerts his utmost force to disengage himself; nor will he then allow any of the koomkees to come near him, but is outrageous for some time, falling down and goring the earth with his tusks. If by these exertions the phands are once broken, which sometimes is effected, and he escapes into the thick jungle, the mahotes dare not advance for fear of the other wild elephants, and are therefore obliged to leave him to his fate; and in this hampered situation, it is said, he is even ungenerously attacked by the other wild elephants. As the cables are very strong and seldom give way, when he has exhausted himself by his exertions, the koomkees are again brought near and take their former positions, viz. one on each side and the other behind. After getting him nearer the tree, the people carry the ends of the long cables around his legs, then back and about the trunk of the tree, making, if they can, two or three turns, so as to prevent even the possibility of his escape. It would be almost impossible to secure an elephant in any other manner, as he would tear up any stake that could at the time be driven into the ground, and even the noise of doing it would frighten the elephant: for these reasons, nothing less than a strong tree is ever trusted to by the hunters. For still farther security, as well as to confine him from moving to either side, his fore-legs are tied exactly in the same manner as the hind-legs were, and the phands are made fast, one on each side, to trees or stakes driven deep into the earth. During the process of tying both the hind and fore-legs, the fourth koomkee gives assistance where necessary, and the people employed cautiously avoid going within reach of his trunk; and, when he attempts to

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seize them, they retreat to the opposite side of the koomkees, and get on them, if necessary, by means of the rope above-mentioned, which hangs ready for them to lay hold of. Although by these means he is perfectly secured and cannot escape, yet as it would be both unsafe and inconvenient to allow him to remain in the verge of the jungle, a number of additional ropes are afterwards put on, as shall be mentioned, for the purpose of conducting him to a proper station. When the goondah has become more settled, and eats a little food, with which he is supplied as soon as he is taken, the koomkees are again brought near, and a strong rope is then put twice round his body, close to his fore-legs, like a girth, and tied behind his shoulder; then the long end is carried back close to his rump, and there fastened, after a couple of turns more have been made round his body. Another cord is next fastened to the pharah, and from thence carried under his tail like a crupper, and brought forward and fastened by a turn or two to each of the pharahs, or girths, by which the whole is connected, and each turn of these cords serves to keep the rest in their places. After this a strong rope is put round his buttocks, and made fast on each side to the girth and crupper, so as to confine the motion of his thighs and prevent his taking a full step. These smaller ropes being properly adjusted, a couple of large cables with running nooses are put around his neck, and, after being drawn moderately tight, the nooses are secured from running closer, and then tied to the ropes on each side forming the girth and crupper already-mentioned; and thus all these ropes are connected and kept in their proper places, without any risk of the nooses of the dools becoming tight, so as to endanger the life of the elephant in his exertions to free himself. The ends of these cables are made fast to two koomkees, one on each side of the goondah, by a couple of turns round the belly, close to the shoulder, like a girth, where a turn is made, and it is then carried across the chest and fastened to the girth on the opposite side. Every thing being now ready, and a passage cleared from the jungle, all the ropes are taken from his legs, and only the tooman remains round his buttocks to confine the motion of his hind legs: the koomkees pull him forward by the dools, and the people from behind urge him on. Instead of advancing in the direction they wish, he attempts to retreat farther into the jungle; he exerts all his force, falls down and tears the earth with his tusks, screaming and groaning, and by his violent exertions often hurts and bruises himself very much; and instances happen of their surviving these violent exertions only a few hours, or at most a few days. In general, however, they soon become reconciled to their fate, will eat immediately after they are taken, and, if necessary, may be conducted from the verge of the jungle as soon as a passage is cleared. When the elephant is brought to his proper station and made fast, he is treated with a mixture of severity and gentleness, and in a few months (if docile) he becomes tractable, and appears perfectly reconciled to his fate. It appears somewhat extraordinary, that though the goondah uses his utmost force to disengage himself when taken, and would kill any person coming within his reach, yet he never or at least seldom attempts to hurt the females that have ensnared him, but on the contrary seems pleased, (as often as they are brought near, in order to adjust his harnessing, or move and slacken those ropes which gall him,) soothed and comforted

forted by them, as it were, for the loſs of his liberty. All the elephants, ſoon after they are taken, are led out occaſionally for exerciſe by the koomkees, which attend for that purpoſe.

Having now related the manner in which the male elephants, called Goondahs, are ſecured; we ſhall next deſcribe the methods employed for ſecuring a herd of wild elephants. Female elephants are never taken ſingly, but always in the herd, which conſiſts of young and old of both ſexes. This noble, docile, and uſeful, animal, ſeems naturally of a ſocial diſpoſition, as a herd in general conſiſts of from about forty to an hundred, and is conducted under the direction of one of the oldeſt and largeſt females, called the *patmai*, and one of the largeſt males. When a herd is diſcovered, about five hundred people are employed to ſurround it, who divide themſelves into ſmall parties, called Chokeys, conſiſting generally of one mahote and two coolies, at the diſtance of twenty or thirty yards from each other, and form an irregular circle in which the elephants are inclofed: each party lights a fire and clears a foot-path to the ſtation that is next him, by which a regular communication is ſoon formed through the whole circumference from one to the other. By this path reinforcements can immediately be brought to any place where an alarm is given; and it is alſo neceſſary for the ſuperintendants, who are always going round to ſee that the people are alert upon their poſts. The firſt circle (the dawkee) being thus formed, the remaining part of the day and night is ſpent in keeping watch by turns, or in cooking for themſelves and companions. Early next morning one man is detached from each ſtation, to form another circle in that direction where they wiſh the elephants to advance. When it is finiſhed, the people ſtationed neareſt to the new circle put out their fires and file off to the right and left, to form the advanced party, thus leaving an opening for the herd to advance through; and by this movement, both the old and new circle are joined and form an oblong. The people from behind now begin ſhouting and making a noiſe with their rattles, tomtoms, &c. to cauſe the elephants to advance; and, as ſoon as they are got within the new circle, the people cloſe up, take their proper ſtations, and paſs the remaining part of the day and night as before. In the morning the ſame proceſs is repeated; and in this manner the herd advances ſlowly in that direction where they find themſelves leaſt incommoded by the noiſe and clamour of the hunters, feeding, as they go along, upon branches of trees, leaves of bamboos, &c. which come in their way. If they ſuſpected any ſnare, they could eaſily break through the circle; but this inoffenſive animal, going merely in queſt of food, and not ſeeing any of the people who ſurround him, and who are concealed by the thick jungle, advances without ſuſpicion, and appears only to avoid being peſtered by their noiſe and din. As fire is the thing elephants ſeem moſt afraid of in their wild ſtate, and will ſeldom venture near it, the hunters always have a number of fires lighted, and particularly at night, to prevent the elephants coming too near, as well as to cook their victuals and keep them warm. The ſentinels ſupply theſe fires with fuel, eſpecially green bamboos, which are generally at hand, and which, by the crackling and loud report they make, together with the noiſe of the watchmen, deter the elephants from coming near; ſo that the herd generally remains at a diſtance near the centre of the circle.

