With Mr. Cheek's respects.

THE

EDINBURGH JOURNAL

OF

NATURAL AND GEOGRAPHICAL SCIENCE.

UNDER THE DIRECTION OF

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PREFACE.

The Edinburgh Journal of Natural and Geographical Science was instituted with the view of supplying a deficiency, long contemplated with regret by all men of science and information. That no periodical, devoted to the prosecution of geographical inquiry, and the careful collection of the important facts which every month brings forth, was to be found in this country, seemed to argue a degree of supineness very inconsistent with the character of the nation; that natural science should be the exclusive property of those only who could afford to purchase the expensive periodicals of the day, appeared to be an injustice to the public, and a drawback on the progress of knowledge, which ought no longer to exist; and that the cumbersome quarterly publications should occupy the whole field, "dragging their slow length along," was evidently incompatible with that anxious desire for information, which is now felt by all ranks and classes in this country.

This Journal was, therefore, established for the purpose of affording to the public, with the requisite rapidity, in a condensed form, and at a cheap rate, those discoveries and observations, which could hitherto only be arrived at, by a slow process, at a high price, and in a form the principal merit of which seems to be the respectability of its bulk: and we invite the public to open this volume, and judge how far we have executed our design.

Amongst the authors of the "Original Papers" will be found many of the first scientific names in Scotland, the approvers and liberal supporters of an undertaking, which they are pleased to consider disinterested and praiseworthy; and our gratitude is, moreover, due to several gentlemen, who, though not in the character of contributors, have made unremitting exertions in our behalf.

The "Scientific Reviews" must speak for themselves: we can only observe, that we look with pride to that department, in which the voice of independence has been first raised against a tyranny, under which the public has long suffered, but which seems now to be rapidly advancing towards dissolution. The comparative reviews of discussions on disputed points of philosophy, and the critical investigation of the state of science in this country and abroad, are new features in this section.

The numerous " Collections" in Geography, Natural History, and Natural Philosophy, printed in a small type, and always selected with the requisite attention to the combination of the pleasing with the instructive, form a basis in itself sufficient for the support of this Journal: And whilst, in the " Original Papers," the man of strict science will find that we have catered for his taste, in the " Collections" we have thought of our friends who require more popular information.

The " Catalogue Raisonné," a new attempt in the periodical literature of this country, is necessarily imperfect, from the confined space to which it has been restricted; but the Editors are so firmly impressed with a conviction of its importance, as an analytical record of the contents of books and papers in the scientific periodicals throughout Europe, that they purpose, in a short time, to print, independently of their Journal, a monthly sheet or more under this title.

It only remains for us to direct the attention of our readers to the successful means we have taken to procure the earliest continental information; which, not to be invidious, may be ascertained by observing the translations which appear in other periodicals, months after they have found a suitable place in our " Collections."

The illustrations, for the drawings of which we are indebted to several friends, are, we do not hesitate to say, in point of execution and colouring, superior to those of any publication of the same price; and though we did not originally pledge ourselves that every Number should be accompanied with engravings, we are gratified at having been enabled to exceed our promise, by presenting eleven plates in our first six Numbers, though at a great additional cost.

The only claim we prefer to the indulgence of our subscribers, is in behalf of the list of errata; but those who are acquainted with the hurry and anxiety attendant upon a monthly publication, will readily overlook these little blemishes. And, with respect to ourselves, it is a grateful recompense for our toil, to see that our labours have been appreciated, in the unexpected success which has attended the publication of our first volume.

11, Gardner's Crescent, Edinburgh,
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ORIGINAL COMMUNICATIONS.

ART. I. *Description of the Landes of Acquitania.* By WILLIAM AINSWORTH, ESQ. Member of the Royal College of Surgeons, of the Royal Physical, and Plinian Societies of Edinburgh.*

THE Landes (Ericetæ) are uncultivated tracts, in the south-western part of France, bordering the Bay of Biscay. They comprised, in former times, almost the whole of Acquitania, till that duchy was aggrandized by the Roman arms; and their limits were further extended under the sons of Henry II. At the era of the conquest of the Gauls by Julius Cæsar, the province of Acquitania, whose corrupted name has since given rise to that of Guyenne, extended from the course of the Garonne, in the north and east, to the chain of the Pyrenees in the south, and was bordered on the west by that vast gulf which bathes the occidental shores of Gaul and the Iberic peninsula. Extended by Augustus to the course of the Loire, and chain of the Cevennes, by the addition of fourteen cities, or tribes, it was afterwards divided into two provinces, having for capitals, the one Avaricum, (Bourges,) the other Burdegala, (Bordeaux;) till under Dioclesian, ancient Acquitania was erected into a particular province, under the name of Novempopulania: under the reign of the last Merovingian kings, the vast territory comprised between the Pyrenees and the banks of the Neker and of the Weser, was occupied by three nations; the most meridional part alone was inhabited by the Acquitanic nation. Roman in its laws, its customs, and its language, subjected for nearly a century to the yoke of the Visigoths, (Goths of the west,) it had rather desired the French domination from religious fanaticism, than from that impatient want of ameliorating our condition, which leads us

* Read before the Royal Physical Society of Edinburgh.

to deliver ourselves over to evil, and confide our destinies to the chances of fortune, when all the suggestions of prudence have been wasted without success.

Louis XI. gave to his brother Charles the duchy of Acquitania, comprising under that denomination Bordeaux, Basaz, Landes, Saintonge, and Rochelle. In 1790, the Constituent Assembly abolished the ancient division of French territory by provinces, and established a new one by departments: six were formed in the province of Guyenne, viz. La Gironde, Les Landes, Le Dordogne, Le Lot, L'Aveyron, Le Lot et Garonne. In the original subdivision, Guyenne Proper was supposed to be constituted by the Bordelais territory, and the territory dependant on that; thus almost all the Landes came under the dominion of Bordeaux, consisting of the Pays de Buch, Pays de Born, Pays de Morentin, Benauges, Cusagnes, Pays d'entre deux Mers, and Vitrezai.

The Landes, as constituted by a tract of constant physical characters, are very definite in the line of their extent, which, having an intimate connection with the hydrography of the country, terminates with the course of the Garonne on the north, and with that of the Adour on the south, being more than two geographical degrees in length, and its breadth in no place exceeding one-half that extent. These plains may also be considered as bounded by the Medon, Douze, and Etampon, and to the north-east by the Ceron, including the greater part of the departments of the Gironde and Landes. This tract of land, attaining an elevation of (100 metres,) 328.26 feet above the level of the sea, is pretty uniformly covered with heath shrubs; in some places interspersed with forest trees. Its general characters are those of a continuous level, seldom undulating, traversed by no ravines, cleft by no mineral dykes, and furrowed by few mountain streams. The eye wanders over a great monotonous waste, meeting with no change, till it reaches the dark recesses of the pine forests, or dwells in rapture on the glittering heights of sand which guard the distant coast. The picture, however, possesses many peculiar beauties. In the extensive Landes, shepherds, generally one or two in company, elevated on stilts, form remarkable objects, both by the rapidity of their motions, and their solitary situation.

The temporary huts of the woodman, circularly arranged round the common fuel, in the small woods of cork tree; the fire of the distant resin kiln, lighted on the forest's borders; an occasional oxen cart, wending its way over the pathless heath; and sometimes a cottage or two, surrounded by a few fields of maize or millet, give some diversity to a scene which, as soon as you penetrate the dark woods becomes more lively; villages are met with, neat gardens and shrubberies attest the presence of man, and sand-hills, undulating the surface, give rise to ponds or marshes; this is accompanied by a change in vegetation, and in some places by a material improvement in the appearance of the country, and in the number and enjoyments of its inhabitants. These fertile tracts advance sometimes to the very border of the sandy mountains which line the coast, constituting the back ground of the pine forests, and of the plains of green heather. No small addition to the beauty of the latter, is derived from the predominance of a heath, (Erica ciliaris,) one of the prettiest among European species. Green is a colour at all times pleasing to the eye; that of this plant is peculiary so, and its delicate leaves and graceful form, waving in the winds, or breaking the intensity of the sun's rays, give at once an agreeable relief to the eye, and excite the traveller's admiration.

In the west of the old world, there are now few uncultivated tracts, and those which do occur have generally much similarity of formation; the deposits and unconnected debris of which the heaths and moors of Germany, France, and England, and the elevated plains of the Iberic peninsula, known by the name of Parimas, consist, have, from their supposed origin, been denominated upper marine, and placed among the latest geological epochs, as appertaining to the last catastrophes which may have operated on the earth's surface. Some deposits are of a different nature, as the "Bruyeres," near St. Omer, and the downs of Maestricht. The boulder masses which occur disseminated over the great plains of Germany and Holland have been supposed to have descended from the north. America, so lately under the control of civilization, contains many barren and uncultivated tracts; among these, the Havannahs, Llanos, Pampos, and Campos, stand predominant: the Prairies occur generally on calcareous formations, and are often traversed by subterranean rivers. In the old world occur many waste tracts of modern formations. The steps * between the Caspian and Black Seas are of recent date; the theory of their origin, first advanced by Tournefort has since been developed by Pallas, Lamouroux, and other late writers; but the surface of the uplands of Tartary, supposed by Barrow to be nearly 10,000 feet (3000 metres, Cordier) above the level of the sea, the moving sands of the Shamo, and the deserts in the interior of Africa, very probably date as far back as the oldest rocks of the supermedial order, (new red sandstone, with gypsum and saliferous deposits?)

The existence of uncultivated tracts is, wherever they occur, closely related as well to the geognosy as to the hydrography of the land; and while the climate will influence the nature of the vegetation, still these tracts alone present that vast continuity of the same plants, which afford the best characters for their recognition, and are of so much service in developing the physical distribution of the vegetable kingdom.

With respect to its geognostic constitution, the tract of land comprising the vast basin extending from Thoulouse to Narbonne, separating the Pyrenees from the Montagne Noire, and through which runs the great canal of Languedoc, the undulating and champaign country at the head of the rivers Garonne and Adour, the extensive and fertile plains of Gascony, and the uncultivated Landes, are all

* *Step*, and not *steppe*, (as the Germans, British, and French generally spell it,) on the authority of Dr. Lyall. (Travels in Russia, &c. Note, p. 134.)

formed of the same sedimentary deposits, belonging to the tertiary or superior order, which cover the northern base of the Pyrenees, from the Bay of Biscay to the Mediterranean. For geognostical details, we refer to the excellent labours of the French geologists,* to which we have nothing to add; but their connection with the present state of the Landes, is an object of novel interest.

The circumscription of the tertiary formations, is formed by the chain of the Pyrenees on the one hand, and the schistose rocks of the Vendée on the other; but the limitation of the Landes occurs in the Alpine limestone to the south of the Adour, and in the cliffs of Parisian limestone which gradually approach to overhang the northern banks of the Garonne.

The new red sandstone, muschelkalk, quadersandstein, and lias, may all be traced to the south of the Adour, while the sandstone, oolitic series, and chalk, may be found to the north of the Gironde. The succeeding second arenaceous tertiary formation, or upper marine deposit of the Landes, lies on Parisian limestone, plastic clay, and chalk. The Parisian limestone crops out to the north of the Garonne, from which it is, however, separated by the upper fresh water formation. When we consider the newness of these tracts, as deduced from their geognostic structure, are we not inclined to ask, whether their barrenness is not owing to that very circumstance, inducing such a thinness of vegetable soil as to preclude the access of a variety of plants, as must originally have been much more the case over secondary arenaceous formations, which were never covered by a diluvial gravel or alluvial mud?

In the case of the Landes it is, however, certain that their sterility is in a great part owing to a hard and compact bed, (called *alios* in Acquitania,) of a dark-brown colour, from some inches to several feet in thickness, formed by a quartzose sand, bound by a cement, in which iron oftentimes exists in so great a quantity, that it can be extracted with great advantage, the bed lying at a few feet, and oftentimes only as many inches in depth beneath the surface.

The soil of the Landes, every where sandy, does not consist of a mobile sand, but is bound down by plants and lichens, and blackened a little by the presence of a small portion of vegetable matter. During four months of the year, these plains are partly covered with water, forming shallows (mares) of little depth, marked in the summer months only by a slight difference of vegetation, heaths especially never growing on these spots. These collections of water are sometimes so great as to give rise to strong streams, which work

* La Perouse Fragments de la Mineralogie des Pyrenées, (Mem. de l'Academie de Thoulouse, Vol. III.) Palassou Memoire sur les atterissements formés des debris des Pyrenées, inserted in the "Memoires pour servir a l'Histoire Naturelle des Pyrenées, Pau 1815;" and D'Aubuisson "Traité de Geognosie, t. ii." Charpentier, in his elaborate work, has not described the tertiary formations, but Boué, in the "Annales des Sciences Naturelles," has given sections of the territory from Bordeaux to Bayonne.

themselves deep furrows in the sand, laying bare the roots, and carrying away the shrubby plants, leaving beds of white micaceous sand behind them.

Having given the idea, then, of an extensive tract of land belonging to the upper marine formation, consisting of a sandy soil, lying on a quartzose-ironstone (grés ferrugineux) sands, and shelly marle ; of little elevation, and of a very continuous level, and limited in its extent by hydrographical and geognostical boundaries, we shall proceed to delineate the characters of its vegetation, which are always of the greatest interest in the study of uncultivated lands.

Between the vast tracts of sand entirely deprived of vegetable or animal life, which occur in the tropical regions, and the eternal snows of the polar lands, the plains, vallies, and mountains, and the contrasted configurations of which the continental spaces consist, are generally clothed with a vegetation more or less luxuriant, and presenting characters in whose constancy are to be traced the elements of their physical distribution, and the harmony of their natural laws. It is in the tendency which certain plants have of growing always in the society of one another, and inhabiting only determinate situations, that originates the characteristic vegetation of all uncultivated tracts ; as in the lines of equal annual heat, or of similar hyemal, or summer seasons, must be sought the extended zones of vegetation which characterize different geographical latitudes.

When subjected to determinate laws of this nature, plants have been denominated social ; but while some grow in the society of one another, others seem to prefer the society of different species. If the latter were always the same, such facts would assist in inductions on the vegetation of a district ; but a vagabond plant, that in one latitude accompanies a certain set, will traverse one or more zones accompanying other families of plants, which in these zones grow on tracts of a similar nature ; while others, permanently social in one climate, become dispersed and nomadic when they traverse the limits of their natural stations.

While all plants may be said to be special, with respect to their primitive site, whether parasitical, aquatic, or the inhabitants of forests or plains, still the same characters of lake or marsh, and mountains of the same geognostic structure, will, in different climates, be clothed with plants of different species, and often of different families ; while these circumstances becoming conditions of existence, render the plants growing on these tracts slaves to the society of one another, causing them to perish when borne beyond certain limits of their natural stations ; and in these facts consists the locality of plants, or the laws of special and local creations. Amidst these, numerous flowering plants will appear, whose representatives, are oftentimes found at the antipodal points of the globe, and which gradually advance by regular means of dissemination, or suddenly traverse immense intervals, by accidents connected with the migrations of man or animals, and also with localities, which we can scarcely explain.

The physical characters of the plants themselves, as Turpin has beautifully remarked, will also vary with their situation. Not equally brilliant every where, vegetation, gay and smiling on the borders of rivulets, elegant and graceful in the vallies, rich and majestic on the great plains, is no longer the same when it shows itself on the burning rock, or fights against alpine snow. A vast extent of plain in the same country, and in the same position, will produce pretty nearly every where the same plants; but if this plain is intersected by forests, furrowed by vallies, watered by rivulets,—if the soil is variable, humid, sandy, or chalky, the mass of its plants will be found to vary equally with each change of situation or of soil.

On leaving Paris by any of the south-westerly roads, the physical characters of the country consist of a series of vallies, which seem to sweep consecutively round one another, bearing generally tributary streams to the Seine. From Etampes to Orleans the horizontality of secondary strata gives rise to an extensive plain, though in no point uncultivated or barren; to the west the town of Chartres is visible, on its approach, at a great distance. The uniformity is broken by the course of the Loire, and the cropping out of the oolitic series, which, crossing the channel north of the Seine, appears in the vicinity of Boisgeancy, coursing round the tertiary basin of Paris in a circular manner, and re-appearing at intervals, with the chalk formation, beyond the most northerly departments of France. This series gives origin to the first extensive vineyards in the Tourraine and Bourbonnois. The department of La Charente, traversed in all directions by rivers and rivulets, formed of hills and undulating tracts, covered with verdant forests, which stretch into the plains below, presents a smiling and rich appearance. Some extensive heaths are first met with in the Charente Inferieure, situated on the sides of hills or sandy plains. They present, however, a fine cover of trees and shrubs, intermingled with Ericæ and Leguminosæ of luxuriant growth, becoming more barren only near St. André de Cubzac, where they bear evident marks of a most unproductive soil. The Mantis oratoria is first met with on these plains,* where also grows the Erica ciliaris, and the Datura Stramonium amidst the stony parts.

A similar degree of elevation assigns to extensive plains a mean temperature generally lower than the annual heat of the latitude in which they occur; while the seasons are liable to less abrupt transitions, and the diurnal variations, and annual mean of the barometer, are diminished in the extent of their fluctuations. It may easily be conceived that, with the exception of the Landes, the variety of aspect, in the departments of the west, influences much the nature of the vegetation; and a simple inspection of the map attached to the "Flore Francoise," is sufficient to show that the plants of the southern provinces approach nearer to the north

* The Phasma Rossii is met with in the vicinity of Orleans.

on the west than on the east of France.* If we compare the western and eastern provinces, we shall find that the former are very little elevated above the level of the ocean; for, according to Decandolle, even at a considerable distance from the sea, they do not attain an elevation of more than 100 metres, while on the contrary, the eastern provinces, surrounding the great mountain chains, have generally from 4 to 500 metres of elevation.

De Humboldt gives for the plains of central France and Lombardy, 80 toises, 511.57 English feet; and though, as Decandolle has remarked, near Belgium the degree of elevation diminishes, yet there the temperature is also sensibly cooled by the second cause that produces such a change, namely, distance from the equator. The plains at the foot of the eastern Pyrenees, do not attain an elevation of more than 63 feet near Perpignan, but they rapidly rise, attaining at Arles 908.03 feet, and at Foix 1214.97 feet. The great plain of Thoulouse is about 466.81 feet, and this will average the plains of Gascony, rising at Tarbes 959.15 feet, at Luz to 2423.65 feet: the plain of the Landes is 328.0899 English feet above the level of the sea.† The influence of the proximity of the sea, in equalizing the mean annual heat, and the effect of the difference of physical aspect on the opposite sides of the continent, on the isotheral and isocheimal lines, render it highly probable, that even with an equal mean temperature, the distribution of the plants on the two sides would be different.

In the west a slight change in the Graminæ takes place about the line of cultivation of the maize, or in lat. 46°. The Panicum dactylon, more abundant on the shores, is met with in the woods, south of Poitiers; the Lolium perenne is replaced by the Aira media: these are soon followed by other grasses, as the Alopecurus utriculatus, Andropogon provincialis, Agrostis capilaris, A. stolonifera, Polypogon monspeliensis, Digitaria stolonifera, D. ciliaris, Schismus marginatus, &c. &c. At Tours, the beautiful Nymphaæ alba wanders from deep ponds to flower in the smallest collections of water; the Erigeron canadense will occupy sometimes one side of a ditch, while its contemporary, the E. campestre, will be seen on the other. They are succeeded near Thoulouse by the Erigeron glutinosum and E. Villarsii, accompanied by a curious plant, the Momordica Elaterium: the Quercus nigra is met with every where in the west as far as Nantes, but is unknown in all the east; the Menziesa Dabeoci (Erica Dabeoci, Eng. Bot.) is likewise met with in the west, where plants of the hot climates are also seen wander-

* Mr Arthur Young had remarked, that if a line be drawn across the most northerly points of cultivation of the olive, maize, or vine tree, three nearly parallel lines are obtained, which all approximate to the north on the eastern side; precisely the inverse of what the French naturalists have observed with respect to the indigenous plants.

† These altitudes have been all reduced to the English standard, through the kindness of Mr Buchanan, from Reboul and Vidal's trigonometrical measurements of the Pyrenees, and the barometrical observations of Ramond, Charpentier, and D'Aubuisson.

ing; the Ophioglossum lusitanicum grows abundantly in the sands of Brest roads; the Phalangium bicolor, a plant of Barbary, is met with in the Landes of Angers and Nantes; the Cistus hirsutus, Helianthemum serratum, plants of Spain, grow on the borders of the Loire and coast of Britany. Decandolle met with lichens, which had only been found in Jamaica, on trees, in the vicinity of Quinfer-cotentin, and the Narcissus calathinus, considered as indigenous to Greece, and the east, was seen by this learned botanist on the isles of Glenaus. Bory St. Vincent found the Lobelia Dortmanna, considered as peculiar to the north, in the Landes of Anvers, and the ponds of Cazau, on the slope of the Acquitanic downs.

In the descriptive botany of the Landes, we must necessarily distinguish between the plants growing on general sandy tracts, and plants which flourish only in maritime sands: thus the Scabiosa maritima, and Galium maritimum, are not essentially maritime; Corrigiola litoralis, and the Silene bicolor, grow indifferently in the vicinity of the sea, or in other spots; but the Echinophora spinosa, and the Eryngium maritimum, have deep roots, which pierce through the sands to the salt water, from which they cannot be withdrawn without affecting their growth: while other plants wander to a great distance; thus the Salsola tragus ascends along the gravel of the Rhone, as far as Pierre Benite near Lyons; the Tamarix gallica, abundant on the saline marshes of the basin of Arcachon, is also met with between Trebes and Carcassone; the Triglochin maritimum is met with on the borders of the pond of St. Julien, and Decandolle found the Cochlearia officinalis on the mountains of Neouvielle, (High Pyrenees,) at 1600 metres* above the level of the sea. We shall thus be induced to treat separately of the plants of the Landes, and those of the Downs, where the progress of vegetation is also different. The first plants which come to adorn the surface of the bare rock, belong to the family of the pulverulent lichens; the foliaceous follow them, and soon after, the green ferns begin to wave their flexible fronds. The passage of mosses to ferns is perfectly well filled up; on the one hand, by the Lycopodia, with imbricated and subulated leaves, comprising a crowd of species in the first family; on the other hand, by those little Hymenophylla and rampant Trichomanes, which, in the torrid zone, cover the trunks of almost all old trees, and the surface of moist rocks, confounding themselves at first sight with the Leskiæ and the Jungermanniæ, with whose stems they frequently intertwine. In the Landes pulverulent lichens blacken the white sands, whose motions they arrest, and are succeeded by imbricated Lycopodia, and afterwards a few grasses, or in some places mosses and ferns. The Downs present no appearance of this kind; the flower of some vagabond plant, or an occasional patch of bent, alone appearing at intervals to adorn these desert regions, and enliven their sorrowful sterility. In the Landes many species of lichens assist

* The metre is equal to 1.093,633 yards.

in furnishing a vegetable soil, more especially Lichen ericetorum, L. fungiformis, Web., L. cocciferus, L. uncialis, &c. The Lycoperdon verrucosum, L. pyriforme; the genera Peziza, Phallus, Boletus, and Agaricus, among the mushroom tribe; the Jungermannia, Marchantia, Anthoceros, and Riccia, among the Algæ. The genera Hypnum, Bryum, Lycopodium, Mnium, Polytrichum, Phascum, Fontinalis, Sphagnum, furnish many species. Among the ferns the genus Polypodium, the Asplenium scolopendrium, Pteris aquilina, Adianthum nigrum, Equisetum sylvaticum, stand predominant. Among the Cyperaceæ and the grasses, Carex brizoides, C. digitata, C. hirta, C. montana, &c. The genera Alopecurus, Poa, Melica, Briza, Dactylis, Cynosurus, Festuca, Phleum, Milium, Panicum, Bromus, Avena, Lolium, Arundo, &c. have each their representatives. The Festuca ovina may be considered as the most general grass, and thus affording what slight nutriment sheep can cull from tracts so infertile. To these classes of plants succeed the heaths, which, by their universal distribution, afford the characteristic vegetation of the Landes; yet while the Calluna vulgaris, Erica cinerea, E. ciliaris, E. scoparia, E. tetralix, and E. mediterranea, are dispersed all over the Landes, the E. multiflora is only found near St. Sever, or in the company of the Cistus salvifolius, on the rocks of Biarritz. The Erica arborea is only met with in the forest of Arcachon, and the Erica purpurascens in the environs of the Teste. The latter species may, however, be mere varieties; the former of the E. scoparia, and the latter of the E. multiflora. Amidst these shrubs, others are occasionally met with, some of which are pretty generally dispersed. They are the Spartium complicatum, S. scoparium, Genista anglica, G. humifusa, and G. tinctoria. The Ulex vernalis, and U. autumnalis, which are generally of very moderate height in the Landes, attain, under the shade and shelter of the Pignadas, a height of from 16 to 22 feet. Among other plants constant in the Landes, are the Scilla umbellata, (Ramond Bull. de Soc. Philom. No. 41,) Daphne cneorum, Silene bicolor; (Thore designates under this name a species common on all the sands and dry heaths, branched at the base, rarely in the stem, and ordinarily several times dichotomous; it is cultivated in the Garden of Plants, under the name of Silene picta;) Anemone pratensis, Fumaria officinalis, Allium ericetorum, (Thore, p. 123,) Linum radiola, Anthericum bicolor, Ononis arvensis, Serratula tinctoria, Viola lancifolia, (Thore; never rising above six inches from the ground: it has solitary peduncles; all its leaves lanceolate, and its flowers of a very pale blue, and inodorous. It is probably a variety of V. lactea of Smith.) Among the Leguminosæ are several species of Vicia, Orobus, Lathyrus, Ervum, and Ornithopus.

The uniformity of the vegetation of the Landes is broken by the pine forests, termed Pignadas in the language of the country; by cultivated fields; by the Lagunæ or ponds; or finally by the Downs. The Pignadas stand in the midst of the plains, like islands on a sea of water. Their still and unfrequented recesses, are haunted by birds and animals that avoid the broad glare of day-light; and the wanderer, when he penetrates into their shady labyrinths, is imperceptibly influenced by the gloomy silence around him. Heaths seldom or never adorn these forests, where the Ulex and Arbutus spring forth in great luxuriance; and the decomposition of the leaves and remnants of the pines, gradually forms a soil in which shrubby oak trees soon make their appearance. The Pinus sylvestris, (P. syrtica, Thore,) forms the mass of the Pignadas, attaining commonly a height of from 80 to 100 feet. A variety with cones of about the size of a pigeon's egg, grows in the Pignadas of Boucau. The Pinus genevensis, (Duhamel, No. 5,) indigenous to Russia and Sweden, was introduced about thirty years ago, and has succeeded completely; the Pinus pinea grows in the vicinity of rural habitations; and the Weymouth pine, (Pinus strobus,) silver fir, (Pinus picea,) P. cembra, P. abies, and the larch, are all met with in the enclosures of the Landes. The oaks, which in most of these forests are mere shrubs, attaining their maximum of growth in many parts of the Landes, are the Quercus robur, Q. ilex, Q. nigra, and the Q. suber, of which extensive plantations are preserved for commercial purposes. The Arbutus unedo, always diminutive in the gardens, where it seldom flowers, attains a height of 15 to 20 feet in the pine forests, where it is constantly covered with fruit and flowers. The cold of 1789, which made the thermometer descend to —15°, destroyed almost all the plants; the largest had at that period 20 to 25 inches in circumference, and about 30 feet in height, but the following spring they in the most part sprung out again from the roots. The shade of the Robinia pseudo-acacia is found favourable to vegetation in the neighbourhood of these forests. The Ilex aquifolium lives sometimes to a very great age; one in the vicinity of St. Julien is from 25 to 30 feet in height, and from 2 to 3 feet in circumference. Among the other plants common to the Pignadas, are the Tilia europæa, Cistus alyssoides, Var. *a.*, C. salvifolius, (Pignada of Cape Breton,) Cratægus torminalis, Thalictrum minus, Melampyrum sylvaticum, Anemone hortensis, A. nemorosa, Helleborus viridis, Clematis Vitalba, Geum urbanum, Tormentilla erecta, Cucubalus bacciferus, C. Behen, Asphodelus ramosus, Convallaria majalis, Sambucus nigra, S. Ebulus, Asclepias Vincetoxicum, Vinca major, V. minor, Vitis Labrusca, Evonymus europæus, Rhamnus Frangula, R. cathartica, Lysimachia nemorum, L. vulgaris, L. nummularia, Senecio sylvaticus, Aster Tripolium, (groves near Dax,) Bryonia alba, Juniperus communis, Ruscus aculeatus.

Between the Pignadas and the Downs, are the low bottoms of vales and vallies formed by the hills of sand, whose motions prevent the recess of water, constituting sometimes mere marshes covered with wood, at other times lakes or ponds, (lagunæ,) whose borders are shaded by extensive groves; among the trees composing these, we observed the Fagus sylvatica, F. Castanea, Carpinus Betulus, Corylus Avellana, Ulmus campestris, U. carpinifolia, and interspersed, Tilia europæa, Betula Alnus, Juglans regia, Platanus occidentalis, P. orientalis, Salix triandra, S. pentandra, S. vitellina, and other species, Populus tremula, P. latifolia, &c.

(To be continued in the next Number.)

ART. II.—*Description of Five New British Species of Shells.* By CAPTAIN THOMAS BROWN, F. R. S. E. F. L. S. M. R. P. S. M. W. S. &c. &c.

1. *Anatina brevirostris.*

Shell very convex, transversely ovate-oblong, posterior side rounded, anterior side abruptly tapering to an abbreviated beak. It has one large elevated recurved cardinal tooth in the right valve; cartilage impressions very deep; margins somewhat plain; umbo small, pointed, and slightly turned towards the anterior side. The whole interior is of a pale purple colour, darker towards the extremities; exterior covered with a fawn-coloured epidermis, which is transversely truncated and semistriated, with a slight metallic lustre.

The size of the shell is 3-8ths of an inch in length, and half an inch in breadth. Plate I. Fig. 1. the shell represented the size of nature. Fig. 2. right valve magnified. Fig. 3. left valve ditto. Fig. 4. a section shewing the thickness of the shell.

This new and interesting species was discovered by my friend James Gerard, Esq. in the Frith of Forth. The *Anatina longirostris* of Lamarck's An. sans Vert. vol. v. p. 463. together with this shell, might very properly be formed into a distinct section.

2. *Cyclas fontinalis.*

Testa oblique corditata, ventricosa, substriata, pellucida, umbone subacuta.

Cyclas fontinalis Drap. Hist. des Moll. p. 130. pl. x. fig. 11, 12.
——————— Lam. An. sans Vert. vol. v. p. 559. No. 7.
Pisidium fontinale, Pfeiffer Land und Wass. Sch. p. 126.

Shell sub-oval, oblique, very convex, pellucid, and covered with extremely fine concentric striæ; beak placed nearer to one side, with two lateral teeth and one central in the right valve, and two oblique teeth and a single lateral one in the other.

Fig. 5. size of nature. Fig. 6. a magnified view of the left valve. Fig. 7. a section magnified, shewing the thickness of the shell.

This species is of a pale ash colour, little more than the eighth of an inch in length, and somewhat broader. It was found in a ditch near Duddingston Loch, by James Gerard, Esq. It has very much the appearance of the *Cyclas obiqua,* but is much more convex than that shell, in proportion to its size, and less oblique.

This is the first time its habitat has been ascertained as British.

3. *Crassina ovata.*

Shell thick, strong, and sub-compressed, with broad elevated parallel transverse ridges, which become nearly obsolete as they approach the base of the shell; it has a strong central tooth, and a very small oblique tooth in the right valve; left valve with two strong central teeth; umbo reclined; under which the cordiform depression is lanceolate, deep, and large. Inside blueish white, with a broad and plain margin; the muscular impressions very large and deep. Colour of the epidermis dark-burnt umber.

This species has much the appearance of the *Crassina Scotica*, but differs from it in being more ovate, much stronger, and in the muscular impressions being nearly double the size, and in the cordiform depression being also much longer and deeper.

The *Crassina ovata* was discovered near Helensburgh, mouth of the Clyde, by Henry Witham, Esq. where it appears to be not uncommon. The specimen from which my figure was drawn, is in the cabinet of James Gerard, Esq.

Plate I. Fig. 8. Fig. 9. a section showing the thickness of the shell.