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Should they at any time advance, the alarm is given, and all the people immediately make a noise and use their rattles to make them keep at a greater distance. In this manner they are gradually brought to the keddah, or place where they are to be secured. As the natives are extremely slow in their operations, they seldom bring the herd above one circle in a day, except on an emergency, when they exert themselves and advance two circles. They have no tents or covering but the thick woods, which, during the day, keep off the rays of the sun; and at night they sleep by the fires they have lighted, upon mats spread on the ground, wrapt up in a piece of coarse cloth. The season is then so mild that the people continue very healthy; and an accident seldom happens except to stragglers about the outskirts of the wood, who are sometimes, though very rarely, carried off by tigers. The keddah, or place where the herd is to be secured, is differently constructed in different places; here it consists of three enclosures, communicating with each other by means of narrow openings or gateways. The outer enclosure, or the one next to the place where the elephants are to enter, is the largest; the middle one is generally, though not always, the next in size; and the third, or farthermost, is the smallest. These proportions, however, are not always adhered to in the making of a keddah, nor indeed does there appear to us any reason for making three enclosures: but, as our intentions are merely to relate facts, we shall proceed to observe, that, when in the third or last enclosure, the elephants are then only deemed secure; here they are kept six or eight days, and are regularly though scantily fed from a scaffold on the outside, close to the entrance of an outlet called the Roomee, which is about sixty feet long and very narrow, and through which the elephants are to be taken out one by one. In many places this mode is not adopted; for, as soon as the herd has been surrounded by a strong palisade, koomkees are sent in with proper people, who tie them on the spot, in the same manner as was mentioned above of the goondahs, or male elephants, that are taken singly. These enclosures are all pretty strong; but the third is the strongest, nor are the elephants deemed secure, as already observed, till they have entered it. This enclosure has, like the other two, a pretty deep ditch on the inside; and, upon the bank of the earth, that is thrown up from the excavation, a row of strong palisades of middle-sized trees is planted, strengthened with cross bars, which are tied to them about the distance of fourteen inches from each other; and these are supported on the outside by strong posts like buttresses, having one end sunk in the earth and the other pressing against the cross bars to which they are fastened. When the herd is brought near to the first enclosure, or baigcote, which has two gateways towards the jungle, from which the elephants are to advance, (these, as well as the other gateways, are disguised with branches of trees and bamboos stuck in the ground so as to give them the appearance of a natural jungle,) the greatest difficulty is to get the herd to enter the first or outer enclosure, for, notwithstanding the precautions taken to disguise both the entries as well as the palisade which surrounds this enclosure, the palmal, or leader, now appears to suspect some snare, from the difficulty and hesitation with which in general she passes into it; but, as soon as she enters, the whole herd implicitly follows. Immediately, when they have all passed the gateway,

gateway, fires are lighted round the greatest part of the enclosure, and particularly at the entries, to prevent the elephants from returning. The hunters from without then make a terrible noise by shouting, beating of tomtoms (a kind of drum), firing blunt cartridges, to urge the herd on to the next enclosure. The elephants, finding themselves ensnared, scream and make a noise; but, seeing no opening except the entrance to the next enclosure, and which they at first generally avoid, they return to the place through which they lately passed, thinking perhaps to escape, but now find it strongly barricaded; and, as there is no ditch at this place, the hunters, to prevent their coming near and forcing their way, keep a line of fire constantly burning all along where the ditch is interrupted, and supply it with fuel from the top of the palisade; and the people from without make a noise, shouting and hallooing, to drive them away. Whenever they turn, they find themselves opposed by burning fires, or bundles of reeds and dried grass, which are thrust through the opening of the palisades, except towards the entrance of the second enclosure, or doobraze-cote. After traversing the Baigcote for some time, and finding no chance of escaping but through the gateway into the next enclosure, the leader enters, and the rest follow: the gate is instantly shut by people who are stationed on a small scaffold immediately above it, and strongly barricaded, fires are lighted, and the same discordant din made and continued, till the herd has passed through another gateway into the last enclosure, or rajecote, the gate of which is secured in the same manner as the former was. The elephants, being now completely surrounded on all sides, and perceiving no outlet through which they can escape, appear desperate, and in their fury advance frequently to the ditch in order to break down the palisade, inflating their trunks, screaming louder and shriller than any trumpet, sometimes grumbling like the hollow murmur of distant thunder; but, wherever they make an attack, they are opposed by lighted fires, and by the noise and triumphant shouts of the hunters. As they must remain some time in this enclosure, care is always taken to have part of the ditch filled with water, which is supplied by a small stream, either natural, or conducted through an artificial channel from some neighbouring reservoir. The elephants have recourse to this water to quench their thirst and cool themselves after their fatigues, by sucking the water into their trunks, and then squirting it over every part of their bodies. While they remain in this enclosure, they continue sulky, and seem to meditate their escape; but the hunters build huts, and form an encampment as it were around them close to the palisade; watchmen are placed, and every precaution used to prevent their breaking through. This they would soon effect, if left to themselves, notwithstanding the palisade is made of very strong stakes sunk into the earth on the outside of the ditch, and strengthened by cross bars and buttresses as already-mentioned.

When the herd has continued a few days in the keddah, the door of the roomee is opened, into which some one of the elephants is enticed to enter, by having food thrown first before, and then gradually farther on into the passage, till the elephant has advanced far enough to admit of the gate's being shut. Above this wicker-gate, or door, two men are stationed on a small scaffold, who throw

down the food. When the elephant has paſſed the door, they give the ſignal to a man who from without ſhuts it by pulling a ſtring, and they ſecure it by throwing two bars that ſtood perpendicular on each ſide, the one acroſs the other thus ×, forming the figure of St. Andrew's Croſs; and, then two ſimilar bars are thrown acroſs each other behind the door next to the keddah, ſo that the door is in the centre: for farther ſecurity, horizontal bars are puſhed acroſs the roomee, through the openings of the paliſades, both before and behind thoſe croſſes, to prevent the poſſibility of the door's being broken. The roomee is ſo narrow that a large elephant cannot turn in it; but, as ſoon as he hears the noiſe that is made in ſhutting the gate, he retreats backwards, and endeavours to force it: being now ſecured in the manner already noticed, his efforts are unavailing. Finding his retreat thus cut off, he advances and exerts his utmoſt force to break down the bars, which were previouſly put acroſs a little farther on in the outlet, by running againſt them, ſcreaming and roaring, and battering them, like a ram, by repeated blows of his head, retreating and advancing with the utmoſt fury. In his rage he riſes and leaps upon the bars with his fore-feet, and ſtrives to break them down with his huge weight. In February 1788 a large female elephant fell down dead in the roomee, from the violent exertions ſhe made. When the elephant is ſomewhat fatigued by theſe exertions, ſtrong ropes with running nooſes are placed in the outlet by the hunters; and, as ſoon as he puts a foot within the nooſe, it is immediately drawn tight and faſtened to the paliſades. When all his feet have been made pretty faſt, two men place themſelves behind ſome bars that run acroſs the roomee to prevent his kicking them, and with great caution tie his hind-legs together, by paſſing a cord alternately from the one to the other, like the figure 8, and then faſtening theſe turns as above deſcribed. After this, the pharah, dools, &c. are put on in ſucceſſion, in the ſame manner as on the goondah, only that here the people are in greater ſecurity. While theſe ropes are making faſt, the other hunters are careful not to go too near, but keep on the outſide of the paliſade, and divert his attention as much as they can from thoſe employed in faſtening them, by ſupplying him with graſs, and ſometimes with plantain-leaves and ſugar-canes, of which he is remarkably fond, by preſenting a ſtick, giving him hopes of catching it, or by gently ſtriking or tickling his proboſcis. He frequently, however, ſeizes the ropes with his trunk, and endeavours to break them, particularly thoſe with which his feet are tied, and ſometimes tries to bite them through with his grinders (as he has no inciſors or front teeth); but the hunters then goad him with ſharpened bamboos, or light ſpears, ſo as to make him quit his hold. Thoſe who are employed in putting the ropes around his body, and over his head, ſtand above him, on a ſmall kind of platform, conſiſting of a few bars run acroſs through the openings of the paliſades; and, as an elephant cannot ſee any thing that is above, and rather behind his head, they are very little incommoded by him, although he appears to ſmell them, and endeavours to catch them with his trunk. When the whole apparatus is properly ſecured, the ends of the two cables (dools) which were faſtened round his neck, are brought forward to the end of the roomee, where two female elephants are waiting; and to them theſe cables are made faſt. When every thing is ready, the door at the

end

end of the outlet is opened, the crofs bars are removed, and the paffage left clear. The ropes that tied his legs to the palifades are loofened, and, if he does not advance readily, they goad him with long poles fharpened at the ends or pointed with iron, and urge him on with their noife and din, and at the fame time the females pull him gently forward: as foon as he has cleared the Roomee, his conductors feparate; fo that if he attempts to go to one fide, he is prevented by the elephant that pulls in the oppofite direction, and *vice verfa*. The bundahs, which tie his hind-legs, though but loofely, yet prevent his going faft; and, thus fituated, he is conducted like an enraged bull that has a cord faftened to his horns on each fide, fo that he cannot turn either to the right or left to avenge himfelf. In like manner is this noble animal led to the next tree, as the goondahs before-mentioned were. Sometimes he becomes obftinate, and will not advance; in which cafe, while one of his conductors draws him forward, the other comes behind and pufhes him on: fhould he lie down, fhe puts her fnout under and raifes him up, fupporting him on her knee, and with her head pufhing him forward with all her ftrength; the hunters likewife affift by goading him, and urging him forward by their noife and din; fometimes they are even obliged to put lighted torches near, in order to make him advance. In conducting fmall elephants from the roomee, only one cable and one koomkee are made ufe of. As foon as each elephant is fecured, he is left in charge to the mahote, or keeper, who is appointed to attend and inftruct him; and, under him, there are from two to five coolies, according to the fize of the elephant, in order to affift and to fupply food and water, till he becomes fo tractable as to bring the former himfelf. Thefe people erect a fmall hut immediately before him, where the mahote, or one of the coolies, conftantly attends, fupplies him with food, and foothes and careffes him by a variety of little arts. Sometimes the mahote threatens and even goads him with a long ftick pointed with iron, but more generally coaxes and flatters him, fcratching his head and trunk with a long bamboo fplit at one end into many pieces, and driving away the flies from any fores occafioned by the hurts and bruifes he got by his efforts to efcape from the roomee. This animal's fkin is foft, confidering his fize; is extremely fenfible, and is eafily cut or pierced, more fo than the fkin of moft large quadrupeds. The mahote likewife keeps him cool, by fquirting water all over him, and ftanding without the reach of his trunk: in a few days he advances cautiouffy to his fide, and ftrokes and pats him with his hand, fpeaking to him all the while in a foothing tone of voice, and in a little time he begins to know his keeper and obey his commands. By degrees the mahote becomes familiar to him, and at length gets upon his back from one of the tame elephants, and, as the animal becomes more tractable, he advances gradually forward, towards his head, till at laft he is permitted to feat himfelf on his neck, from which place he afterwards regulates and directs all his motions. While they are training in this manner, the tame elephants lead out the others in turn, for the fake of exercife, and likewife to eafe their legs from the cords with which they are tied, and which are apt to gall them moft terribly unlefs they are regularly flacked and fhifted. In five or fix weeks the elephant becomes obedient to his keeper, his fetters are taken off by degrees, and generally in about five or fix months he

suffers himself to be conducted by the mahote from one place to another: care, however, is always taken not to let him approach his former haunts, lest a recollection of the freedom he there enjoyed should induce him again to recover his liberty. This obedience to his conductor seems to proceed partly from a sense of generosity, as it is in some measure voluntary; for, whenever an elephant takes fright, or is determined to run away, all the exertions of the mahote cannot prevent him, even by beating or digging the pointed iron hook into his head, with which he directs him; on such an occasion the animal seems to disregard these feeble efforts, otherwise he would shake or pull him off with his trunk, and dash him in pieces. Accidents of this kind happen almost every year, especially to those mahotes who attend the large goondahs; but such accidents are in general owing entirely to their own carelessness and neglect. It is necessary to treat the males with much greater severity than the females, to keep them in awe; but it is too common a practice among the mahotes, either to be negligent in using proper measures to render their elephants docile, or to trust too much to their good nature before they are thoroughly acquainted with their dispositions. The iron hook, with which they direct him, is pretty heavy, about sixteen inches long, with a straight spike advancing a little beyond the curve of the hook, so that altogether it is exactly like that which ferrymen or boatmen use fastened to a long pole.

In this account of the process for catching and taming elephants, we have used the masculine gender to avoid circumlocution, as both males and females are treated in the same manner: the former are seldom so docile, but, like the males of other animals, are fiercer, stronger, and more untractable, than the females.

Before we conclude, it may be proper to observe, that young elephants suck constantly with their mouths, and never with their trunks, as Buffon has asserted; a conclusion he made merely from conjecture, and the great and various uses to which they are well adapted and applied by every elephant.

The mode of connection between the male and female is now ascertained beyond the possibility of a doubt; as Mr. Buller, Lieut. Hawkins, and many others, saw a male copulate with a female, after they were secured in the keddah, in a manner exactly similar to the conjunction of the horse with a mare. This fact entirely overturns what has been so often related concerning the supposed delicacy of this useful animal, and a variety of other hypotheses, which are equally void of foundation. The exact time an elephant goes with young, has not yet been ascertained, but it cannot be less than two years, as an elephant brought forth a young one twenty-one months and three days after she was taken. She was observed to be with young in April or May 1788, and she was only taken in January preceding; so that it is very likely she must have had connection with the male some months before she was secured, otherwise they could not discover that she was with young, as a fœtus of less than six months cannot well be supposed to make any alteration in the size or shape of so large an animal. The young one, a male, was produced October 16, 1789, and appeared in every respect to have arrived at its full time. He was thirty-five inches high at his birth, and grew four inches in nearly as many months. Elephants are always measured at the shoulder; for the arch or curve of the back,

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of young ones particularly, is considerably higher than any other part, and it is a sure sign of old age whenever this curve is found flattened or considerably depressed, after an elephant has once attained his full growth.

Though these remarks, as well as several others in the above relation, do not come within the plan proposed, which was merely to describe the method of taking wild elephants in the province of Tipura, yet we hope they will not be deemed impertinent or superfluous, especially as several of them tend to establish some important facts in the natural history of this animal, that are not generally known, or little attended to in the accounts hitherto published.

ROYAY ACADEMY, SOMERSET HOUSE, 1799.

THE anniversary dinner of the Royal Academy and Associates, on the 27th of April, previous to the opening of the Annual Exhibition of Pictures, &c. &c. was attended by a more numerous company than on any former occasion. Among the visitors and amateurs of the fine arts, were, his Royal Highness the Duke of Kent; Duke of Norfolk, the Marquis of Abercorn, the Earls of Suffolk, Harcourt, and Besborough; Lords Carysfort, Grey de Wilton, Holland, and Sheffield; Bishop of Rochester; Imperial and Swedish Ambassadors; Sir Joseph Banks, Sir George Beaumont, Sir Abraham Hume, Sir William Young, Sir Harry Inglefield, and Sir John Leicester; Colonels Smith and Elford; Messrs. H. Dundas, Long, Canning, Windham, Charles Pybus, Rose, Elmsley, Udney, Godfrey, Thornton, de Calonne, William Smith, Desenfans, Price, Steevens, Malone, Pye, Aldermen Boydell and Clarke, and the two Messrs. Locke.

The company was so numerous that it was found necessary to provide an additional table, and about two hundred sat down to dinner. The Duke of Kent came in full uniform, attended by his aide-de-camp. His health was proposed by the president, and drunk standing. The president then, at the request of the duke, thanked the company in his name, and his royal highness rose and drank the health of the assembly. After a short interval, the duke proposed "Success to the arms of Archduke Charles," which was received with the most lively acclamation, and Mr. Knyvett gave an appropriate song.

The motto is taken from Quintilian, and, though descriptive of the just claims which the excellence of antiquity possesses to the veneration and gratitude of the moderns, might certainly be applied with an much justice to many other institutions as the Royal Academy. There is in it nothing strikingly characteristic of the object to which it serves as an index: "Tot nos præceptoribus, tot exemplis, instruxit antiquitas, ut possit videri nulla forte nascendi ætas felicior quàm nostra, cui docendæ priores elaboraverunt." It could unquestionably be no insult to the erudition or wisdom of the academy, to set themselves free, at least occasionally, from the classical fetters which seem to have been forged for them by Cicero, Quintilian, Longinus, &c. and to choose from some of our own writers a motto pertinent to their views, and illustrative of their labours.

The Exhibition is allowed by the best judges to contain, this year, more collective merit that it displayed the last two seasons.