4. *Cyclostoma marmorea.*

Shell with five ventricose and deeply divided volutions, tapering suddenly to an obtuse apex. The aperture is quite orbicular; the inner lip slightly reflected on the base of the columella, behind which is a deep umbilicus. This shell is smooth, glossy, and of a pale ash colour, covered with zigzag markings of a reddish chesnut brown, which form four spiral fasciæ on the lower volution, and gradually become obsolete in the upper portion of the spire. Plate I. Fig. 10. and 11.

I noticed this elegant shell in the cabinet of Mr Gerard, associated with some British specimens of the *Cyclostoma elegans*, to which it is closely allied, but may at once be distinguished from that shell, being totally devoid of striæ, which in the *elegans* are very strong and conspicuous.

5. *Helix vitrea.*

Shell much depressed, thin, and of a greenish white; volutions six; aperture large, semi-lunate, and enveloping the body whirl with a deep but small umbilicus; size an eighth and a sixteenth of an inch. It has somewhat the appearance of the young of the *Helix nitens*, but may at once be distinguished, from having a greater number of volutions, and being thicker, with the volutions more depressed on the apex.

Fig. 12. size of nature. Fig. 13. and 14. top and bottom magnified.

Two specimens of this shell were found by Mr Gerard on an old wall at Corstorphine Hill.

ART. III.—*On the Changes which take place in the Electricity of the Simple and Compound Galvanic Circles, by increasing or diminishing the distance of the Zinc and Copper Plates from each other.* By K. T. Kemp, Esq. Lecturer on Chemistry, Member of the Royal Physical Society, &c. &c.

When a fine metallic wire is made to complete the circuit between the poles of a galvanic battery consisting of a few large plates, the circulation of the electricity along the wire, in a few minutes raises its temperature to a red heat, and if the quantity of electricity generated be too great to pass along the wire, the heat will become so intense as to cause it to take the liquid form. If the plates composing this battery be cut so as to form a battery of smaller sized plates, presenting, however, the very same extent of surface to the action of the liquid, we shall find that in this arrangement the quantity of electricity will be quite unable to raise the temperature of the wire to a red heat.

This is a fact that has been well ascertained, but never perfectly accounted for; and it was for the purpose of investigating its cause that the following experiments were performed.

Experiment I.—Having procured a glass jar, eighteen inches in height, and six in diameter, into the bottom of which a small hole was perforated, to admit of a wire passing through it, a plate of copper, and one of zinc, was then prepared, nearly the size of the internal diameter of the jar, so as to slip easily into it. To the centres of each of the plates, a copper wire was then soldered.

The zinc plate was lowered into the bottom of the jar; the copper wire, which was attached to the centre of its under surface, passing through the hole made for this purpose in the bottom of the jar. The apparatus was then rendered tight by cement. A mixture of muriatic acid and water, in the proportion of one of acid to sixteen of water, was now poured into the jar until it was quite filled. The extremity of the wire coming from the zinc plate which was at the bottom of the jar, was then connected, by means of mercury, with a needle apparatus: the extremity of the wire coming from the copper plate, was in like manner connected with the needle apparatus, so as to form a continuous metallic wire passing below a magnetised needle; and thus to complete the galvanic circuit whenever the copper plate was immersed in the jar.

The apparatus being thus prepared, the copper plate, by means of its wire, was brought in contact with the liquid, in a sloping direction, and very gradually, until the whole of it was immersed to the depth of the sixteenth of an inch, leaving nearly eighteen inches of liquid between the two plates. The instant this was done, the simple galvanic circle was completed, and the needle indicated that a current of electricity was passing along the wire, sufficient to cause a deviation of between four and five degrees. The copper plate was now gradually lowered in the jar, and the deviation produced on the needle became greater; and as it continued to approach the plate of zinc, it gradually increased until at the distance of about the thirty-second of an inch, which was as near as the inequalities of their surfaces would allow the plates to be brought: the deviation of the needle amounted to nearly 75°.

The copper plate was now gradually raised in the jar, and the deviation produced on the needle decreased just in proportion as the distance between the plates became greater; so that when it arrived at the surface of the liquid, the needle stood at the same point as it did when it was first immersed.

Experiment II.—In this experiment the relative situations of the plates were reversed; the copper plate being placed at the bottom of the jar and the zinc plate lowered into it. The effect produced on the needle was precisely the same as in the former experiment.

Both of the plates had a few perforations made in them to allow the passage of the hydrogen from their under surfaces up through the liquid, and thus keep them in the most favourable state for the action of the liquid. When the plates were immersed in a wooden trough, eighteen inches long, in a horizontal position, the very same effects were produced upon the needle, as the distance of the plates was varied.

Experiment III.—Having procured a wooden box, fifteen inches square, and two feet in length, rendered tight by cement, a plate of copper and one of zinc was cut fifteen inches square, so as to be easily immersed and taken out of the box; to each of the plates a strong copper wire was soldered. The box was then filled with a strong solution of muriatic acid and water, and a very fine iron wire, about four inches in length, was then attached to the extremity of each of the wires proceeding from the plates, so as to form a continuous metallic communication between the two plates. The plates were then immersed into the box, the copper at one extremity and the zinc at the other, having two feet of liquid interposed between them. At the instant of immersion, a violent action took place on the zinc plate, yet the centre of the thin iron wire scarcely attained a heat equal to 212° of Fahrenheit. As, however, the plates were made gradually to approach each other, the heat increased, and when at a distance of one foot from each other, the centre of it began to assume a red heat, and as the distance became less, the heat augmented, until, when about the sixteenth of an inch from each other, nearly the whole length of iron wire was heated to redness.

The effect produced on the thin iron wire, will be more apparent, if at the different distances the plates are taken out, washed, and again immersed; as the numerous globules of hydrogen, which attach themselves to the surfaces of the plates, are thus disengaged, and allow a free action of the liquid upon them at every immersion.

From the preceding experiments, we have seen that when the electricity is made to pass through the liquid for a considerable distance, in the case of a simple galvanic circle, it is no longer capable of affecting the needle or heating the wire. It has been fully ascertained that electricity of a low intensity affects the needle, and raises the temperature of iron wire, while that of a high intensity acts more powerfully in chemical decomposition.

The subject of inquiry then is, What is the nature of this change that takes place in the electricity? Does the quantity of electricity circulating along the wire remain the same, having only its intensity increased by passing through a greater extent of liquid, and thereby becoming incapable of affecting the needle or heating the wire? or is it absorbed by the liquid in its passage through it? or, according to Dr Hare's theory, does the electricity alone pass through the liquid, while the caloric is absorbed by it?

The chemical action upon the plates continued the same at whatever distance they were removed from each other; hence the generation of electricity ought to have been the same at all distances. From these experiments, I had some reason to think that the electricity is not absorbed in its passage through the liquid, but merely increased in its intensity; and consequently, that by increasing the distance between the plates, a change of the electricity would take place, from that of a low to a medium intensity, or that state of electricity which is capable of decomposing liquids; and that, by increasing the distance of the plates still farther, nearly the pure electrical effects, or those of De Luc's column would be produced; so that from the simple galvanic circle, electricity of any intensity might be procured, provided the distance between the plates was of sufficient extent. From the difficulty of obtaining a trough large enough to immerse the plates in, in order to discover whether I was correct or not in this opinion, I had recourse to the expedient of immersing them in the sea.

The experiments were performed on the Chain Pier, Newhaven, which projects into the sea nearly 600 feet, on Wednesday the 5th August 1829, in presence of Captain Thomas Brown, and Messrs. Cheek and Ainsworth.

A plate of copper and one of zinc were prepared, 12 inches square. A copper wire was then soldered to each of them, 200 feet in length. Fine platina wires were also soldered to the extremities of each of the copper wires. The plates being thus prepared, two of the gentlemen who assisted me, stood on the pier, at a distance of nearly 300 feet from each other, one of them having the copper and the other the zinc plate, who were ready, at a given signal, to immerse them into the sea by the wires that were attached to them. The wires were continued along the pier, so as to meet in the middle to complete the circuit, at equal distances from the plates, where the experiments were performed.

Experiment I.—The first experiment was made with a view to determine whether or not the metallic taste would be produced. At a given signal the copper and zinc plates were immersed, and at that instant the taste was distinctly perceived, as the extremities of the platina wires were brought in contact with the tongue.

Exp. II.—The great sciatic and anterior crural nerves of a frog were laid bare, and the connecting wires brought into contact alternately with each; at every immersion of the plates, the limb was strongly convulsed.

Exp. III.—A glass was filled with water, to which a small quantity of muriatic acid had been added, to increase its conducting power. On the platina wires being put into it, which completed the circuit, decomposition took place; hydrogen appearing at the wire coming from the *zinc* plate, or positive pole, and oxygen at the *copper* or negative pole, as would be expected from the fluid circulating in a direction different to that of the battery.

Exp. IV.—The platina wires were then made to terminate in a glass of pure water, when only a slight decomposition was effected: this was on account of the bad conducting power of the pure water. No spark could be elicited from the contact of the wires.

When the platina wires were terminated by iron wires much finer, and placed into water so as to complete the circuit, decomposition ensued; hydrogen appearing at the zinc side, while the iron wire which came from the copper side combined with the disengaged oxygen. When a little acid was added to the water, the effect was greatly increased,—a continued stream of hydrogen rising from the wire in connection with the zinc plate, while the iron wire from the copper plate was so much oxidated, that it became quite brittle.

In these experiments it was necessary to raise the plates occasionally out of the sea, in order to free them from any globules of air or hydrogen that might attach themselves to their surfaces when the action went on more briskly.

The distance between the plates was now gradually diminished, while the circuit was kept complete; the wires being terminated in the glass containing water and acid, in order to ascertain whether or not decomposition became lessened as the plates were made to approach each other. When they were about half the distance from each other that they originally were placed, or about 150 feet, decomposition was considerably lessened. No effect took place upon the needle until the plates had approached to within four or five feet from each other; and the effect increased as they were brought nearer, until when about 1-4th of an inch separate, the deviation amounted to nearly 40°.

When the circuit was completed by a fine iron wire, no sensible increase of temperature took place; so that the action upon the plates was too weak to admit of this effect being produced.

On account of neglecting to carry an electrometer with us, it could not be ascertained whether or not the electricity was of sufficient intensity to affect it.

Having so far ascertained the certainty that the distance at which the plates are placed from each other, exerts an influence on the nature of the electricity generated, in the farther investigation of the subject, I constructed a battery where the plates were brought within the smallest possible distance from each other, which was about the 30th or 40th of an inch, to ascertain what effects would be produced from such a combination.

For this purpose, I constructed a common wooden trough, A B, 16 inches in length, and 2 inches square, into which were placed 30 glass divisions, at equal distances from each other. Each pair of plates, *c* and *z*, were connected by means of a slip of wire, *w*, soldered to them, the copper plates being previously perforated, to allow a repeated renewal of the liquor contained between the glass division *c*, and the copper plate *c*, so as to keep up the action on the zinc plate. The plates were then placed in the trough, so as to inclose a glass partition between them; the copper plate being brought as near as possible to the zinc plate, without being in actual contact, small pieces of oiled silk being used to keep them separate.

On the battery being charged, the effects on the deflagration of the metals, were similar to those produced by a battery of a few large plates; the effect on the needle was also very powerful; while the shock perceived was not more than half the strength of one got from the same plates in the form of a pile. This indicated that galvanism of a low intensity had been generated, which exactly agreed with the deduction I had made from the experiments previously performed.

It thus appears, that although electricity of a low intensity is generated by plates of a large size, yet size is not the cause of this low intensity; but it is rather to be attributed to the small portion of intervening liquid the electricity has to traverse, which prevents it being increased in intensity.

Supposing now that four plates, each twelve inches square, composing a battery, were cut into plates four inches square, so as to form a battery of thirty-six plates, and so arranged as that the same distance of liquid may exist between each pair, as that which previously existed between each pair of plates in the large battery. The whole distance which the electricity of the first pair of plates will have to traverse, in passing from the negative to the positive pole, will be 36 inches of liquid; and every pair of plates will be of greater or less intensity, in proportion as the distance between the negative or positive poles is increased or diminished.

The electricity generated by the pair of plates at the negative pole, having the whole length of the liquid to traverse before it arrives at the positive pole, will be much more intense than that generated by any pair of plates succeeding to the last, or that constituting the positive pole, the distance of the liquid gradually diminishing through which the electricity has to pass.

If instead of arranging the plates so as to form a battery, having a distance between each pair of plates equal to the distance between each pair of plates in the large battery, we place them so that the sum of the distances between the thirty-six plates may be equal to the sum of the distance between the four large plates, we would then have electricity of the same intensity, were it not for the difficulty of having the liquid renewed, and also of expelling the hydrogen between the plates, which thereby prevents the continuous action which goes on when the plates are placed at a greater distance.

If a few plates of a foot square were arranged in troughs, at the distance of three feet from each other, I am inclined to suppose, not having had an opportunity of trying the experiment, that we would not have the igniting effects of the electricity of a battery of the same number of plates placed at the ordinary distance; but only the effects of a battery of the same number of plates, about four inches square, placed at the usual distance from each other. The chemical power of such a battery, however, would be increased.

ART. IV.—*Notes of a Tour in the Island of Jersey.* By ALEXANDER SUTHERLAND, ESQ. Member of the Royal Physical Society.

———WE lost sight of the Needles at sunset. There was little wind; but a heavy weltering sea throughout the night. Nevertheless our bark drove merrily on her way, and at day-break the French coast, near Cape de la Hogue, was dimly visible through the haze of morning. At dawn the breeze died away; and as the tide set strongly against us, it was found necessary to let go an anchor, in order to prevent the current from carrying us out of our course. The surface of the ocean, though furrowed by the long deep swell peculiar to seas of vast extent, looked as if oil had been poured upon it. The vessel pitched prodigiously too; but neither foam-bubbles nor spray ruffled the glassy expanse. Wave after wave swept by in majesty, smooth and shining like mountains of molten crystal; and though the ocean was agitated to its profoundest depths, its convulsed bosom had a character of sublime serenity, which neither pen nor pencil could properly describe.

The night-dew had been remarkably heavy, and when the sun burst through the thick array of clouds that impended over the French coast, the cordage and sails discharged a sparkling shower of large pellucid drops. In the course of the forenoon, a small bird of the linnet tribe perched on the rigging in a state of exhaustion, and allowed itself to be caught. It was thoughtlessly encaged in the crystal lamp that lighted the cabin, where it either chafed itself to death, or died from the intense heat of the noon-day sun, which shone almost vertically on its prison. At the time this bird came on board, we were at least ten miles northward of the island of Alderney, the nearest land.

At one P. M. tide and wind favouring, we weighed anchor, and stood away for the Race of Alderney, which separates that island from Cape de la Hogue. In the Race the tide ran with a strength and rapidity scarcely paralleled on the coasts of Britain. The famous gulf of Coryvreckan in the Hebridean Sea, and some parts of the Pentland Firth, are perhaps the only places where the currents are equally irresistible. To the latter strait, indeed, the Alderney Race bears a great resemblance; and an Orkney man unexpectedly entering it, would be in danger of mistaking Alderney for Stroma, and Cape de la Hogue for Dunnet Head. In stormy weather the passage of the Race is esteemed by mariners an undertaking of some peril,—a fact we felt no disposition to gainsay; for though the day was serene, and the swell from the westward completely broken by the intervention of the island, the conflict of counter-currents was tremendous. At some places the water appeared in a state of fierce ebullition, leaping and foaming as if convulsed by the action of submarine fires; at others it formed powerful eddies, which rendered the helm almost of no avail in the guidance of the vessel.

We steered as near to Alderney, or Aurigni as it is frequently called, as prudence warranted. It is a high, rugged, bare-looking island, encompassed by perilous reefs, but supporting a pretty numerous population. The only arborescent plants discernible from the deck of our vessel, were clumps of brushwood. The grain on the cultivated spots was uncut, and several wind-mills on the higher grounds, indicated the means by which the islanders, who have very little intercourse with the rest of the world, reduce their wheat into flour. The southern side of the island is precipitous, and its eastern cape terminates in a fantastic rock called the Cloak, which our captain consulted as a landmark in steering through the Race. There is only one village in Alderney,—a paltry place, named St. Anne, or in common parlance La Ville; and there a detachment of troops is generally stationed. Small vessels only can enter the harbour, which is shelterless, and rendered difficult of access by a sunken reef.

At sunset Alderney was far astern, and three of its sister islands, Sark, Herm, and Jethau, were in view ahead. It was impossible to behold, without a portion of romantic enthusiasm, the dazzling radiance of the orb of day, as it went down in splendour beyond the gleaming waves. A thousand affecting emotions are liable to be excited by the prospect of that mighty sea whose farther boundaries lie in another hemisphere,—whose waters have witnessed the noblest feats of maritime enterprise, and the fiercest conflicts of hostile fleets. Where shall we find the man to whom science is dear, who dreams not of Columbus, when he first feels himself rocked by the majestic billows of the Atlantic,—who regards not the golden line of light, which the setting sun casts over the waste of waters, as a type of the intellectual illumination experienced by the ocean pilgrim, when he first steered his bark into its solitudes? Who can survey, even the hither strand of that vast sea, without reflecting that the waves that break at his feet have laved the palm-fringed shores of America; and that the bones of millions—the pride, and pomp, and treasure of nations—repose in the same capacious tomb?

Anxious to be a spectator of the perils that beset navigation among these islands, I repaired to the deck before day-break, at which time, according to our captain's calculation, we were likely to double the Corbiére—a well-known promontory on the western side of Jersey—which requires to be weathered with great circumspection. Jersey was already visible on our larboard bow,—a lofty precipitous coast. Wind and tide were in our favour, and we swept smoothly and rapidly round the cape; but the jagged summits of the reefs that environ it, and the impetuosity of the currents, bore incontestible evidence to the verity of the tales of misfortune which our captain associated with its name. The rock which bears the appellation of the Corbiére, is close in shore, and so grotesque in form, as to be readily singled out from the adjacent cliffs. A reef, visible only at low water, shoots from it a considerable distance into the sea, and another ledge of the same aspect, lies still farther seaward; consequently the course of a careful pilot, is to hold his way free through the channel between them. If a landsman may be permitted to make an observation on a nautical point, I would say that our steersman kept the peak of the Corbiére exactly on a level with the adjacent precipices, till we were directly abreast of the headland, and then stood abruptly in-shore till within a few fathoms of the cliffs, under the shadow of which he afterwards held a steady course till we opened the bay of St. Aubin.

The fantastic and inconstant outline of the Corbiére, as we were hurried swiftly past it, was a subject of surprize and admiration. When first seen through the haze of morning, it resembled a huge elephant supporting an embattled tower; a little after, it assumed the similitude of a gigantic warrior in a recumbent posture, armed *cap-a-pied;* anon, this apparition vanished, and in its stead rose a fortalice in miniature, with pigmy sentinels stationed on its ramparts. The precipices between the Corbiére and the bay of St. Aubin, are no less worthy of notice than that promontory. They slope down to the water edge in enormous protuberances, resembling billows of frozen lava, intersected by wide sinuous rifts, and present a most interesting field for geological research.

The bay of St. Aubin is embraced by a crescent of smiling eminences thickly sprinkled with villas and orchards. St. Helier crouches at the base of a lofty rock that forms the eastern cape: the village of St. Aubin is similarly placed near Noirmont Point, the westward promontory, and between the two, stretches a sandy shelving beach, studded with martello towers. The centre of the bay is occupied by Elizabeth Castle,—a fortress erected on a lofty insulated rock, the jagged pinnacles of which shoot up in grotesque array round the battlements. The harbour is artificial, but capacious and safe, and so completely commanded by the castle, as to be nearly inaccessible to an enemy. The jetties and quays, which had only been recently constructed, are of great extent and superior masonry. The majority of the vessels in port were colliers from England; but summer is not the season to look for crowded harbours. The merchants of St. Helier engage deeply in the Newfoundland fishery, and are otherwise distinguished for maritime enterprise; consequently there is no reason to infer, that the vast sum of money which must of necessity have been expended in the improvement of the harbour, has been unprofitably sunk. During the late war the islanders rapidly increased in opulence, as the island was filled with troops and emigrants, who greatly enhanced the value of home produce; but the cessation of hostilities restored matters to their natural order, and the Jerseymen bewail the return of peace and plenty with as much sincerity as any half-pay officer that ever doffed his martial appurtenances.

St. Helier may contain about 7000 inhabitants. Internally it differs little from the majority of small sea-ports in England, save it may be in the predominance of foreign names on the sign-boards, and the groups of French market-women, distinguished by their fantastic head-gear, who perambulate the streets. The only place worthy of a visit is the market, which, for orderly arrangement, and plenteous supply, is scarcely excelled in any quarter of the world. It was occupied chiefly by Norman women, who repair here regularly once a-week from Granville to dispose of their fowls, fish, eggs, fruit, and vegetables. Most of them were seated at their stalls, and industriously plying their needles, when not occupied in serving customers. They had a mighty demure look, and never condescended to solicit any person to deal with them,—a mode of behaviour which the butchers, fish-mongers, fruiterers, and green-grocers, of Great Britain would do well to imitate. The generality were hard-featured; and their grotesque head-dresses, parti-coloured kerchiefs, and short clumsily-plaited petticoats, gave them a grotesque, antiquated air, altogether irreconcileable to an Englishman's taste. They were, however, wonderfully clean, and civil and honourable in their traffic, compared with the filthy, ribbald, over-reaching hucksters who infest our markets; and it was gratifying to hear that the Jersey people encouraged their visits, and treated them with hospitality and respect.

The rock on which Elizabeth Castle is perched, is nearly a mile in circuit, and accessible on foot at low water by means of a mole, formed of loose stones and rubbish, absurdly termed "the Bridge," which connects it with the mainland. In times of war with France, this fortress was a post of great importance, and strongly garrisoned; but in these piping days of peace, I found only one sentinel pacing his "lonely round" on the ramparts. The barracks were desolate,—the cannon dismounted,—and grass sufficient to have grazed a whole herd, had sprung up in the courts, and among the pyramids of shot and shells piled up at the embrazures. The gate stood open, inviting all who listed to enter, and native or foreigner might institute what scrutiny he pleased without interruption. This fearless exposition of our national strongholds to the inquisitorial eyes, whether of friend or foe, is peculiarly British. It is in the bravery and unfettered spirit of her people, not in walls and ramparts, that she trusts; and a war of twenty years has proved that her defences are of adamant.

The hermitage of St. Elericus, the patron saint of Jersey, a holy man who suffered martyrdom at the time the pagan Normans invaded the island, is said to have occupied an isolated peak, quite detached from the fortifications, which commands a noble seaward view of the bay. A small arched building of rude masonry, having the semblance of a watch-tower, covers a sort of crypt excavated in the rock, into which, by dint of perseverance, a man might introduce himself; and this, if we are to credit tradition, is the cave and bed of the ascetic. Here, like the inspired seer of Patmos, he could congratulate himself on having shaken off communion with mankind. Cliffs shattered by the warfare of the elements,—a restless and irresistible sea, intersected by perilous reefs,—and the blue firmament,—were the only visible objects to distract the solemn contemplations of his soul. The voluntary privations of the early anchorites have now fallen into disrepute, and he who struggles with temptations in the busy haunts of life, is understood to discharge more faithfully his temporal duties, than he who expiates past transgressions in a monastic cell. But granting this to be true, it does not follow that we are to overlook the advantage that accrued to mankind from the self-imposed penances of the early hermits. Austere and blameless in their lives, and actuated by a spirit as fervent as it was pure, they acquired an influence over the minds of unenlightened men, which no other mode of existence could have purchased, and by that means essentially contributed to the propagation of Christianity. The "dweller of the rock" is a character now unknown, and even the appellation "hermit" has in some measure lost its ancient signification; but the geuuine propagators of a blessed creed are nobly represented by those self-devoted men, who at the present day fearlessly cast themselves, "without staff or scrip," among barbarous tribes, to forward the great work of salvation.

An Abbey, dedicated to Saint Elericus, once occupied the site of Elizabeth Castle. The fortress was founded on the ruins of this edifice in 1551, in the reign of Edward the Sixth, and according to tradition, all the bells in the island, with the reservation of one to each church, were seized by authority, and ordered to be sold, to defray in part the expense of its erection. The confiscated metal was shipped for St. Malo, where it was expected to bring a high price, but the vessel foundered in leaving the harbour, to the triumph of all good Catholics, who regarded the disaster as a special manifestation of divine wrath at the sacreligious spoliation.

The works of Fort Regent occupy the precipitous hill that overhangs the harbour, and completely command Elizabeth Castle, and indeed the whole bay. They are of great strength, and immense masses of rock have been blown away from the cliff in order to render it impregnable. The barracks are bomb-proof, and scooped in the ramparts; and the parade ground, which in shape exactly resembles a coffin, forms the nucleus of the fortifications. This fortress had been completed since the peace, and we found the 12th regiment of the line garrisoning it; but little of the pomp and circumstance of warlike preparation was visible on its ramparts. The prospect seaward is magnificent, and includes a vast labyrinth of rocks called the Violet Bank, which fringes the south-eastern corner of the island. One glimpse of this submarine garden is sufficient to satisfy the most apprehensive patriot, that Jersey is in a great measure independent of "towers along the steep."

At St. Helier a stranger may, without any great stretch of imagination, fancy himself in England; but no sooner does he penetrate into the country, than such self-deception becomes impossible. The roads, even the best of them, are mere paths, narrow, deep sunk between enormous dikes, and so fenced by hedges and trees, as to be almost impervious to the light of day. The fields, of which it is scarce possible to obtain a glimpse from these "covered ways," are paltry paddocks, rarely exceeding two or three acres. Hedges and orchards render the face of the country like a forest, and nearly as much ground is occupied by lanes and fences as is under the plough. The crops, chiefly wheat and barley, had been cut down before my arrival; but, judging by the stubble, they had been luxuriant. Many of the fields were carpeted with a rich aftermath of clover; and such as were laid down as meadow were beautifully verdurous. A considerable extent of ground was cropped with potatoes, which promised to be so productive throughout the island, that several growers with whom I conversed, predicted they would scarcely be worth digging. The potatoe is reputed to attain perfection in Jersey, and the lightness and friability of the soil are certainly favourable to its cultivation; but I did not detect any superlative qualities in such as were produced at table during my sojourn at St. Helier.

A view of the western side of Jersey, is calculated to impress a stranger with an idea that it is a barren, unproductive island; but no supposition could be more erroneous, as, in fact, a great proportion of it may be described as orchard. The extent of ground planted with fruit trees—apple, pear, and plumb—is prodigious; and consequently cyder—and very excellent cyder too—is one of the staple products of the country, and a favourite beverage among the natives. At the Union Hotel, St. Helier, boarders were allowed to quaff as much as they had a liking for, without being subjected to any additional charge. The rage for planting and fencing first seized the Jersey proprietors about two centuries ago, when the whole island being exposed to the blighting sea wind, the fruit suffered greatly from want of shelter. This led to the absurd system of subdivision which has been in progress ever since, and which has so lamentably reduced the productive surface. The preposterous breadth of the dikes, and the unpruned luxuriance of the hedges, intertwined with brambles and other rank growing plants, are neither profitable nor ornamental; and it is only surprising how the islanders should have remained so long blind to the waste and inconvenience they occasion. The more public roads exhibited traces of having been recently widened and repaired,—an improvement suggested and carried into execution during the late efficient government of General Don. What sort of tracks they were previous to this trimming, may be conjectured from the state of the bye-roads. It is a fact strikingly illustrative of the besotted ignorance which too frequently characterizes the deliberations of interested bodies of men, that Governor Don encountered great opposition, and even risked his popularity, when he first began this useful work; but the clamour which prejudice raised against him, has long since died away, and the natives, convinced by experience of the sound policy that dictated the improvement, look back to his administration with gratitude and respect.

About three miles inland from St. Helier, is a singular structure named Prince's Tower, erected on an artificial mound or tumulus, and embowered in a grove of fine trees. The extensive prospect it commanded, and the indubitable antiquity of the masonry, induced me to apply for permission to ascend it; and I was rewarded with a bird's eye view of nearly the whole island, and a vast sweep of the French coast, extending almost from Cape de la Hogue to Avranches. An Englishman had lately taken up his abode in the tower, which, with the adjacent pleasure ground, he rented at forty pounds a-year. His object was to render it a place of resort to the inhabitants of St. Helier, and his advertisements promised that the "delightful emotions excited by its unrivalled scenery, and the harmonious chat of the feathered tribe, should not be counteracted by the comfortless sensations of hunger, thirst, and weariness." The interior of the tower was neatly and appropriately fitted up. One apartment was designated the chapel; and in the highest room were several telescopes, mounted so as to traverse to any point of the compass, for the gratification of visitors.

But it is the traditionary history of Prince's Tower that renders it interesting in the eyes of the islanders. In former times it was known by the name of La Hogue-Bye, and the following legend, quoted from *Le Livre noir de Coutances,* gives the origin of its celebrity:—In remote times, a moor or fen in this part of Jersey, was the retreat of a monstrous serpent or dragon, which spread terror and devastation throughout the island. At length a valorous Norman, the Seigneur de Hambye, undertook to attempt its destruction, which, after a terrible conflict, he accomplished. He was accompanied in this adventure by a vassal of whose fidelity he had no suspicion, but who, seeing his lord overcome by fatigue, after having vanquished the reptile, suddenly bethought himself of monopolizing the glory of the action. Instigated by this foul ambition, he assassinated his lord, and, returning to Normandy, promulgated a fictitious narrative of the encounter; and, to further his iniquitous views, presented a forged letter, which he said had been written by De Hambye to his widow, just before his death, enjoining her to reward his faithful servant, by accepting him as her second husband. Reverence for the last injunction of her deceased lord, induced the lady to obey, and she was united to his murderer. But the exultation of the homicidal slave was of short duration. His sleep was disturbed by horrid dreams; and at length, in one of his nightly paroxysms, he disclosed the extent of his villany. On being arrested and questioned, he made a full confession, and was tried, found guilty, and publicly executed. De Hambye's widow, in memory of her lord, caused a tumulus of earth to be raised on the spot where he was buried; and on the summit she built a chapel, with a tower so lofty, as to be visible from her own mansion at Coutances.

So much for the fable. As to the word *Hogue,* there are several places in Jersey called *Hougues,* which are always situated on a rising ground. The word has evidently originated from the German *hoch,* from which is derived our English *high,* A *hougue,* therefore, means a mound or hillock, and in the present instance, the addition of *bye* is obviously a contraction of Hambye; and, in accordance with the foregoing tradition, means literally the *barrow* or tomb of the *Seigneur de Hambye.*

The chapel at la Hogue is said to have been rebuilt in imitation of the Holy Sepulchre at Jerusalem, by one of the popish deans of Jersey, in the reign of Henry VIII. La Hogue-bye remained for many years in a dilapidated state, till about 1790, when the late Admiral d'Auvergne, a native of Jersey, better known under his French title of Duke of Bouillon, became its owner by purchase, and hence it obtained its present name. At his death, in 1816, it was purchased by the late lieutenant-governor, Lieutenant-General Sir Hugh Mackay Gordon, whose heirs afterwards sold it to Francis le Breton, Esq. to whom it now belongs.

The most prominent object in the noble panoramic view from the top of Prince's Tower, is a huge fortress on the eastern side of the island, called the Castle of Mont Orgueil. It crests a lofty conical rock, that forms the northern headland of Grouville Bay, and looks down, like a grim giant, on the subjacent strait. The fortifications encircle the cone in picturesque tiers, and the apex of the mountain shoots up in the centre of them, as high as the flagstaff, which is in fact planted upon it. During war a strong garrison constantly occupied Mont Orgueil, but now a corporal and two privates of artillery composed the whole military force. The corporal, a quiet intelligent man, who spoke with much horror of paying a visit to the West Indies, which, in the mutations of his professional life, he had a prospect of doing at no distant period, acted as *cicerone,* and, among other places, introduced me into a small circular apartment, forming one of the suite appropriated to officers, which he said had been the habitation of Charles II. when a wanderer. This prince, when his unfortunate father fell into the hands of the regicidal party, found a loyal welcome in Jersey. Here he was recognized as king, when in England they sought his blood: here he remained in security, when his father-land afforded him no asylum. During his lonely sojourn in this remote portion of his hereditary dominions, he is said to have employed himself in making a survey and delineating a map of the island. The natives, flattered by the confidence he reposed in them, and justly proud of nine centuries of unblemished loyalty to the throne of Great Britain, still refer to his residence as a memorable event; and in no other part of the British dominions, is the memory of the 'merry monarch' more respected. When Cromwell, after the disastrous issue of the battle of Worcester, sent an expedition, under Admiral Blake, to reduce the island, it made a most gallant and protracted defence; and had not circumstances conspired to favour the invaders, their victory would have been dearly purchased. If we view Charles only as a crowned king, his character inspires sentiments that point him out as utterly unworthy of the blind but generous devotion of his adherents; but as a wanderer, proscribed by his regicidal subjects, and driven, like a weed on the ocean, from shore to shore, he excites that sympathy which unfortunate royalty always claims. While standing at the window from whence he had often surveyed the rock-strewn channel that divided him from France, the hoary sensualist, the ingrate monarch, was forgotten, and I remembered only the generous and kingly-hearted prince, who had often scarcely a roof to shelter him.