It

It may not be unneceſſary to obſerve, that the boaſted diſcovery of a preparation, by which it was ſuppoſed the profeſſors of the Venetian ſchool prepared their canvas, has failed in producing the effect propoſed, and that the generality of our artiſts now rely on their own ſkill and experience, in giving to their productions force and brilliancy of colouring.

The preſident, Mr. Weſt, who is not ſurpaſſed in induſtry by any of his brother artiſts, has furniſhed nine pictures for the preſent Exhibition. His deſign is correct in all the *minutiæ* of the art, and his colouring has acquired a greater glow, and a more faſcinating hue, than moſt of his former pieces. His beſt production is the Nativity, a cartoon, deſigned for the collegiate church at Windſor. There exiſts throughout a chaſte and animated ſtile of expreſſion that is perfectly conſonant to the ſubject.

Weſtall's drawings continue to hold that diſtinguiſhed rank to which they have been long entitled, but his pictures are devoid of the outlines of ſymmetry, and filled in a crude and imperfect manner.

The Tired Soldier of Opie is in every reſpect one of the fineſt paintings in the exhibition. Finiſhed according to the pureſt principles of the art, it abounds in beauties that are the genuine characteriſtics of genius and ſenſibility.

Sir Francis Bourgeois has three landſcapes, very diſtinct in their nature. They are all excellent, but his Landſcape and Cattle at Sun-Riſe diſplays a glow of tint, a profound knowledge of light and ſhade, and a combination of powers which are rarely to be matched.

Smirke has been uncommonly ſucceſsful both in the drawing and colouring of his ſketch from Don Quixote, which combines ſpirited and ſtriking execution with the whimſical and ludicrous.

The Land-ſtorm of Loutherbourg is replete with a variety of beauties which cannot be eaſily deſcribed, but are felt by the connoiſſeur on the firſt view.

Gilpin's gift to the academy, on his admiſſion as a member, of Horſes frightened by flaſhes of lightning, is a teſtimony creditable to his own talents, and worthy of being preſerved by the ſociety.

Treſham has employed his pencil on a ſcriptural ſubject, and has given to Chriſt, in his conference with Nicodemus, a dignity and impreſſion that exemplify the dignity of the topic which he undertook to handle.

Turner, a young artiſt, who diſtinguiſhed himſelf laſt exhibition by a variety of excellent pieces, continues to ſupport the reputation which he has acquired.

We have only one piece from Fuſeli, and that is allegorical. The ſubject is the Cave of Spleen, from Pope's Rape of the Lock; and, though objectionable in ſome points, it is however entitled to a conſiderable degree of encomium.

De Wild retains his ſuperiority in the expreſſion of dramatic character, and his portraits of Munden and Fawcett are highly deſcriptive of the reſpective parts in which they are drawn.

Sir George Beaumont has not indulged the amateurs this ſeaſon with a ſingle landſcape; but he has furniſhed a very ſtriking picture of a Woman, living in a bleak ſituation, expoſed to the inclemency of the weather.

Among the portrait-painters, Sir William Beechy, Lawrence, Hoppner, Shee, and Northcote, are the principal. Sir William Beechy's

Beechy's portrait of Mr. Kemble the actor, and Lawrence's picture of Miss Jennings, which is a whole length, are their best. Shee has been peculiarly happy in his Portrait of an Officer. There is in the man and the horse an uncommon grandeur of outline, and a boldness of effect, which he has seldom produced before.

The sculptural pieces of Nollekens, Banks, and Bacon, are full of taste and correctness; and, among the architectural designs, those of Wyatt and Bonami take the lead.

LETTER WRITTEN TO A MINISTER WHO WAS VERY FOND OF USING HARD WORDS IN HIS SERMONS.

SIR, The unanimous and humillimous desideration, as well of your parochian as hicceubiquitarian illiterate semipaganian auditors, submissively demonstrateth, That although your spacious proemiums, and specious introduction of premised perspicuity in prædication, do inveigle our affections, for the meliorating of our minds, and indoctrinating our agricolated intellects, and do engage our acroamatic organs, and infix our ophthalms for the better inhibition of the stellicides of your beatifying instruction, yet, through the calliginous sublimity of internexed conundrums, tonitruating with obstreperous cadencies, you rather inanimate and obfuscate, than illuminate and scientificate, our abecedarian conceptions, so that commonly we return as plentifully unedified, as when we came:—We, therefore, out of the sense of our soul's good and benefiting by your ministry, in bonne esperance that your urbanity will not be exasperated at the presentation of these our cordial desires, do, from the nadir of our rusticity, almacanterize to the very zenith of your unparallelled sphere of activity, in conjunctively requesting that your ingenious genius would be placentiated to nutriate our animal appetites with intelligible theology, suitable to our most paidonatical apprehensions, and to recondite your sacrocondite locutions for more scholastic auscultators and scholiasts, and that ourselves, second-selves, junior ones, and servants, all of ignoramus's offspring, may not hear you evaporate in lycophronian cantharus, and gigantize in farraginous raptures, words we never met with in holy writ, as corollaries, ephemeris, and such other syssegists, or heterogeneal language; for that, without dilucidation of their genuine signification, we lose the gravy and system of your doctrine, and our common-sense is admiring at the words we understand not. Being therefore angustiated with a panic timidity of another Babel's restoration, or lest some sesquiqepalian saltembanco should be circumforaneate, or the spagyric bombast of holiensiem have experimented a metempsychosis, to repuzzle the quintessentials of our ingeniosities with more amalgamas, cohobations, and fixations, we shall quote St. Austin's saying, *Mallem ut reprehendant grammatici quam non intelligant populi*; and we wish it may be your practice.

And now, eximious sir, we supplicate your clemency not to look upon these lines as derogatory to your most exquisite parts, for we rather magnify and admire such egregious acquisitions, as being very suitable, and much in request; and of such Solomon's exclamation doth well, otherwise St. Paul's exprobation of barbarism may be injected, or the help of an interpreter required. *Qui loquitur linguâ*

seipsum ædificat; nam tibi benefacias, sed aliis non ædificatur: sed verbum sat sapienti. And thus, having copulated our plebeian endeavours, we exosculate the subumbration of your subligacles; and sooner shall the surges of the areniferous sea ignify and evaporate, than the chain of our duty be in the least unconcatenated or dissolved; always wishing you health and happiness, &c.

CELIBACY OF THE FELLOWS OF COLLEGES.

IT has long been a cause of complaint, that the restriction of celibacy laid upon fellows of colleges, has not been abolished in both of our universities. A grace was lately proposed in the Cambridge senate, but without success. That a class of men who are expected to set an example of virtue and irreproachable conduct, should be excluded from a mode of life disallowable to no other, is contrary to the dictates of Nature, and hostile to the improvement of religion and morality. Unless it can be denied that clergymen are endued with passions similar to other men, no just argument can be alleged in favour of such an exception. We know there will be many adversaries to encounter, many obstacles to surmount, before this object can be carried into effect. We know that there are many amongst you, who, having passed, as it were, their meridian, will discountenance it in toto; many will treat it with lukewarmness; yet many, we trust, there are, who will be ready to espouse its cause.

Amongst the objections started against this proposal, one of the principal seems to be, that the succession will become slower in every college; we grant it may be so, yet the vacancies occasioned by marriage are comparatively so very few, that no very material difference will be felt in this respect.

Others plead that the university will be rendered a scene of confusion, and that there will be an interruption to the discipline of it, when it is filled with the families of the collegians.

Others assert, on the contrary, that the university will be deserted by its professors. But both these disadvantages may be guarded against by proper regulations.

Let us now consider the evils that arise from this restriction: and here it cannot be denied, that it opens a door to perjury and immorality. A clergyman, respectable perhaps in every other instance, when debarred from the happiness and comfort of an honourable connection, is induced to enter into one of an improper kind, which, if known, renders him an object of censure and disrespect. He gets preferment at a time of life when he cannot relinquish his old habits, and sits down at his living unenjoyed when obtained, because he thinks it too late to form a new connexion. Others there are, who, having at an early period engaged themselves to women of amiable manners and genteel education, are compelled to make up their minds to celibacy, till they get preferment from their college. Others again there are, who are tempted to infringe the laws of their respective societies, and clandestinely to commit an offence which may possibly appear to them to be a venial one.