Mont Orgueil, in point of historical association, is by far the most interesting spot in Jersey. A part of the fortifications, according to tradition, are coeval with Cæsar's incursions into Gaul; and the islanders hold it famous in their oldest story, and of antiquity beyond record. In 1374, the celebrated Constable du Guesclin passed over from Bretagne at the head of a large army, including some of the bravest knights of France, and encamped before this fortress, then called Gouray Castle, into which the principal inhabitants had retired for safety; but after a siege of several months, he was obliged to draw off his forces in despair, and quit the island. Henry V. added much to the strength and beauty of Gouray,—made it a depot of arms, and conferred on it the proud name of Mont Orgueil. About 1461, Nanfant, the governor, a dependent of Henry VI. was prevailed upon, by an order of Queen Margaret, to surrender it to Surdeval, a Frenchman, agent of Peter de Brezé, Count of Maulevrier; but though de Brezé kept possession of it for several years, the natives, under the command of Philip de Carteret, seigneur of St. Ouen, a family long illustrious in the Jersey annals, prevented him from completely subjugating the island. Sir Richard Harliston, vice-admiral of England, afterwards re-captured Mont Orgueil, and put an end to Maulevrier's usurpation.

A small pier, intended to facilitate the landing of stores, and shelter the numerous oyster vessels that resort to Grouville Bay at the dredging season, projects into the sea, immediately under the castle guns. The bay, like that of St. Aubin, is defended by a regular line of martello towers, several of which are built far within flood-mark, on reefs that form part of the Violet Bank. The adjacent country is a perfect garden, and numerous secluded villas and cottages are scattered among the umbrageous and productive orchards that spread around. A small village, called Goree, lies a short way southward of Mont Orgueil. In former times, it was a sutling-place for the garrison; now it is only the rendezvous of a few oyster-fishers. In the auberges here, (every alternate house retailed liquor,) brandy sold at a shilling a bottle. The honest corporal at Mont Orgueil, mentioned that, about twenty years ago, several thousand Russian troops, destined to co-operate with a British force in a diversion on the coast of France, in favour of the house of Bourbon, were encamped here, and died in hundreds, in consequence of their intemperate attachment to this liquor.

The road leading directly from Grouville to St. Helier runs parallel with the southern shore, among corn fields, orchards, and hamlets, and is the best in the island. I travelled it after sunset, and found myriads of toads hopping across it in every direction. These reptiles are extremely common in Jersey; while, in the neighbouring island of Guernsey, if popular report may be credited, they are not only unknown, but cannot exist, as has been ascertained by importing them from less favoured countries. This exemption in favour of Guernsey, is in all probability a mere fable, originating with some ignorant native, the absurdity of which no person has been at the trouble to expose. Illiterate men are always eager to claim anomalies in nature in favour of the place of their birth. Lizards and small snakes are also numerous in Jersey; and at night-fall, a chorus of crickets resounds from every hedge. So shrill is the tiny chirp of these insects, that it might almost pass for the vesper note of some diminutive feathered songster.

The Jersey cattle are small; but like the pigmy breed of the Scottish Highlands, their flesh is delicate, and their milk and butter rich. The butcher market at St. Helier is supplied chiefly from France. There are sportsmen in Jersey as well as in other countries, but game is neither various nor abundant. The list, however, includes hares, rabbits, the Jersey partridge, a beautiful bird, with pheasant eyes, red legs, and variegated plumage, and several varieties of water fowl. In severe winters, flocks of solan geese, locally denominated "barnacles," frequent the shores; and Falle states, that in his time a vulgar notion prevailed in the island, that these birds were bred in rotten planks, or the ribs of ships, which had long been immersed in the sea. The more credulous supporters of this theory, affirmed that they had seen the young goslings adhering to pieces of decayed wood, some of the shape and size of mushrooms, others perfectly fledged, and ready to take wing. The same silly story prevails in certain parts of Scotland, where the solan goose is an annual visitant.

The Romans, the pioneers of discovery and civilization in Europe, conferred on Jersey the name of Cæsarea, in honour of their leader; and Cæsar and Tacitus concur in describing it as a stronghold of druidism, of which worship many monuments still exist. The aborigines were doubtless sprung from the Celtic tribes spread over the adjacent continent; but the present inhabitants are universally recognized as the lineal descendants of the warlike Normans, who, under the auspices of the famous Rollo, conquered and established themselves in the north of France in the ninth century. It was first attached to the British crown at the conquest; and though repeated descents have been made on it by France during the many wars waged between the countries since that remote era, none of them were attended with such success as to lead to a permanent occupation of the island. The islanders, proud of an unconquered name, and gratified to recollect that they originally gave a king to England, not England a king to them, have been always distinguished for fidelity to the British government, and their unshaken loyalty has, from time to time, been rewarded by immunities and privileges, highly conducive to their prosperity, and calculated to foster that spirit of nationality, which is invariably distinctive of a free people. They are exempted from those taxes which press heaviest on the English yeoman, and from naval and military service beyond the boundaries of their own island. The local administration of justice is still regulated by the old Norman code of laws, and this circumstance is regarded by the natives as a virtual recognition of their independence; but strangers, when they inadvertently get involved in legal disputes, have often cause to regret its existence. In cases of assault, particularly the assaulting of a magistrate, even though his official character be unknown to the offender, a severe punishment is generally awarded. We heard several instances of military officers, who had been guilty of raising an arm of flesh against jurats in night frolics at St. Heliers, narrowly escaping the penalty attached to this heinous infraction of the laws, —a penalty which would have left them maimed for life.*

* "In the days of Rollo," says Falle in his History of Jersey, compiled in the 17th century, "a custom obtained that in case of any encroachment and invasion of property, or of any other oppression and violence requiring immediate remedy, the party aggrieved need do no more than call upon the name of the Duke, though at never so great a distance, thrice repeating aloud *Ha-Ro*, &c. &c. and instantly the aggressor was at his peril to forbear attempting any thing farther. *Aa*, or *Ha*, is the exclamation of a person suffering. *Ro* is the duke's name abbreviated; so that *Ha-Ro* is as much as to say, 'O! Rollo, my prince succour me.' Accordingly, (adds Mr. Falle,) with us in Jersey, the cry is, '*Ha-Ro a l'aide, mon prince!*'" And this is that famous *Clameur de Haro*, subsisting in practice even when Rollo was no more, so much praised and com-

The introduction of Christianity, and final extirpation of idolatry, is said to have occurred in the sixth century. In the latter days of the reign of popery, Jersey formed part of the diocese of Coutances in Normandy, where the ancient records of the island were deposited; but at the Reformation, in the reign of Elizabeth, it was attached to the see of Winchester,—an annexation, however, merely nominal, for the island is in reality exempt from the dominion of the church of England. The inhabitants are a well-disposed and peaceable race, but not particularly distinguished for enthusiasm in religion. The peasantry are orderly and industrious; the merchants enterprising; and the seamen, a numerous class, hardy and adventurous. The aggregate of the people live more after the French manner than the English; that is, they substitute fruit and vegetables, in a great measure, for animal food, and cyder for ale. Neither men nor women are distinguished for personal beauty, though we noticed several very comely dames in our perambulations; and notwithstanding the boasted purity of their descent from the ocean-roamers of the north, they have many of the anomalous features of a mixed race.

ART. V.—*Description of a Species of Worm found in the Frontal Sinus of a Sheep.* By WILLIAM RHIND, Member of the Royal Medical and Royal Physical Societies of Edinburgh; Author of a Treatise on Intestinal Worms of the Human Body.

THROUGH the kindness of my friend, W. A. F. Browne, Esq. I have been favoured with a specimen of a worm found by him, about two months ago, in the frontal sinus of the common sheep, *(ovis aries.)*

This worm, of which a representation is here given, is a species of the Pentastoma, Ord. III. Genus XVII. of Rudolphi. Five

mented upon by all who have written on the Norman laws. A notable example of its virtue and power was exhibited about 170 years after Rollo's death, when a private individual and subject boldly stood forward to oppose the interment of William the Conqueror's body in the great abbey of St. Stephen at Caën, because the grave had been dug on a spot of ground which had been his father's property, and for which he had never received an equivalent. "He who oppressed kingdoms by his arms," said he, addressing the funeral train, "has been my oppressor also, and has kept me under a continual fear of death. Since I have outlived him who injured me, I mean not to acquit him, now he is dead. The ground whereon you are going to lay this man is mine; and I affirm that none may in justice bury their dead in ground which belongs to another. If, after he is gone, force and violence are still used to detain my right from me, *I appeal to Rollo*, the founder and father of our nation, who, though dead, lives in his laws. I take refuge in those laws, owning no authority above them." This fearless speech, uttered in presence of Prince Henry, son of the deceased monarch, afterwards King Henry I. was not made in vain. The *Ha-Ro* was respected, the grievance redressed, and the conqueror laid quietly in his grave.

species of the Pentastoma are enumerated by Rudolphi, and figured in his admirable illustrations, Plate X. The nearest approximation which the present worm exhibits to any of these, is the Pentastoma Tænioides, Fig. 14, 15. Plate X. the original specimens of which were found in the frontal sinus of the wolf, *(canis lupus.)* The Pentastoma Tænioides is found also in the frontal sinus of the dog, *(canis vulgaris;)* and, according to Greve, in the ethmoidal cells of the mule. Another species, the Pentastoma Denticulata, has been found in the frontal sinus of the goat, *(capra hircus and capra Americanus;)* but, as far as I know, this is the first of the genus Pentastoma which has been described by any writer as found in the frontal sinus of the sheep.

The general characters of this worm are as follows: Body oblong, annular, sub-depressed, curved, and tapering slightly towards its head, and abruptly towards its tail, which terminates in an obtuse point, in the centre of which is situated the anus. Head large, obtuse, with five orifices; the central one circular, and the others awl-shaped: the abdominal viscera commencing a line from the head, and terminating about two lines from the tail. The belly is rather depressed, and the epidermis thickish, with the annulations distinctly continuous. The back is tumid, and the membrane extremely pellucid; the annulations in the upper extremities of which are nearly invisible, becoming more distinct as they approach the tail, under which the convolutions of the oviducts, (which are of a flesh colour,) can be distinctly traced throughout their whole length, with the intestinal canal running above along the left side, disappearing among the folds of the oviducts, about 3-4ths of an inch from the tail, and then re-appearing, and crossing them till they are no longer seen. From the sides of the abdominal cavity the worm is quite depressed, and the edges along its whole length serrated. Length 2 inches; breadth 3-8ths; colour cream white.

The Distoma Hepaticum is a species frequently found in the livers of sheep, and the Cœnurus Cerebralis, a species of the Hydatid, is also found occupying the cavities of the brain of the same animal. The present worm, however, has no similarity to either of these species.

It is certainly a singular question, and one of some interest, How this worm has been generated in the frontal sinus of the sheep? It is a cavity, one would imagine, completely excluded from all extraneous communication; and if any circumstance could favour the idea of spontaneous or equivocal generation, this is certainly a strong one.

Unfortunately I am unable to give any description of the appearance of the frontal sinus where this animal was found lodged; whether it was compact and impervious on all sides, or whether the sutures of the skull were pervious, or any, the least opening was found communicating with the interior of the cavity. But neither in this case, nor in similar ones, are we to assume the theory of spontaneous generation as a fact established, because we find it impossible to account for the mode of transmission of the eggs or embryo of the various species from one part to another; for, with the exception of this negative kind of reasoning. we conceive the advocates of the doctrine have never yet brought forward any thing to prove their assertions.

And if such negative reasonings were generally admitted, how many circumstances, well established by daily experience, would be overthrown? Even in the generation of the higher animals, we cannot trace the manner in which the ovum is transmitted from the ovarium to the uterus. There is no direct outlet or passage can be distinguished from the one to the other; but that the ovum does make its way to the womb by some means or other, as through the fallopian tubes, we believe, is never doubted. It is the same in many other departments of the animal economy; and, because we cannot always trace the minute and intricate operations of nature, to have recourse to theories at variance with all the known analogies of her laws, as is the case with the supporters of equivocal generation, appears rather as a cutting of the gordian knot than untying it, and is but too indicative both of the impatience of minute investigation, and the limited nature of man's capacities.*

Plate II. Fig. 2. size of nature. Fig. 3. Head magnified. Fig. 4. point of the tail. Fig. 5. a section.

ART. VI.—*Oral Information on the Origin of the Gorkhas, a Nation now prevalent in the Mountainous Regions of Népal or Nypal.* By Captain Ayton.

The appellation of *Gorkhas* is not the original name of the race, the title and history of whose primogenitor are lost in the obscurity of past ages. Gurhoong, a place to the westward of Kathmanro, (generally but erroneously spelt Catmandoo,) the capital of Nypal, seems to have been the source from whence they issued to establish themselves primarily at Newacote, three days journey north of Bootwull. Having reigned there some time, they made further progress, and gained a footing in Kaskee, one day's journey from Newacote. From Kaskee they found their way to Lumjoong, three days journey east of Kaskee, and from thence to Gorkha. Subsequently they advanced to Newacote 2d, a day's travel N.N.W. from the capital of Nypal, and progressively became masters of the Happy Valley.

The Gorkhas, now so denominated, are vaguely said to be descended from one Meemcha, who had four sons. Disagreements caused them to separate, and disperse into different quarters: one

* We have carefully examined this worm, and it does not appear to bear sufficient similarity to Rudolphi's P. tænioides to constitute identity of species.—Ed.

went to Kaskee; a second to Suthoon; a third to Pyoong; and the eldest remained at Newacote.

Any information connected with these mountaineers may be considered interesting, from the uncouthness and peculiarities of the people, as well as from the obscurity in which their early history is involved.

BARRY'S HOTEL, 17*th June* 1829.

SCIENTIFIC REVIEWS.

Crustacés de la Mediterannée, et de son Littoral, decrits et Lithographées par POLYDORE ROUX, Conservateur du Cabinet d'Histoire Naturelle de la Ville de Marseille. Levrault, Paris, 1828.

THIS work is well conceived; for much advantage is derived to natural history by the description of the productions of individual spots. By this means, England or France would become better known, and we should have works on which more care would be bestowed, and more useful than those compilations which so rapidly succeed one another in metropolitan towns, without any benefit to science. The Crustacea of the shores of the Mediterranean, will be published in 4to., in about 36 livraisons, at six francs each. We have examined the first two numbers, and been much pleased with the general execution of the work.

The first number contains the *Lambrus Mediterraneus,* (Roux;) the *Eurynome Aldrovandi,* (of which Risso had examined the young,) he considers to be the same, and he also refers to it the *Cancer Macrochelos* of Herbst, figured by Aldrovandi and Seba:—the *Calappa Granulata,* Desm.; of this species, the only one of its genus that frequents the European seas, Mr. Risso has described a variety of a pale rose colour, with white feet, and brown nails:—the *Amathia Rissoana,* (Roux;) our author has named this addition to the European Crustacea after Mr. Risso: its characters are, *testa ovato-trigona; fronte spinis duabus discedentibus; dorso tredecim-aculeato; pedibus manibusque lævibus, rubescentibus; corpore lutescento.* There is another new species, the *Squilla Cerisii,* (Roux,) *(Corpore fulvo, supra lævi; pollicibus bidentatis; caudâ rubrâ, spinosâ, canaliculatâ,)* described from specimens brought from Corsica, and named after Lefebvre de Cerisy, a continental entomologist.

The second livraison strengthens the good opinion we had formed of the first. To the figures which the author had previously given, as those of the species, and of the abdomen relative to the two sexes, he now adds drawings of the antennæ and external feet-jaws, *(pieds machoires,)* organs which furnish the generic characters. Upon the sixth plate two species of Grapsi are figured, the turtle and the pelagic, which Latreille thinks may be the *Cancer mutus* of Linnæus. The next presents the *Homola Cuvieri,* a species which, in a memoir read to the Academy of Sciences in 1815, Latreille, (in establishing the same genus, under the denomination of *Hippocarcinus,*) drew from the neglect under which it had lain since the time of Aldrovandi. Two *Leucosiæ,* of the sub-genus *Ilia* of Dr. Leach, one of which has been named *nucleus,* and the other the *rugulosa* of Mr. Risso, compose the 8th plate. The *Gonoplax Rhomboides,* Latr. (*Ocypode longimana,* Risso,) occupies the ninth. The tenth and last represents, with details, the *Pagurus striatus.*

In speaking of the *Gonoplaces,* (*Rhombilles* of the French writers,) he refers to the determinations of Mr. Desmarest, who has figured five fossil species, (Desm. Consid. Gen. sur les Crustacés, p. 124. and Hist. Nat. des Crustacés fossiles, p. 99.) *Gonoplax Latreillii, G. incisa, G. emarginata, G. impressa, G. incerta;* but these, according to Latreille, would belong, some to the genus *Gelasimus,* others to the genus *Macropthalmus,* and one to the genus *Concropthalmus,* (Annales des Sciences Naturelles, t. 17. p. 78.)

A Dissertation on the Course and probable Termination of the Niger. By Lieut.-Gen. Sir Rufane Donkin, G. C. H. K. C. B. and F. R. S. Murray, London, 1829.

There are few problems in geography which present such a combination of interesting discussions, as the course of the Niger in the centre of Africa, the determination of which has been long held in anxious request. To ally the existing condition of the country with the relations of early historians,—to fix the precise geographical positions of mountains, rivers, and towns,—to settle the question as to the possibility of an immense river running across a continent, or of its terminating in the interior,—have alike employed and baffled the ingenuity of the classical antiquary, the speculations of the geographer at home, and the unwearying persistance of the traveller abroad.

Many attempts, however, have been made by enthusiastic and indefatigable men to acquire such information as would enable them to lay down a chart with minuteness and accuracy. But every evil conspires to prevent Europeans from penetrating these regions. The climate of that "pest-house of the world," intertropical Africa, brooding over the land with deadly influence, spreads universal destruction over the path of all strangers. The savage tribes which infest the soil, vying with the inclement elements, form an almost insuperable barrier against approach. And the incapacity of the human frame to endure such constant suffering as all our travellers have experienced, accompanies the individual through all his toils, and increases with his advance. Hence it arises that the progress of discovery has been tardy, and the amount small.

The real knowledge acquired by the various expeditions to this portion of Africa, may be expressed in a few words; but the title of the work at the head of this article, leads the mind to dwell rather on the hypotheses which ingenuity has contrived, than on the facts which have hitherto appeared on the surface of our ignorance. It will be necessary, however, to state what we know, before we enter upon a detail of the theories which have usurped the place of that of which we have no knowledge; and an historical view of the discoveries and opinions which have successively had credence amongst European geographers, may most advantageously introduce the avowal of the extent of our present information.

Before the labours of the Portuguese, the relations respecting this region are in general liable to too many interpretations to be relied upon as evidence of facts. Nor, indeed, till the establishment of our African Association, can we claim much authority for the publications which originated in this inquiry.

The *direction* of the river, a fact which, it would be supposed, needed only to be once observed to be finally determined, was for a long period a debatable question. Whilst Herodotus, and succeeding ancient geographers, supposed the Niger and Nile to be an identical stream, the former rising in the mountains of Mauritania, its course was necessarily believed to be from west to east. Ptolemy, however, who laid down the true source of the Nile, is not so distinct in his statement of the direction of the stream of the Niger. But the Arabian geographers, amongst whom Edrisi and Abulfeda are the most eminent, attribute to the river a westward course, stating that the Niger and the Nile spring from the same source, (the true origin of the latter,) and afterwards divide into the two rivers, one flowing to the west into the Sea of Darkness, (the Atlantic,) and the other rolling to the north, to mingle its waters with the Mediterranean. And Leo Africanus distinctly states, that he had personally observed the western direction of the stream, in navigating from Tombuctoo to Ginea. From a contracted knowledge of the western portion of Africa, the Portuguese also, on seeing the Senegal, the Gambia, and other rivers, pour their contents into the Atlantic Ocean, imagined them to be mouths of the Niger, and appropriated to it accordingly a westward course. But all these erring suppositions were resolved into certainty on the 21st of July 1796, when Mungo Park, from the heights of Sego, saw "the majestic Niger flowing slowly from west to east."

Equally as unsettled were the early notions as to the *source* of this river; for whilst many believed it to originate in the mountains of Mauritania, others supposed its primitive waters to flow in union with those of the Nile, and Leo affirms that it issues from a lake south of Bornou. It is now decided, from observation, that the great central river of Africa rises in the northern declivities of the Kong mountains, between 9° and 10° W. of Greenwich.

When it has been stated that this noble river, called by the various names of Niger, Dhiolibâ or Joliba, Quorra or Quolla, and Nile of the Negroes, pursues an eastward direction, through Lake Dibbie, past Tombuctoo, and to the south of Houssa, we have advanced to the limits of our knowledge, unless we add, from Clapperton, that a river named Quorra, (which, however, is a mere generic name, signifying *great river,*) possibly a branch of the Niger, flows to the south, past Funda, in lat. 8° 15′, but whither we know not.

Having brought our river to this incomplete termination, it must now be relinquished as a legitimate object of contention between those tarry-at-home travellers who have made themselves so prominent in the discussion. But it is with reluctance that we proceed to inflict upon our readers the repetition of the conflicting opinions which have, by mere collision, so long maintained their unprofitable existence: nothing but our duty to the uninformed, should rescue these "whimsies of the brain" from their merited neglect.

1. When Park was told by the traders of Tombuctoo and Houssa, that the Niger which he had discovered runs "towards the rising sun to the end of the world," data were given to Major Rennell for the first theory which obtained in this country. The testimony of both ancient and modern writers, also led him to the opinion of D'Anville,* that Wangara was the great receptacle of the Niger, and he conceived that the waters of this and other rivers, spread out over those vast marshes, were dissipated by the evaporating power of a tropical sun. The eminent geographical learning evinced by the author of this opinion, was alone sufficient to entitle it to reception; but from the ingenious contrivance of his arguments, principally of a negative character, additional support was derived, and his theory long held undisputed sway.

2. The Ephémérides Géographiques for 1803, contained the second hypothesis, emanating from M. Reichard. It was the opinion of this geographer, that the Niger, instead of terminating in Wangara, turns round to the south-west, and enters the Atlantic at the Bight of Benin, by the mouths of the rivers Formosa and Rio del Rey. Calculating the supposed bulk of water poured into Wangara by the Niger and other streams, and comparing with it the imaginary quantity which could be evaporated from the marshes, whose extent he knew not, he assumes a surplus which, in con-

* D'Anville supposed that the Niger terminated at Lake Reghebil in Wangara. See his Treatise "on the Rivers of the Interior of Africa," Acad. des Inscript. tom. xxvi.

junction with certain other rivers, conjecture conducts to the Gulf of Guinea.

3. Major Rennell, in support of his particular views, advances some powerful arguments against the possibility of the Niger communicating with the Egyptian Nile. He contends against Pliny and the Arabians, that the Niger could not pass through Wangara to the Nile, because of the difference of level throgh which these two rivers flow,—the bed of the Nile being higher than the plane down which the waters of the Niger incline; and because the inundations of the Nile do not remain so long after the subsidence of the Niger as they must if the latter discharged itself into the former. However, at the very time that the hypothesis of Reichard was in possession of some degree of attention, this ancient opinion again forced itself upon the public mind. Mr Jackson, a British consul, received oral information from one who had visited Tombuctoo, tending to substantiate the identity of the Niger and Nile, upon the authority of seventeen negroes, who had navigated the river from Tombuctoo to Cairo. The voyagers were, however, obliged several times to transport their canoe overland, from deficiency of water in the river's course.

4. But of all the theories which have been promulgated, the greatest importance has been attached to that which was suggested by a Mr Maxwell to Park, at the time he was preparing for his second voyage. From the magnitude and velocity with which the river Congo or Zaire rushes into the Atlantic, in south lat. 6½°, from its unknown origin, and from the southern direction of the Niger, or a branch of that river, it was hazarded that this might be the embouchure of our mysterious stream. And influenced by the firmest conviction of this termination to the Niger, Park again set out (in 1805) with the hope of navigating along the object of his anxious curiosity, through Wangara, and thence into the Zaire. The result of his unwieldy expedition is but too well known; and though since that period Captain Tuckey has fallen a victim in the same cause, Europe still remains in her original uncertainty as to the termination of the Niger and the source of the Zaire.

Thus the matter stood, no clue appearing in the labyrinth of doubt, when there stood forth, garbed in a proper confidence, a new candidate for immortality, (p. 72.) whose labours come now under our review.

From what slight causes do great deeds arise! It happened to Sir Rufane Donkin, during the leisure and inactivity to which he has been reduced by the victories of his great commander, that he should be "struck with the very general application of the name or term *blue*, or *black*, to large rivers;" and conceiving that the name of the Niger originated in the blackness or depth of its waters,—an opinion which he afterwards discovered to be erroneous,—forthwith he set about to frame a book. We do most sincerely congratulate our country, pre-eminent in the production of convertible talent, on the facility with which our heroes of to-day, can on the morrow fashion their trenchant blades into the humble but more amiable goose's quill. Herein doubtless may be discovered the cause of that wonderful stability, which, whether in peace or in war, this nation has for so many ages maintained. The internal resources of our warriors are the pillars of the state.

Our author, who, if he must have confined himself to the statement of facts, would have been the author of but a meagre volume, calculating on the intimate relation between size and importance, has swelled out his production to 195 pages, by a most ingenious assortment of miscellaneous articles, amongst which, as in a pedlar's box, surely something may be discovered to the taste of every applicant.

In the hope of reconciling "all or most of what has been said of the Niger, from the times of Herodotus and Ptolemy, down to those of Park and Denham," Sir Rufane commences with an elaborate statement of the use of the articles *the* and *a*, as indications of specific and generic differences, and of their misapplication in this question. Thus the words Nile, Niger, &c. are all general appellations of rivers, derived from the different colours or depths. And a fundamental source of error arises in calling that THE Nile, or THE Niger, (as if it were a particular river,) which is in fact only A Nile, (or a blue river,) or A Niger, (or black stream.) And the author hopes to reconcile the various accounts of THE Niger, "partly by the rectification and proper use of a grammatical particle." But not satisfied with the detail of verbal criticism connected with this object, the learned writer, after running over his vocabulary of languages, lapses into a lengthy note, backed by twelve pages of appendix, on the existence and character of the Greek digamma.

There is no doubt that much discrimination is necessary in applying the language of an uncultivated people in the description of natural objects. Amongst the names of rivers, these generic terms have been long marked in the appellations of the Ganges, the Zaire, the Quorra, &c. But we have been unable to discover, in the work of Sir R. Donkin, the manner or place in which he exposes the specific rivers which have been confounded under the general term. He conjectures, indeed, that the westward river of Abulfeda and Edrisi, is the same with Sultan Bello's Kowarrama, and states with reason that the application, by the Arabians and Pliny, of the name *Nile* to the river rising in Mauritania, does not necessarily prove that it is the same with the Nile of Egypt; but he afterwards attempts to show that these rivers have a communicating branch. Thus, however ingenious and pretty, this little grammatical toy is no index of truth.

A commentary on the geography of Ptolemy succeeds this dissertation on the use of the article, in which the author evinces much labour, and much estimation thereof. It is not our intention, however, to follow the Lieutenant-General through the wearisome stages of his critical examination into the course of Ptolemy's rivers, Geir and Ni-Geir, (according to the corrected orthography;) for, except in an historical point of view, the evidence of Ptolemy is inapplicable to the question in dispute. Since that geographer is "so wild in his latitudes," and since the relation of sound even cannot be determined between the Ptolemean and present names of places in this district, it is upon modern discovery alone that we can expect to construct a map which shall approximate to the truth. Nevertheless it is a fine field for ingenuity and laborious research, to attempt an alliance between the vagaries of Ptolemy and the present state of our knowledge, though we are sorry that the author has spent so much acumen in proving what he would have found long since expressed in the maps of Gossellin and Mannert. However, the additional testimony of Sir R. Donkin will probably tend to convert those geographers who still cling to the opinion of D'Anville and others, that Ptolemy's first meridian is to be placed in Ferro of the Canaries, instead of the westernmost of the Cape Verd Islands.

The result of the analysis of Ptolemy may be thus generally stated. The Geir (Misselad) flows from the Pharanx Garamantica (mines of Fertit) into Lake Nuba, (Fittre.) "I am aware," says the author, "that this has been *asserted* before, and the Misselad has been named the *Ghir* (as it has been written) of Ptolemy; but this was mere assertion, without any sort of proof. That proof I have now endeavoured to give, but I never could have given it, had I not gone to Ptolemy's original text,—and, had I not further, by rectifying his first meridian, which had been drawn for him, but not by him, through Ferro, extricated the greater part of the course of the Geir from the bed of the Egyptian Nile, into which that meridian inevitably plunged it, as well as Lake Nuba." From Lake Fittre the Misselad flows into Lake Domboo, which Sir Rufane coincides with geographers in referring to the Chelonidæ of Ptolemy. Thus the Geir is equivalent to the Misselad, and its continuation the Wad-el-Ghazel, or Nile of Bornou. But the river Geir has a western branch; and the author considers it an important point in his Dissertation, that he believes in the fact of a communication between the Tchad and the Nile of Bornou, (p. 74,) which would correspond to this branch.* "If then," says the author in conclusion, "the Geir and the Nile of Bornou have now been shown to be the same, I claim that they be so considered on the grounds I have laid down, and not on the dicta or maps of others—"

Sir Rufane now, his text-book failing, ventures on his own hypothesis, after warning himself of the great care that must be taken, "not to indulge in theory or speculation further than is absolutely necessary." But we hardly know how, with a serious coun-

* The information received by Major Denham from the sheikh Hamed, and the additional testimony of Captain Lyon, certainly support the opinion that there is a channel of communication between the Tchad and the river of Bornou.

tenance, to look upon this new head which has sprung from the dying hydra. Just at the period when men were calming into a confession of the necessity of further observation before an accurate opinion could be formed, a fresh conjecture, without the shadow of a fact to support it, is thrust before the eyes of the public. It would be "to cut the air with scimitars," were we to do more than relate this choice specimen of induction; and so delicate do we feel with respect to the precious production, that we would not even affect its entierty, but give it in the author's words, were not its delivery somewhat too circumlocutory for our pages.

The usual termination assigned to the Nile of Bornou, is in the sands of the desert of Bilmah, (Setzen;) but our author considers that a mighty stream, such as he conceives "the Nile of Bornou to be, *when formed by the united streams of the Niger and Misselad*," (the connecting branch being that communication which he supposes to exist between Lake Tchad and the Wad-el-Ghazel,) cannot be so disposed of in a sandy desart, (p. 58.) It appears to Sir Rufane that the desart of Bilmah is probably composed of silicious sand, (because the African wastes which he has traversed have been generally of that structure,) and silex not being an absorbing substance, would permit the percolation of water, which might, in a subarenaceous stream, "push on by the force of gravitation till it found its natural level." The level to which the Wad-el-Ghazel is supposed to be directed, is "the sea, towards which all rivers tend in one way or another," and that sea is the Mediterranean, the quicksands of the Syrtis being the precise place where the waters of the river are driven back and stopped by the sea on a low flat shore: "they therefore having now no lower level to go to, form a plashy, moving quicksand, which extends towards the land as far as the level will admit, and is stopped only by the gradual rise of the ground," (p. 61-2.) The reasons which have induced the author to this view are, 1*st*, The Syrtis "is in the direct prolongation of the general course of the Nile of Bornou. 2*dly*, It is the nearest point at which a river, disappearing where this river is said to disappear, in the desarts of Bilmah, could reach the sea." And 3*dly*, The occurrence of the 'Two Rivers' near the rock Tibboo, in the very line between the Lake Domboo and the Syrtis, is the precise phenomenon which might be expected, according to this opinion, from the damming up of the hidden stream, ("by the ground rising in the vicinity of the Tiberti mountains,") and its sinking again when the obstacle is surmounted, (p. 64.) Little thought De Mairan, when he calculated the evaporation from the Mediterranean, with a view of disproving the necessity of an under current, that there might enter at an opposite point a stream almost as large as the Bosphorus, and which, spurning communion with the waters of the sea as with the sands of the desart, might possibly flow through the Straits of Gibraltar, itself a submarine current.