Let the present members of our learned societies be the objects of our attention, and some method may hereafter be devised to remove any detriment that might accrue to their successors.

Let

Let this propoſal be allowed to paſs the caput, that the fair opinion of the two univerſities at large may be canvaſſed, and let the heads exert themſelves in ſupport of a cauſe which, both in a religious and moral point of view, ſeems ſo highly intereſting and important. The following arrangements are recommended: 1ſt. Let the fellows be allowed to marry after ſo many years ſtanding. 2d. Let them not be allowed to bring their families either into the univerſity, or within a certain diſtance. 3d. Let ſo many whoſe attendance is required for the inſtruction and care of the ſtudents, be compelled to *reſidence in their reſpective turns.* 4th. Let every fellow vacate his fellowſhip, upon inſtitution to any eccleſiaſtical benefice, upon ſucceeding to an eſtate either real or perſonal, on accepting a place under government for life, or an annuity of a certain value, &c. &c.

OBSERVATIONS ON THE WINTER SLEEP OF ANIMALS AND PLANTS.

THE winter ſleep is a very ſingular property of animals and plants; and, though it occurs daily before our eyes, we are not able to explain the phenomena with which it is attended. In cold countries many animals, on the approach of winter, retire to their ſubterranean abodes, in which they bury themſelves under the ſnow, where they remain five or ſix months without nouriſhment or motion; nay, almoſt without circulation of their blood, which flows only ſluggiſhly and in the wideſt veſſels. Their perſpiration is almoſt imperceptible: but ſtill they loſe ſomething by it; as they enter their winter quarters in very good condition, and are exceedingly thin when they return from them.

Some animals enjoy their winter ſleep under the earth, and others concealed below the ſnow; ſome for the ſame purpoſe creep into the holes of rocks, and others below ſtones or the bark of trees. Some kinds, ſuch as ſwallows and frogs, can paſs the winter in marſhes under the water. In this ſtate many of thoſe expoſed to the ſeverity of the open air are deſtroyed by the froſt when it is violent; and, even ſome of thoſe which have buried themſelves ſhare the like fate.

Plants have their winter ſleep alſo; for, during the period of winter, their ſap flows towards the root, and the circulation of it, which is very ſlow, takes place only in the wideſt veſſels. Were the expanſion of the ſap in winter as conſiderable as in ſummer, it would burſt all the veſſels on being frozen.

Several obſervers have endeavoured to prove that this ſingular circumſtance is merely accidental; and, indeed, no difference is found in the internal organization of thoſe animals which have winter ſleep, and thoſe which have not. It is very remarkable that this property belongs in general to animals of prey. As theſe have far ſtronger powers of digeſtion, and ſtronger digeſtive juices, it would appear that abſtinence from food for ſeveral months would to them be hardly poſſible.

The bear, the bat, and the hedge-hog, have winter ſleep; but the white bear has not. As the latter is ſecured from the cold by his long hair, he finds nouriſhment in the dead whales and ſeals which are caſt on ſhore by the waves.

The earth-worms have winter sleep; but aquatic-worms very seldom. Insects, as well as their larvæ, have winter sleep. Butterflies may be often seen fluttering about in the warm days of spring, after having spent the whole winter in that condition. Amphibious animals have winter sleep, those which live merely in the ocean excepted.

Few birds, on the other hand, are exposed to this state. The greater part of these, on approach of winter, retire to a milder climate, where they can find more abundant nourishment.

In Iceland the sheep have winter sleep, because in that country they are suffered to range in perfect freedom. In the winter season therefore they may be seen buried under the snow and in the bushes, where it would be impossible for them to remain were they not in that condition.

LOVE AND MARRIAGE.

MANKIND were not, in their original, divided into male and female, as at present; but each individual person was a compound of both sexes, and was in himself both husband and wife, melted down into one living creature. This union, no doubt, was very entire, and the parts very well adjusted together, since there resulted a perfect harmony betwixt the male and female, although they were obliged to be inseparable companions. And so great was the harmony and happiness flowing from it, that these androgynes, or men-women, became insolent upon their prosperity, and rebelled against the gods. To punish them for this temerity, Jupiter could contrive no better expedient than to divorce the male part from the female; and make two imperfect beings of the compound, which was before so perfect. Hence the origin of men and women, as distinct creatures. But notwithstanding this division, so lively is our remembrance of the happiness which we enjoyed in our primeval state, that we are never at rest in this situation; but each of these halves is continually searching through the whole species to find the other half, which was broken from it; and, when they meet, they join again with the greatest fondness and sympathy. But it often happens, that they are mistaken in this particular; that they take for their half what no way corresponds to them; and that the parts do not meet nor join in with each other, as is usual in fractures. In this case the union is soon dissolved, and each part is set loose again to hunt for its lost half, joining itself to every one whom it meets by way of trial, and enjoying no rest, till its perfect sympathy with its partner shews, that it has at last been successful in its endeavours.

When Jupiter had separated the male from the female, and had quelled their pride and ambition by so severe an operation, he could not but repent him of the cruelty of his vengeance, and take compassion on poor mortals, who were now become incapable of repose or tranquillity. Such cravings, such anxieties, arose, as made them curse their creation, and think existence itself a punishment. In vain had they recourse to every other occupation and amusement. In vain did they seek after every pleasure of sense and every refinement of reason. Nothing could fill that void in their hearts, or supply the loss of their partners, who were so fatally separated from them. To remedy this disorder, and to bestow some comfort, at least, on the human race in their forlorn situation, Jupiter sent down

LOVE

LOVE and HYMEN to collect the broken halves of human kind, and piece them together in the best manner possible. These two deities found such a prompt disposition in mankind to unite again in their primitive state, that they proceeded on their work with wonderful success for some time; till at last, from many unlucky accidents, dissension arose between them. The chief counsellor and favourite of Hymen was CARE, who was continually filling his patron's head with prospects of futurity; a settlement, family, children, servants; so that little else was regarded in all the matches they made. On the other hand, Love had chosen PLEASURE for his favourite, who was as pernicious a counsellor as the other, and would never allow Love to look beyond the present momentary gratification, or the satisfying the prevailing inclination. These two favourites became, in a little time, irreconcileable enemies, and made it their chief business to undermine each other in all their undertakings. No sooner had Love fixed upon two halves, which he was cementing together, and forming to a close union, but Care insinuates himself, and, bringing Hymen along with him, dissolves the union produced by Love, and joins each half to some other half, which he had provided for it. To be revenged of this, Pleasure creeps in upon a pair already joined by Hymen; and, calling Love to his assistance, they underhand contrive to join each half by secret links to halves which Hymen was wholly unacquainted with. It was not long before this quarrel was felt in its pernicious consequences; and such complaints arose before the throne of Jupiter, that he was obliged to summon the offending parties to appear before him, in order to give an account of their proceedings.—After hearing the pleadings on both sides, he ordered an immediate reconcilement between Love and Hymen, as the only expedient for giving happiness to mankind: and, that he might be sure this reconcilement would be durable, he laid his strict injunctions on them never to join any halves without consulting their favourites Care and Pleasure, and obtaining the consent of both to the conjunction. Where this order is strictly observed, the androgyne, or man-woman, is perfectly restored, and the human race enjoy the same happiness as in their primeval state. The seam is scarcely perceived that joins the two beings together; but both of them combine to form one perfect and happy creature.

MAY GAMES.

IN ancient times it was usual, on the 1st of May, for the inhabitants of London to resort to the surrounding woods and meadows to partake of the diversions called May Games, which were not confined to the lower classes, but were equally the entertainment of persons the highest rank.

On the 1st of May, 1515, King Henry VIII. and Queen Catherine, with many lords and ladies, rode a Maying from Greenwich to the high ground of Shooter's Hill, where they were received by two hundred tall yeomen, all clothed in green, with green hoods and bows and arrows.