Returning to the discussion of the geography of Ptolemy, the course of the Ni-Geir is next to be pursued. This river, formed from several sources, is to be conveyed to the Wangara, through which it passes by the before-mentioned branch of communication into the Nile of Bornou, " somewhere to the southward of 16° north lat." (p. 73.) Five origins or feeding streams are, for the purpose of concordance with Ptolemy, appropriated to this river. The first issues from the Mandrus, (Mandingo Mountains,) and having formed Lake Nigrites, ("a physical aneurism" no longer existing, and which the author supposes *may have been taken up again into the circulation,* p. 79.) is there left by Ptolemy, with the general statement that it continues to flow towards the midland parts. The second from Usargola, corresponding to the Kowarrama of Sultan Bello. The third from the Libyan Lake, (Lake of Ghana,) which, with the second, unites to form an eastward branch, which our author supposes to have misled the Arabians. The fourth from the *south,* which, by an immaterial removal from 17° north lat. (which would be *north* of the river) to 7° north, is made to correspond with a stream which, as Park was informed, flows from the south into the Niger. And the fifth springs in Mount Thala, (a projecting branch of the Mountains of the Moon,) and corresponds with the Shary, which flows into the Tchad, (but which, according to Lander, passes out from that lake.)

Thus briefly the new hypothesis stands: The Niger (Ni-Geir) passes through Wangara, and emptying itself into the Wad-el-Ghazel, or Nile of Bornou, (which is formed by the continuation of the Misselad, (Geir,) through Lake Fittre,) flows under the sands of Bilmah into the Mediterranean Sea.

To complete such a continued stretch of the imagination, no ordinary climax could suffice, and our author, with poetic furor, rising upon the stilts of his vast conceptions, thus terminates his original views.

" But reasoning from analogy, and still more from what we know of the nature of the country of which I am now more immediately speaking, I have no doubt but that, in very remote ages, the united Niger and Geir, that is the Nile of Bornou, did roll into the Sea, in all the magnificence of a mighty stream, forming a grand æstuary or harbour where now the quicksand is......" " The question to be solved under such a supposition is, what revolution in nature can have produced so great a change in the face of the country, as to cause a great river which once flowed into the sea, to stop short in a desart of sand......" " We know from all recent, as well as from some of the older modern travellers, that the sands of those desarts which lie to the westward of Egypt are encroaching on and narrowing, by a constant and irresistible inroad, the valley of the Nile of Egypt. We see the pyramids gradually diminishing in height, particularly on their western sides, and we read of towns and villages which have been buried in the desart, but which once stood in fertile soils, some of whose minarets were still visible a few years ago, attesting the powers of the invading sand. The sphynx buried almost up to the head, till the French cleared her down to the back, attested equally the desolating progress of this mighty sand flood......" " And, if we turn to the valley of the Nile of Egypt, we shall see at this moment the very process going on by which the lower part of the Niger, or Nile of Bornou has been choked up and obliterated by the invasion of the Great Sahara, under the names of the Desarts of Bilmah and Libya. Thus has been rubbed out from the face of the earth a river which had once its cities, its sages, its warriors, its works of art, and its inundations like the classic Nile; but which so existed in days of which we have scarcely a record."—P. 64, *et seqq.*

And "in the same way," he continues with prophetic energy, "shall perish the Nile of Egypt and its valley! its pyramids, its temples, and its cities! The Delta shall become a plashy quicksand—a second Syrtis! and the Nile shall cease to exist from the Lower Cataract downwards, for this is about the measure or height of the giant principle of destruction already treading on the Egyptian valley, and who is advancing from the Libyan Desart, backed by other desarts whose names and numbers we do not even know, but which we have endeavoured to class under the ill-defined denomination of Sahara,—advancing, I repeat, to the annihilation of Egypt and all her glories with the silence, but with the certainty too, of all-devouring time!"—P. 69.

The remainder of the volume is occupied, 1. By a critical consideration "of a sort of geographical centaur," which has appeared of late years under the immiscible names of the Niger-Congo, and under this section there is an attempt at a refutation of the theories which have been previously promulged; and as it always proves much easier to controvert the opinions of others, than to afford a satisfactory explanation of dubious questions, this is by far the most successful portion of the author's volume. 2. By observations on the African geography of D'Anville and Rennell. And 3. By a discussion of the site of the island of Ulil, which he places in Lake Domboo, (but which common consent has hitherto located in the Bight of Benin.)

When the author of the inductive philosophy strove to apply his new method to the elucidation of Natural History, nothing was wanting to ensure sound deductions but accurate data; and thus it is with the inquiry on the termination of the Niger. But so long as such a momentous question exists, as whether the Kong Mountains on the west meet the Mountains of the Moon from the east,—so long as it is a matter of doubt whether, if their existence were proved, a primitive range of upwards of 2500 feet high, would afford a barrier to a tropical flood whose source is elevated 1600 feet above the level of the sea,—whilst the facts do not exist upon which we may argue, and whilst Physical Geography has few axioms which may be made the basis of reasoning,—we view it as the more philosophic mode, however much we may be privately inclined to a particular opinion, to delay even the discussion of the various speculations which have been advanced, till Science shall have further encouraged the nations of Europe to be earnest in the collection of well-attested facts.

Polynesian Researches during a Residence of nearly Six Years in the South Sea Islands. By WILLIAM ELLIS, Missionary to the Society and Sandwich Islands, 2 vols. 8vo. Fisher & Co. London, 1829.

MR. ELLIS is a Christian philanthropist in the fullest acceptation of the term, and his work is one of that character, of which we would say, we wish there were many such. Few men have more splendid opportunities, as a body, to improve our knowledge of foreign parts, than those individuals who sacrifice the companionship of early life, and the ties of family, to transfer the scene of their exertions to the unfrequented shores of distant continents, or the islands scattered over the ocean. But the education which is at present given to men previous to their thus being sent abroad, is insufficient not only for any improvement in our knowledge of the countries which they may visit, but also for the important duties with which they are intrusted; for it is certain that when the lawful aristocracy, derived from the rational or intellectual advantages which flow from a religion adapted to the highest state of civilization, is not displayed in the professors of that creed, its influence is less immediate, and the faith less resolute; for after the humanizing influence of a benevolent philosophy, comes the sway of its intellectual march, without which, fortitude in trial, and integrity in morals, will never be securely gained.

We are certain that any examples borrowed from the history of Continental Missionaries, known by the name of Jesuits, cannot have given origin to the supposition, that ambition is *always* connected with intellectual superiority; and we are still more certain, that the education of our missionaries has not been curtailed on any such account. The author of this work is, however, of a different cast,—a volunteer with knowledge to discern, and benevolence to guide,—well known as the intelligent author of a Tour through Hawaii, and a Journal of a Residence in the Sandwich Islands,—and equally known for the interesting information respecting the manners and customs of the islands of the South Sea, which characterize his addresses at public meetings; and we recommend his present work to the perusal of our readers, as containing much information on islands little visited, and on the manners of neglected, outcast races of men. The work, illustrated by wood-cuts and engravings from drawings by Captain R. Elliot, R. N. promises much, and on some points, as the history of the missionary enterprize, fulfils its promise; but of physical descriptions, and of remarks on those great kingdoms of nature—below the lord of animals—not so striking to his comprehension, but affording the best materials for confirming a reverence of an omniscient Maker, the work is very deficient; and thus his assertion, that an increased geographical acquaintance with the Pacific is principally useful in affording a new field for missionary labours, we think very sophistical.

The accounts given by the natives of the introduction of the animals found on the islands by the first European visitors, are interesting. Some say that pigs and dogs were brought from the west by the first inhabitants; but others refer their origin to man. One of their traditions states, that after Taarou had made the world and mankind, he created the quadrupeds of the earth, the fowls of the air, and the fishes of the sea; but one of their accounts, which our author considers as "most indelicate," states, that in ancient times a man died, and after death his body was destroyed by worms, which ultimately grew into swine, and were the first known in the islands. Any traces of the Asiatic doctrine of the transmigration of souls, was never observed among them; although they believed that hogs had souls, and that there was a distinct place called Ofetuna, whither they supposed the souls of the pigs repaired after death. This idea some carried so far as not only to suppose, that animals had souls, but to imagine that even flowers and plants were gifted with immortal spirits. Another singular practice, in reference to their pigs, was that of giving them some distinct though often arbitrary name, by which they were called, as well as the several members of the family. This difference, however, prevailed. A man frequently changed his name, but the name of the pig once received, was usually retained until his death.

The following remarks on the Polynesian deluge are curious:—

"The memorial of an universal deluge, found among all nations existing in those communities, by which civilization, literature, science, and the arts, have been carried to the highest perfection, as well as among the most untutored and barbarous, preserved through all the migrations and vicissitudes of the human family, from the remote antiquity of its occurrence to the present time, is a most decisive evidence of the authenticity of revelation. The brief yet satisfactory testimony to this event, preserved in the oral traditions of a people secluded for ages from intercourse with other parts of the world, is adapted to furnish strong additional evidence that the scriptural word is irrefragable. In several respects, the Polynesian account resembles not only the Mosaic, but those preserved by the earliest families of the post-diluvian world, and supports the presumption that their religious system has descended from the Orkite idolatry, the basis of the mythology of the Gentile nations. The mundane egg is conspicuous in the cosmogony of some of the most ancient nations. One of the traditions of the Hawaiians state that a bird deposited an egg, (containing the world in embryo,) upon the surface of the primeval waters. If the symbol of the egg be supposed to refer to the creation, and the bird is considered a corrupted memorial of the event recorded in the sacred writings, in which it is said "the spirit of God moved upon the face of the waters," the coincidence is striking. It is no less so if it be referred to the ark floating on the waters of the deluge. The sleep of Ricahatu accords with the slumber of Brama, which was the occasion of the crime that brought on the Hindoo deluge. The warning to flee, and the means of safety, resemble a tradition recorded by Kæmpfer as existing among the Chinese. The canoe of the Polynesian Noah has its counterpart in their antipodes, the Druids, whose memorial states the bursting of the waters of the Lake Lleon, and the overwhelming of the face of all lands, and drowning all mankind, excepting two individuals, who escaped in a naked vessel, (a vessel without sails,) by whom the island of Britain was re-peopled. The safety which progenitors of the Peruvian race are said to have found in caves, or the summits of the mountains, when the waters overflowed the land, bears a resemblance to the Hawaiian, and that of the Mexican, in which Coxcox, or Tezpi, and his wife, were preserved in a bark, corresponds with the Tahitian tradition. Other points of resemblance between the Polynesian account, and the memorial of the deluge preserved among the ancient nations, might be cited; but these are sufficient to shew the agreement in the testimony to the same event, preserved by the most distant tribes of the human family."—Vol. II. p. 61.

Transactions of the Plinian Society, Session 1828-9. Maclachlan & Stewart, Edinburgh, 1829.

The history of the Plinian Society is that of an institution whose origin was accidental, but whose progress, from the interest of the subjects with which it proposed to occupy itself, and from the enthusiasm of its members, has been unprecedentedly rapid. It consists principally of young men attached to the University of Edinburgh; but men of mature judgment, and scientific renown, are also constantly to be met with in its halls. Nor would its juvenile character be any objection; for we know, by the greatest examples borrowed from the history of science, how much may be accomplished by the ardent minds of youth, and how rich the fruit may be which springs from communion of sentiment, and co-operation of labour. The Plinian Society has hitherto been retired: its members have laboured; and, with the exception of occasional essays in the Scientific Journals, they have been content with the suffrage of their associates. After seeing a museum and library established, and their labours attended by a considerable accession of members, they first began to collect the titles of communications and memoirs, printing them annually for distribution amongst the members; and we have this year laid before us the transactions of the two last sessions, in an improved form, containing a short additional notice of the nature and contents of these memoirs, and a hope, warranted by its present success, that ensuing sessions will witness an increase in their interest and importance. Devoted at once to Natural History, Antiquities, and the Physical Sciences in general, it might naturally be expected that information of varied character would be presented in these pages,—and so it is;—but it will also be found, that when we peruse the different branches of science which have been made the subject of communications, that there are individuals whose names stand prominent for their exertions in particular departments. We had originally intended cursorily noticing these labours, classing them under their different heads; and while we are sorry that our space will not allow us so pleasing a task, we cannot but express our hope, that, in the ensuing session, they will continue with renewed zeal; for where the genial waters of science flow so nobly, a rich and splendid harvest must in time be reaped.

White's *Natural History of Selborne; with Additions by* Sir William Jardine, Bart. (Vol. XLV. of Constable's Miscellany.)

We view the publication of a work of this kind as an act of kindness to the public. It is placing what first implanted the germs of a love of nature, and of observation, in the breast of many a young person, at a very moderate price, and in the reach of the poorest of the reading public. We do not intend making here any observation on the original work. Forty years of constant sale, and many successive editions, have proved its popularity. It is in clothing Natural History in its most pleasing garments,—allowing it to speak in its own language,—establishing those interesting relations which exist between the severest sciences and our daily observation,—and thus engrafting the study of Natural History, by enticing into the love of its first principles, and not in any immense additions to science, or in great originality of opinion, that the value of this work lies; and that renders it, like the history of Robinson Crusoe, capable of influencing the character of a nation.

The edition, however, which is now presented to us, has the great advantage of being accompanied by notes from the hands of an eminent naturalist, Sir William Jardine. They are partly quotations, but principally original. The observations on ornithology are, as might have been expected, particularly valuable. Sir William mentions the possible introduction of that beautiful bird, the *Tetrao urophasianus*, brought from North America by Mr. Douglas, and lately figured by Mr. J. Wilson in his "Illustrations," an introduction which he seems to advocate. The little American partridge, *Ortyx borealis*, is, he says, now plentiful in some counties. There are some interesting remarks on migration; and he very properly corrects the author, in one place, for mentioning the tit-lark as singing on trees,—the bird Mr. White alluded to, was undoubtedly the tree-lark, *Anthus arboreus*. Upon the whole, this volume may be placed with credit by the side of the Family Library, and Library of Entertaining Knowledge, to which it will form a most useful accessory.

An Experimental Inquiry into the Laws which regulate the Phenomena of Organic and Animal Life. By G. C. Holland, M. D. &c. Maclachlan & Stewart, Edinburgh, 1829.

"Animal heat is not in the direct ratio of the quantity of oxygen inhaled, but in the inverse ratio of the quantity of blood exposed to this principle." Such is the expression of one of the leading views which this novel volume exposes. Founding upon experiments, for the most part original, a train of inductions which do credit to their author, Dr. Holland has struck out a new theory of animal heat, whose very origin would alone entitle it to our respect. For, as the author, in a tone of deprecation, remarks, we are to investigate the results obtained by the experimentalist, "not because we should be disposed to doubt the observations of an individual engaged in experimental inquiries, but because the reasoning which he founds, or the principles which he deduces from important results, are occasionally far from being either legitimate or correct," (Introd. p. xiii.) But the application of observations conducted by the author, in elucidation of the cause of the uniform temperature of the arterial blood over the surface of the body, is highly valuable, as tending to remove the great objection to the chemical theory of Black. When this celebrated chemist advanced the opinion, that a process analogous to combustion takes place in the lungs, it was a natural objection that they would, in that case, become much warmer than any other part of the body, which is contrary to the fact. Crawford for a time removed this difficulty, by the publication of experiments to show that arterial blood has a greater capacity for heat than venous blood. More recently, Dr. John Davy has produced experiments which do not accord with the conclusions of Crawford. It was then that physiologists plunged into their last resource, where mystery shrouds the truth, and attributed the production of animal heat to "the influence of the nerves." Dr. Holland now proposes that it is not the quantity of oxygen which is inspired, but the frequency of inspirations, by which a greater or less surface of blood is exposed to the air during a given time, that forms the ratio according to which animal heat is generated, and the smaller the quantity of blood in the lungs, the more complete will be the chemical change, "because the air will have a less portion to oxygenate." He appropriates independent functions to the acts of inspiration and expiration, the former accelerating, the latter impeding the circulation of blood throughout the system, and thus varying the proportions within the chest at different times. As an enlargement of these principles, the author advances *(inter alia)* the following laws as universal:

"1. That, in every case, in which inspirations preponderate, either in number or completeness, the pulse will be small, weak, and for the most part frequent; the surface and extremities of the body pale or collapsed, and the temperature of the system less than in the regular action of the two states of respiration.