On the invitation of the gentleman who assumed the character of Robin Hood, the king and queen, with their retinue, entered the Green Wood, where, in arbours made of boughs intermixed with flowers, they were regaled with venison and wine.

RED SNOW FOUND ON THE ALPS.

WHEN M. de Sauſſure explored mount Breven, for the firſt time, in the year 1760, he found in ſeveral places on a declivity ſnow ſtill remaining, and was not a little ſurpriſed to ſee the ſurface of it, in various parts, tinged with a very lively red colour. This colour was brighteſt in the middle of ſuch ſpots as had their centres more depreſſed than the edges, or where different planes covered with ſnow ſeemed to be joined to each other. When he examined this ſnow more cloſely, he remarked that its redneſs proceeded from a very fine powder mixed with it, and which had penetrated to the depth of two or three inches, but no farther. It did not appear that this powder had come from the higher parts of the mountain, becauſe ſome of it was found in places at a conſiderable diſtance from the rocks and much lower down; and it appeared alſo that it had not been conveyed thither by the winds, becauſe it was not diſpoſed in ſtripes or in the form of radii. The moſt probable conjecture therefore was, that it was a production of the ſnow itſelf, or the remains of its partial melting ſuſpended at its ſurface as in a filtre when the water paſſed through it. What ſeemed to favour this conjecture ſtill more, was, that the colour at the edges of the hollow places where little water had ſunk down was extremely faint; and, on the other hand, ſhewed itſelf ſtronger in thoſe parts where the greateſt quantity of water ſeemed to have penetrated.

M. de Sauſſure took a tumbler full of this ſnow, as he had no other veſſel with him, and held it in his hand till the ſnow melted, when he ſoon ſaw the red duſt depoſit itſelf at the bottom. Its colour then did not appear ſo dazzling as before, and when dry it loſt it entirely: it decreaſed alſo in quantity, ſo as almoſt to appear nothing.

Next year M. de Sauſſure aſcended the Breven, and found on it a quantity of the ſame kind of red ſnow, ſome of which he ſqueezed cloſely together and put into a large handkerchief, but before he got home it was entirely diſſolved by the heat of the ſun. It was not, however, on the Breven alone that he diſcovered ſnow of this kind; for he found of it on all the high mountains of the Alps, about the ſame ſeaſon of the year, and in ſimilar ſituations; ſo that he was much ſurpriſed that authors who had written reſpecting the Alps, ſuch as Scheuchzer, had made no mention of it. It is, indeed, true, that it is found only in hollows, where the ſnow lies deep, and at a ſeaſon of the year when the melting of it has proceeded to a certain degree; for, when none of the ſnow or when very little of it has been melted, the duſt is then in too ſmall quantity to attract the eye; and, if the melting has proceeded too far, the whole of the powder has paſſed through with the water, and it becomes equally inviſible. Beſides, towards the end of the melting, a great many foreign particles and impurities, conveyed thither by the wind, are mixed with it, ſo that its colour is no longer diſtinguiſhable.

In the year 1778, when M. de Sauſſure was on mount St. Bernard, he found a great deal of the ſame kind of ſnow. He collected as much of it as he poſſibly could; and Mr. Murrith, an experienced naturaliſt, collected of it alſo; ſo that they were enabled to make ſome experiments. On account of its great ſpecific gravity, M. de Sauſſure

Sauſſure treated this red powder as an earth, firſt with diſtilled vinegar, but he employed ſo little that he had no reſult. He then boiled it in the muriatic acid, and obtained a ſolution, which, when carefully diſtilled and filtred, had ſo brown a colour that he was quite at a loſs reſpecting the nature of this ſubſtance. He therefore applied it to the blow-pipe, and obſerved that it flamed with a ſmell like that of burnt vegetables.

This experiment induced M. de Sauſſure to digeſt forty grains of the powder in ſpirit of wine; and, having filtered the ſolution, he found that the reſidue weighed ſeven grains leſs: the ſpirit of wine had become of a golden yellow colour. He then diſtilled it in a balneum mariæ, and the ſpirit of wine came off perfectly pure. An oily tranſparent matter of a golden brown colour, which by the warmth of the balneum mariæ had not become dry, remained at the bottom of the retort. This oily matter had a ſmell like that of wax, which it emitted alſo when burning. The depoſit, which the ſpirit of wine had not diſſolved, was, in regard to its extractive part, alſo inflammable; and the aſhes which remained after it was burnt, tho' they did not ſeem alkaline, were fuſed by the blow-pipe into a porous kind of greeniſh glaſs.

Theſe experiments ſeem to prove that this powder was a vegetable ſubſtance, and probably the farina of ſome flower. M. de Sauſſure was acquainted with no plant in Swiſſerland that produced red farina in ſuch abundance as to tinge the ſnow of the Alps red; eſpecially when it is conſidered that a great deal of it muſt be loſt before it can reach the ſpots where the red ſnow is found. But the action of light, perhaps, may firſt give it its red colour; and, in regard to its ſpecific gravity, that is not ſurpriſing, as by its long continuance on the ſnow it muſt, on account of the repeated ſlow meltings, receive ſuch an accumulation of particles as to become denſe and heavy.

M. de Sauſſure communicated his diſcovery to M. Bonnet, who adviſed him to examine the powder with a microſcope, in order to ſee whether it exhibited the appearance of the farina of flowers. He did ſo with the greateſt care and the beſt glaſſes, but he could not diſcover the leaſt regularity in its form.

Though M. de Sauſſure found this powder in different places on the Alps, he however aſks, whether it be very common, and whether it be found on the high mountains in different countries and different climates, ſuch, for example, as the Cordilleras? Theſe queſtions deſerve certainly to be examined; and, though it be probable that this powder conſiſts of the farina of flowers, it is not altogether impoſſible that it may be an earth ſeparated by the ſnow itſelf, and poſſeſſing ſome inflammable properties called forth by the immediate action of the light and heat of the ſun, which ſhines with ſo much livelineſs in the pure air of theſe elevated regions.

ACCOUNT OF THE NEW INSECTS SO PREJUDICIAL TO APPLE-TREES; AND A METHOD FOR EXTIRPATING THEM.

WITHIN theſe few years an inſect, before unknown in this country, has made its appearance in the Britiſh orchards, which, if means are not generally taken to root it out, will in a ſhort period deſtroy every apple-tree in the kingdom. It exhibits upon the trees the appearance of a white efflorescence, like what

may

may be sometimes seen on stones in the fields: this seems, however, to be only the habitation of the insects, which exist in millions wherever they have once lodged themselves. On bruising the efflorescence-like matter between the fingers, a deep red-coloured fluid like blood is expressed, and which probably is of that nature. Already have several valuable orchards been much injured by this insect, which corrodes the apple-trees in such a manner as at last completely to destroy their organization and to kill them, without the proprietors, many of them at least, even once suspecting the cause. We hope what we now state will be the means of making the fact generally known, and of inducing every person interested to co-operate in rooting them out.

We are happy in having it in our power to give them the recipe of a cheap composition discovered by William Forsyth, Esq. his majesty's gardener at Kensington, which has been found effectually to answer the purpose. It is as follows:

To one hundred gallons of human urine and one bushel of lime add cow-dung to bring it to the consistence of paint. With this composition anoint the trees. The present is the proper season for applying it. If the white efflorescence-like substance in which the insects are lodged has made its appearance, it should previously be brushed off.

AGRICULTURAL MISCELLANIES.

THE firing of hay, though it is stacked while too green, is less common about Newcastle than in most other parts of the country. This is owing to the following precaution being in general practice in the above neighbourhood: The farmers stuff a sack as hard as they can with hay, and tie the top tight with a cord; they then make the rick round the sack, which they pull up as the rick advances in height; and it is pulled out at the top when the rick is finished. Thus a tunnel is left in the middle of the hay, which admits a circulation of air, and prevents the heat which might otherwise occasion its destruction.

An experiment of considerable extent has been made in cultivating moss ground, belonging to the estate of Pottieshall, near Bathgate; other mosses adjoining and in the neighbourhood have also begun to be cultivated in the same manner; and it is hoped every gentleman who has moss on his lands will follow this laudable example, and give encouragement to their tenants and others to do so.

To prevent Flies teazing Horses.—Take the tops or any tender part of elder, from which express the juice, and mix it with hog's lard till it is of the consistency of promatum. Apply it to those parts the flies in general come to, and they will avoid it. The utility of this method has been often experienced in the New Forest, against the forest fly; and elder boughs will keep off smaller flies from the heads of horses.

At a time when, from a laudable principle of public spirit, exertions are making in every part of the kingdom for improving the breed of cattle, the following particulars may not be unacceptable to the practical husbandman:—In the course of the last century the Dutch, convinced by the success with which pigeons, turkies, and other

other foreign animals, had been transplanted into Europe, that others, when once accustomed to the air of that quarter, might likewise become more fruitful in it, brought from the East Indies a kind of sheep, larger than the common sheep of Europe, and clothed with a wool little inferior to that of England; and this kind of sheep succeeded so well in the Texel and East Friesland, that the ewes used to have four lambs a-year. This agrees with the observation, that sheep generally thrive much better when removed from a hot to a cold climate, than when removed from a cold to a hot climate. The sheep of this species, bred in the Texel, give fleeces weighing from ten to sixteen pounds, and of a wool so long, so fine, and so silky, that it passes for English wool. Some of this breed, which the Dutch had permitted the Flemings to transport into the neighbourhood of Lisle and Varneton, succeeded so well, that the whole race has since obtained the name of Spanish sheep.

The Swedes, though situated in a more severe climate, tried the same experiment on some English sheep; and with such success, that they now can boast of wool of their own growth equal to that of the growth of England, or even of Spain itself.

In the kingdom of Thibet, which lies to the northward of Hindostan, and is separated from it by a range of high mountains, there is a very peculiar and extremely-valuable breed of sheep, which, in the opinion of people who have visited the country, might prove an acquisition of vast importance to our settlements in the East. They are of a small breed, not differing from our sheep in figure, except that their tails are very broad; but their fleeces, with respect to the fineness, length, and beauty, of the wool, are incomparably superior to all others yet known. The wool of these sheep is the material from which is manufactured the shawl, the most delicate woollen manufacture in the world, so highly prized in the East, and of late years well known in England. The tails of these sheep sell very high, and are used, mounted on silver handles, for brushes to chase away the flies. At the time Mr. Hastings left Bengal, he had some of these Thibet sheep in his paddock.

The following remarks have been sent us relative to the breed of sheep in the Isle of Man.—The rot is scarcely known among them; but a disorder prevails, occasioned by eating a particular weed, which the Manks call *ouw*. Its leaf destroys the liver, and in about twelve months causes the animal's death. On opening the sheep, this leaf is found attached to its liver, and transformed into an animal having apparent life and motion, and retaining its shape as an herb.

Spanish Wool.—The following account of the care and treatment of sheep by the Spanish flock-masters, with a view to the preservation of their wool, is extracted from a work of admitted authenticity, and may be interesting to many in this country.

In Spain there are two kinds of sheep; the coarse-wooled sheep, who remain all their lives in their native country, and who are housed every night in winter; and the fine-wooled sheep, who are all their lives in the open air, and travel every summer from the cold mountains of the northern parts of Spain, to feed all the winter on the southern warm plains of Andalusia, Manca, and Estramadura.

From a computation made with utmost accuracy, it has appeared, that there are five millions of fine-wooled sheep in Spain. Ten thousand sheep compose a flock, which is divided into ten tribes. One man

man has the conducting of all. He has authority over fifty shepherds and fifty dogs, five to each tribe.

The first thing the shepherd does when the flock returns from the south to their summer downs, is to give them as much salt as they will eat; every owner allows his flock of 1000 sheep 100 azoves or 25 quintals of salt, which the flock eats in about five months; they eat none in their journey, nor in their winter walk. This has ever been the custom, and it is the true reason why the kings of Spain cannot raise the price of salt to the height it is in France, for it would tempt the shepherds to stint the sheep, which, it is believed, would weaken their constitutions and degrade the wool. The shepherd places fifty or sixty flat stones at about five steps from each other, and strews salt upon each stone: he leads the flock slowly though the stones, and every sheep eats to his liking.

Dr. Marx, an eminent German physician, lately published some experiments, shewing that so common a production as the acorn may be converted to many salutary purposes. The doctor ascribes great medical virtues to a kind of coffee made from acorns, and the method of preparing it is as follows:—Take sound and ripe acorns, peel off the shell or husk, divide the kernels, dry them gradually, and then roast them in a close vessel or roaster, keeping them constantly stirring, in doing which especial care must be taken that they be not burnt or over-roasted, either of which would be hurtful. The doctor recommends half an ounce of these roasted acorns, ground and prepared like coffee, to be taken morning and evening, either alone or mixed with coffee and sweetened with sugar, either with or without milk. The author says, that acorns have been always esteemed a wholesome nutriment for men, and that by their medical qualities they have been found to cure slimy obstructions in the *viscera*, and to remove nervous complaints.

An ingenious mechanic at Manchester, has produced several specimens of a kind of cloth made of thread obtained from the stalk of the common stinging-nettle, after being prepared exactly in the same manner as hemp and flax. It seems that the workmen who wove these specimens, and others who have accurately examined them, are of opinion, that stuffs of a fine and lasting quality, warm and pliant, and of an uniform consistence, may be produced in large quantities from the thread of the nettle.

A letter from Kingston, Jamaica, says, "The Bourbon cane, being so wonderfully productive, will be a source of incalculable riches to this island; two acres and a half of them, cut on Williamsfield estate, in St. Thomas in the Vale, made nearly eight hogsheads of fine clear and strong-grained sugar, each hogshead weighing upwards of 16 cwt."

Colonel Lyons, a native of Vermont, and member of Congress, has lately discovered a method of making paper of the bass-tree, which equals that made of rags in every thing but the colour.

A manufactory is establishing at Norwich for making stockings, gloves, pieces for waistcoats, &c. of the hair of rabbits, spun with silk to supply the want of length. From the specimens that have been produced, it is supposed this project will prove a very advantageous undertaking.

While

While travelling in the interior of Africa, Mr. Parke had frequent opportunities of observing the conduct of that remarkable bird, called the honey-guide, mentioned by Dr. Sparman, and other naturalists who have travelled into Africa. It is a curious species of the wokow, and derives its name from its singular quality of discovering wild honey to travellers. Honey is the favourite food of this bird; and, morning and evening being the time of feeding, it is then heard calling in a shrill tone *cherr, cherr*, which the honey-hunters carefully attend to as the summons to the chace. At last the bird is observed to hover for a few minutes over a certain spot, and then silently retiring to a neighbouring bush, or other resting place, the hunters are sure of finding the bees nest in that identical spot, whether it be in a tree, or in the crevice of a rock. The bee-hunters never fail to leave a small portion for their conductor, but commonly take care not to leave so much as would satisfy its hunger. The bird's appetite being only whetted by this parsimony, it is obliged to commit a second treason, by discovering another bees nest, in hopes of a better salary. It is farther observed, that the nearer the bird approaches to the hidden hive, the more frequently it repeats its call, and seems the more impatient.

GLEANING.—After all that has been said for and against the practice of gleaning corn, perhaps the most conclusive arguments may be found in the following extract from Mr. Colquhoun's Treatise on the Police of the Metropolis. "If some general regulations could be established by law to prevent the gleaning of corn except for the benefit of the farmers, infinite advantages would arise in the preservation of the honesty of a great number of the labouring people in the country, whose morals are completely ruined in early life through this medium alone. Parents take their children to the fields during harvest, exhibiting an example too often to infants, which reconciles them at mature years to habits of pilfering, ruinous to themselves and to society. It would perhaps be better for farmers to pay double wages to gleaners than to permit gleaning on their own account.—The mischief arising from it must be obvious to every country magistrate: it first teaches the children of cottagers to become thieves in a little way, and afterwards serves as a cover for more extensive depredations; for almost every thief, charged with stealing corn, pretends it was obtained by gleaning."

Account of a Provision made upon an Inclosure for supplying the Poor with Fuel, by Edward Parry, Esq.

Upon the inclosure of the parish of Little Dunham, in Norfolk, in the year 1794, being lord of the manor, I got a clause inserted, directing the commissioners to set out a parcel of land, to be called The Poor's Estate, to be vested in the lord of the manor, rector, churchwardens, and overseers of the poor, for the time being, and to be let by them for twenty-one years on lease; the rents and profits to be laid out by them in fuel, to be delivered at the cottages of the poor in such proportions as the trustees should think proper.

Although the prejudices of the poor against the inclosure were very great before it took place, the moment they saw the land inclosed, and let as the poor's estate for twenty-one years, by auction, at the rate of 50l. a-year, (although estimated by the commissioners at only 20l. a-year,) they were highly gratified.

MEETING OF ASTRONOMERS AT GOTHA.

THE following account of the objects discussed by Lalande and the German astronomers, &c. who met last summer at Gotha, has been published by Professor Bode, of Berlin, in his Astronomical Almanac for the year 1801.

In the month of January, 1798, Lalande gave public notice that he intended, in the course of the summer, to make a tour to Gotha, partly to see the celebrated observatory at that place, and partly to pay a visit to his learned friend and old correspondent Major Von Zach. On this occasion he wished, in particular, to form a personal acquaintance with several German astronomers, some of whom had long kept up an epistolary correspondence with him; and many of them, among whom I was one, received the most flattering invitation to meet him.

I resolved to undertake this jaunt; to which I was encouraged, in particular, by M. Von Hahn, of Remplin, who, however, was not able to accompany me. I accordingly obtained his majesty's permission; and having learned that Lalande, with his niece, Madame le Français, had arrived at Gotha on the 25th of July, I set out the 7th of August by Leipsig, Naumburg, and Erfurt; and on the 9th reached Gotha, where I had the pleasure of becoming personally acquainted with the long-celebrated meritorious French astronomer and his learned niece, and of embracing my worthy friend Von Zach. At the duke's court I met with the most gracious reception; but the unfavourableness of the weather deprived me, in a great measure, of the satisfaction of using the noble instruments in the observatory; for, during the time which I spent there so agreeably, the atmosphere was overcast, and storms and rain prevailed. The astronomers and others present were,—Professor Klugel, Professor Gilbert, and M. Pister, secretary of the post-office, from Halle; Professor Seyffer, from Gottingen; M. Kohler, and M. Seyffert, from Dresden; M. Schaubach, from Meiningen; and M. Feer, architect, from Zurich. The other German literati, who had received an invitation, sent excuses for not accepting it.

Among the various astronomical and mathematical objects discussed on this occasion were the following:

Lalande wished that the decimal system, some time ago proposed in France to be used in astronomical and mathematical calculations, in the division of time and of the circle, in instruments for long measure, in weights, coins, &c. might be introduced into Germany. We, on the other hand, represented to him the difficulties, in regard to common life, which opposed, and which would perhaps ever oppose, the general adoption of this system, otherwise useful in calculation; and, that men of letters were the least of all fit to remove these difficulties; we, however, agreed that in future we would favour this system more in our writings, in order to make it better known; and we at the same time expressed a hope that the national institute of Paris would transmit to us the new tables for the decimal calculation, as soon as they were published, which Lalande promised to use his interest to effect.

He mentioned also the general adoption of the new standard proposed in France, called the Metre, or the linear unity of 10,000,000

parts of a quadrant of the earth's meridian; because, in his opinion, it was borrowed from Nature itself, and therefore was equally proper for all nations. But we could give him very little hope in regard to the introduction of the metre in Germany; especially as the French foot is already used in comparing measures, and its exact length every where known. We, however, resolved to give foreign measures according to the metre, as we formerly gave them by the French foot, as soon as the exact length of the former should be made known to us by the grand measurement, carrying on in France, but not then completed, though it has since. We agreed also to give, in future, all calculations and astronomical observations, as well as the places of the heavenly bodies in astronomical books, for the mean time, as soon as the editor of the Connoissance des Tems should set us the example. Perhaps it will be possible also to introduce this mean time into common life, in order to effect a better regulation of the going of watches.

Accurate and more numerous observations of the time of the moon's culmination were next recommended, as these might serve in determining the difference of meridians of places; also to insert in astronomical almanacs the time of the occultation of stars of the 5th and 6th magnitude, before the first and after the last quarter of the moon, in order to give occasion to more frequent calculations of these differences. In calculating the oppositions of the superior planets, for examining the theory of their orbits, the same method must absolutely be followed; and that given in Lalande's Astronomy, section 4162, was here proposed.

I produced a complete drawing of the 15th sheet, and the two engraved but not yet finished sheets, tab. 11. and 12. of my large Celestial Atlas, and the manuscript of my Complete Catalogue of the Stars, and particularly the part respecting De la Caille's Southern Stars, which have never yet been numbered. Lalande took this occasion to observe, that room might still be found on some of the celestial charts for new constellations, and wished to see inserted among the stars an aerostat, as the invention of the French. I embraced this opportunity, contrary to my former firm resolution of introducing no new constellations, to propose on the other hand, that a German discovery, made 350 years ago, viz. the art of printing, might be perpetuated in the heavens by some emblem. Both proposals were approved. The first constellation will be inserted between the Goat and Southern Fish; and the other between the Ship, Unicorn, and Greater Dog.

Lalande was convinced, at the same time, by ocular demonstration, of the accuracy of observations made with a Hadley's sextant on the Insels Berge, one of the highest forests of Thuringia, where the duchess gave a fete to the company, and where we took several corresponding altitudes of the sun with various ten-inch sextants by Troughton, in order to determine the time and height of the pole.

Lalande had with him a chronometer by Berthond the elder at Paris. The Duke of Gotha has in his possession four English chronometers, by Arnold, Emery, Mudge, &c. Major Von Zach has one by Emery; and M. Seyffert, of Dresden, one made by himself. All these were compared with pendulum clocks, and with each other; and their rate of going was found to be remarkably regular, which proved that they were fit to be used in determining the longi-

tude. Seyffert also shewed, merely to give pleasure to Lalande, a clock constructed by himself, according to a new invention, and having marked on the dial-plate the diurnal division of the day proposed in France. He had likewise with him, of his own workmanship, a stop-watch with the decimal division, which he presented to Madame le Français.

Some new instruments and maps were also exhibited and examined. Among these were an ocular heliometer, to be applied to a Herschel's telescope, invented by M. Kohler, and constructed by M. Seyffert; the diaphragms of the former, for determining the strength of the light of the stars, and his proposed vessel for an artificial water horizon; a map of the Rhein Thals, laid down by means of a Hadley's sextant, by M. Feer, of Zurich; some sheets of a new map of the Duchy of Wurtemberg, by M. Bohnenberger, of Tubingen, measured and delineated by means of like instruments. The beautiful instruments on the ducal observatory of Seeberge, near Gotha, and the convenient and proper manner in which they are erected, obliged Lalande to acknowledge that he had never seen any where an observatory so well furnished.

Of the new French calendar, and their manner of reckoning by decades, as well as their proposed decimal division of the day, there was no discussion. Lalande himself must have been aware, that as the introduction of this innovation found even in France, and particularly in the provinces, so great opposition, it would meet with much more in other countries. It would also hardly find admission among those who have still any regard for institutions which, thousands of years ago, the first law-givers and astronomers declared to be proper for civil life, and which have since been retained through all ages. Besides, this new French calendar, in making the year begin at the entrance of the sun into the equinoxial point, determined by astronomical calculation, brings it back upon no solid and sure grounds; while we, on the other hand, by the very simple method of intercalation, can determine common time backwards and forwards for many centuries, and differ only one day from astronomical time in the course of 3200 years.

The Elector of Saxony has enriched the observatory at Leipsic with a considerable number of astronomical instruments, which were before preserved in the Mathematical hall at Dresden.

END OF THE FOURTH VOLUME.