"2. In every instance in which expirations exceed inspirations, either in number or completeness, the pulse will be strong and frequent, the surface and extremities of the body florid and full, and the temperature of the system higher than natural.

"3. The influence of cold upon the surface of the body will diminish the generation of animal heat, according to the degree of congestion produced in the internal viscera.

"4. The influence of heat applied to the same parts, will increase the temperature of the body, according to the relief which it gives to the internal organs, by diffusing more generally and equably the circulation of blood.

* * * * * * * *

"7. Every exertion characterised by muscular and expiratory action will increase the temperature of the body, and tend to equalise the circulation.

"8. Every exertion characterised by muscular and inspiratory action will diminish the temperature of the body, and tend to destroy the regular distribution of the blood.

"9. The effects of respiration, on the animal economy, can be estimated only by ascertaining the character, frequency, and force of the acts of which it is composed."—P. 20.

In treating of the cause of animal heat, Dr. H. lays down the following principles, of which he offers proofs too much dependent upon detail to admit of analysis:

> "1. Animal heat is proportionate to the capacity and activity of the lungs, not understanding by *activity* the number of respirations, but the number and character of its compounded acts, inspiration and expiration.
>
> "2. This principle is proportionate to the chemical changes in the lungs, and the perfection of all other functions is also in the direct ratio to these.
>
> "3. The nervous system has no influence whatever upon the generation of animal heat, except in diminishing or retarding those chemical changes on which it depends, by destroying the natural proportions of blood submitted to the action of the air."—P. 34.

Nearly every physiologist seems to bow the knee to some exclusive idol, which shall, as a superior agent, preside over and regulate all its fellow functions, and Dr. Holland is under the same influence. "And the Lord God formed man of the dust of the ground, and breathed into his nostrils *the breath of life;* and man became a living soul." Our author, therefore, may certainly be excused for attributing such overruling power to the respiratory function.

The chapter on the Passions will be particularly interesting to the general reader, providing him with plausible reasons for many phenomena which the body exhibits during passionate perturbations of the mind.

The passions, from their action on the body, have been divided into those that *excite,* and those which *depress.* From the former, as an instance, we select the author's explanation of anger, "the most violent of all the mental stimuli."

> "Of what kind soever be the object that awakens our feelings, its primary action is upon the mind; and when an individual receives an insult, or is vehemently exasperated, we observe the fluency with which he pours forth his sentiments, the hurried state of his respiration, and the muscular exertions employed to enforce the character of his feelings. His volubility of tongue changes the regular order of respiration. *Expirations are more numerous and complete than inspirations*—the effect of which is, that the blood becomes better oxygenated, from the quantity within the chest being less than natural. The blood, having undergone more perfect chemical changes, becomes more stimulating to the heart; the pulsations of this organ are more frequent and forcible; the increase of contraction, conjoined with augmented muscular exertion, explain the rapidity of the circulation and the highly florid colour which it gives to the face. At this stage of anger, it is not uncommon for the heart to palpitate; and this irregularity arises from the more stimulating nature of the blood. The internal cavities of this organ, and the coronary arteries, receive a more than usual excitation, and therefore the function to which they contribute is influenced accordingly.
>
> "If the violence of anger be long continued, we remark a different train of symptoms. The countenance is swollen, and of a livid aspect; the respiration becomes deep and laborious, and the individual often applies his hand to the præcordial region, from the pain or oppression which he feels in this situation. *Expirations* having exceeded *inspirations* to a painful extent, necessarily prevent the free return of blood from the head and other parts of the body; and this fluid, in a short time, accumulates and occasions that bloated expression to which I have alluded.
>
> "I have spoken only of one species of anger. There is another, which is more

rare, and has often been fatal, from destroying the action of the heart. It is that in which an individual scarcely utters a word, and in which he exhibits extreme paleness. When an emotion is very intense, it seldom spends itself in idle words; it absorbs too much of the mind to vent its indignation in momentary expressions; and, instead of being a stimulant it becomes a sedative to the system. *Expirations* are not excited as in the preceding instance, but the person affected draws *deep inspirations;* and these having the tendency to bring the blood towards the chest, they diminish the quantity in the face and surface of the body; and the superabundance in the thorax quickly causes palpitation or syncope, from the action of the heart being oppressed."—P. 337-339.

Fear, on the contrary, is a depressing passion, characterized by deep inspirations.

"Inspirations have the tendency to bring the blood towards the chest in greater quantity than usual, and, if we have a superabundance here, it is obvious that a diminution will occur in other situations; and it is these modifications in its distribution that explain the paleness of the face, coldness of the extremities, and the oppression of the chest in fear."—P. 344. An illustration of this view is found in retracing the transactions or amusements of our juvenile years.

"On a winter evening, when assembled together to listen to the credulous matron, who felt all she described, and whose stories, from their interest, suspended every faculty except attention, and obliterated every feeling save sympathy—the pale countenance, *heaving chest,* and palpitation of the heart, expressed sufficiently well the depth of our sentiments, and indicated clearly the cause to which the effects were attributable, viz. *the functional disorders of respiration.* During the continuance of the interest, no shivering or coldness was felt; but when we approached towards the close, when no further mystery remained to excite or absorb, the mind became susceptible of the sensation of cold."—P. 346.

Though published with a view to the improvement of the practice of medicine, it will be evident, from the contracted examination which we are permitted to present to our readers, that the work before us is not restrictively the property of the professional man. The second and concluding volume, which is in preparation, will, however, be devoted to more practical topics. If it were only on account of the interesting application of the many phenomena of life, which constantly come under the notice of the domestic circle,—a mode of elucidation which produces such a convincing effect in the plastic arguments of the leader of the phrenological sect,—we should, without hesitation, recommend to the man of general science the perusal of the new theory of Dr. Holland.

The Journal of a Naturalist. 2d edit. Murray, London, 1829.

The domestic economy of Natural History, is a study which affects individuals of every rank and capacity. The country clergyman, the independent gentleman, the hunter, the farmer, the wife, in short, all those who are restrained to particular localities in the country, are alike alumni of the universal school of nature. The power of observation, and a taste for the manifestations of the Deity, in his wonderful arrangement of things, are the only requisites for the accumulation of facts, valuable and new. Under such circumstances, it appears surprising that there do not more frequently issue from the press such volumes as the Journal of a Naturalist, a collection of remarks on the natural history of the environs of a little village in the West of England; but, excepting in the instances of White's Natural History of Selborne, Murray's Experimental Researches in Natural History, and a few other miscellanies of that cast, it has been rather the custom to enter the columns of a periodical under the shelter of an anonymous contribution, than to risk the character of a sublunary immortality by the production of a responsible volume. It is with satisfaction, however, that we observe, in a speedy appearance of a second edition of the little volume before us, the sanction which a tasteful public has decreed to this method of registering data, which shall in future be applicable to the inductions of more talented men; and we enjoin our friends in the country to be diligent with their note-books, whether it be for their own use or for ours, recollecting that however simple the ordinary observations which daily occur may appear, this is the stuff of which such interesting and valuable books as the Journal of a Naturalist are altogether composed.

Little more than a general notice and recommendation can be given of a volume, whose contents are all fragments of thoughts and unconnected notes. We must, at least on this occasion, confine ourselves to the selection of some new species, which the author suggests as additions to our British Fauna.

The plates, accordant with the text, contain many little things which would not be found elsewhere; for instance, "a grass, from Malvern Hills," which appears to be the *festuca duriuscula*, with peculiar characters, owing to the constant browsing of cattle, sections of wood, exhibiting their microscopic structure, nightingales' eggs, snakes' eggs, &c.

Plate IV. Fig. 4. represents a Sphæria (faginea?) found upon the decayed wood of the beech tree in the earlier part of the spring, which "does not accord well with the Sp. faginea of Lamark." "It appears on the surface of the tree in little nodules, which, gradually uniting and increasing, form a regular black crust. Upon examination we find, that little round bodies have forced a passage through the outer bark, and enlarged into small round tubes, which ultimately become the conductors of the seminal dust, discharged from round, beaked seed vessels, imbedded beneath upon the inner bark," (p. 125.) The author has not met with any notice of this plant; but conjectures that "Sp. granulosa of Sowerby, and Sp. tentaculata of Batsch, may be it in a young stage of growth."

An agaric, in general appearance like the Agaricus varius, occupies Plate VII. It is "rare, local," and, the author believes, "unnoticed; trailing its long roots in October among the small decayed fragments of some old hedge, elegant in itself, but more remarkable from the coloured fluid it contains, which upon being wounded it emits, not as a milky fluid, but like an orange-coloured, tasteless, spirituous extract, long retaining its colour upon paper, and tingeing the hand like the celandine, or blood-wort, (sanguinalis canadensis.)" Hence the author names it Agaricus infector. Every part discharges this ichor, but it flows rather more copiously from the roots. In diffidence, however, it is added, this plant may possibly be passed over as the A. varius. The characters are,

"Pileus—conical, one inch ocsasionally in diameter—pale gray, becoming ocherous, summit orange, flesh thin.

"Lamellæ—fixed, white, four in a set, stained in places.

"Stipes—fistular, long, chestnut at the base, upwards pale brown; root long, trailing, woolly."

At p. 378. we have a neat wood-cut of an agaric, which the author has named A. surrectus, whose bulbous roots, and downy pileus, spring from the smooth summit of the Agaricus caseus, which has a uniform footstalk. The following characters are given to this new species:

"Pileus—convex, expanding, covered with a pile of short, white hair; centre depressed; faintly tinted with yellow; from one to three inches in diameter.

"Laminæ—loose, irregular, generally four in a set, rather numerous, broad, white, changing to buff, and then pink.

"Stipes—solid, tapering upwards, rather thick immediately below the pileus, three inches high, thick as a reed, white, and often downy, wrapper at the base.

"Many of this species of singular plant," continues the author, "I found in October 1819, springing from a confluent mass of a. caseus. Bolton's a. pulvinatus is something like our plant; but he describes his under side as perfectly flat, and represents a singularity in the termination of his laminæ, which is not observable in our a. surrectus."

The water-shrew, lately supposed by a correspondent in Loudon's Magazine to be an animal extremely rare in this country, appears to have been frequently seen by our author, though, with him, we strongly suspect that there are two species (Sorex fodiens, and S. Daubentonii) to be met with in England: one inhabiting clear fountains, and the other the fens in this gentleman's neighbourhood, those of Lincolnshire, according to Pennant, and which we have seen on the moors of Lanarkshire.

GEOGRAPHICAL COLLECTIONS.

Voyage of the Astrolabe.

We have had some difficulties to combat with, in the first number of these Collections, from the necessity of viewing travels in an historical light; for it is not with Geography as it is with Natural History, where the latest observations or facts may be immediately introduced under their separate heads. The traveller must be followed from the moment of his departure, through his toils and exertions, to the end of his journey; and the results of his expedition must be carefully analyzed, that the additions made to science, or to our knowledge of foreign parts, may be brought at once before our readers. They will not then be dissatisfied if we refer to voyages which are now of some date; for though it will always be our first object to give them the latest information, they will perceive that it is to their own advantage that this should be historically connected with the origin and progress of these expeditions,—that the antecedent numbers of the Journal may also always form the point of reference, where the first notice of expeditions must be looked for, whose progress and labours it may afterwards come under our province to describe.

We have prefaced these remarks to our notice of the interesting expedition of the Astrolabe, in search of the remains of the unfortunate La Peyrouse, commanded by a naval officer, (Mr. Dumont d'Urville,) well known to the scientific world, and of whose travels we shall introduce a short sketch, from a report read to the Royal Academy of Science and Belles Lettres of Caën, by Mr. P. A. Lair.

Mr. Dumont d'Urville, (Jules Sebastian-Cesar,) captain of a frigate, born the 21st of May 1790, at Condé-sur-Noireau, (Calvados,) prosecuted his studies at Caën. From his childhood he shewed a decided taste for sea voyages. He read with avidity all the narratives connected with them, and with peculiar interest those of Cook and Bougainville, those great navigators who were one day to be his models. The excellent education which he received, rendered him capable of distinguishing himself in whatever career he should follow. Having decided for the navy, he soon made himself remarked by his intelligence and his instruction. In 1819 and 1820, he accompanied Captain Gautier in the survey of the coasts of the Grecian Archipelago and of the Black Sea, one of the most remarkable labours that has been undertaken by the French marine. Mr. Verneur hastened to insert, in the 9th volume of the "Journal des Voyages," Mr. d'Urville's account of this hydrographical campaign, and the Academy of Sciences heard with great interest a report of the observations which he had made on Natural History. He had followed some courses of Botany and Entomology at Toulon. These studies, to which he had only devoted his leisure hours, were subsequently of great advantage to him.

Mr. d'Urville composed a Latin flora of the Greek Archipelago and the shores of the Black Sea. He also gave a detailed account of the subterranean galleries in the island of Milo. The observations which he made on these excavations are new and curious. He thinks that they served for Pagan worship, and that they were the miniature representations of the famous labyrinths of Crete, of Egypt, and of Lemnos.

It was during his stay at Milo, that he had the good fortune to discover and mention to Mr. de Riviere, then French ambassador at Constantinople, the Venus, which a peasant of that island had just found in digging his field. This chef d'œuvre of sculpture, the object of artists' admiration, is now in the museum of the Louvre; but by a too common injustice, easy this time to be amended, the name of Mr. de Riviere, ambassador, and that of Mr. Marcellus, secretary of the embassy, alone inscribed at the base of the statute, have been signalized to public gratitude, while that of Mr. d'Urville has remained in oblivion.

Scarcely had he returned than he projected another journey conjointly with M. Duperrey. This voyage round the world lasted thirty-one months, during which the Coquille journeyed 25,000 leagues, visiting the *Malouin* islands, the coasts of Chili and Peru, the dangerous Archipelago, and many other groups scattered over the vast extent of the Pacific Ocean; New Ireland, the Molluccas, New Holland and New Zealand; the Archipelago of the Caroline islands, Java, the isles of France and of Bourbon.

Mr. d'Urville, second in command of the frigate, learnt to reconcile the duties of his rank with scientific researches. He had taken under his charge the botanical and entomological parts: the herbarium which he brought home contains more than 3000 species, of which there are 400 new. He enriched the Museum of Natural History of Paris with nearly 1200 insects, constituting about 1100 species, of which 450 were wanting in the cabinet, and 300 were unpublished.

Mr. d'Urville has written different floras: those of *Taiti*, of *Oualan*, and of the *Malouin* isles; the last is already published. From the report of Mr. Mirbel to the

Academy of Sciences, it was ordered to be printed among the memoirs of foreign writers. Not contenting himself with a simple nomenclature of plants, nor with merely collecting, he viewed plants in the relation which they bore to the climate, and to their geographical distribution, in the manner of De Humboldt and of Decandolle. *

The study of natural history did not lead him to neglect that of manners. He observed with care the physical and moral characters, the organization and intelligence of different people; their language and their vocabulary; their opinions and their religious practices. These researches often lead him to establish very curious and important relations. "In every thing that concerns the history of man," said he, "nothing is indifferent to the eyes of the observer, and under this view, the faithful description of a single tribe, would it not offer as much food for philosophic meditation, as the complete history of one of our great empires?"

It would have been thought, that after so laborious though splendid a voyage, Mr. d'Urville would have wished to enjoy in future tranquillity, the fruit of his labours; but his indefatigable zeal, and the enthusiasm with which he was animated, led him to meditate another expedition. It was not again to make a voyage round the world. These great circumnavigations did not appear to him to offer as much interest or utility as the exploration of coasts. He proposed to himself particularly to acquire some exact notions on New Guinea; nor was there perhaps any information of more importance, from its probable susceptibility of an European colonization. This territory, fertile, and favoured by nature, produces spontaneously nutmegs, cloves, sandal-wood, and many other objects of an advantageous commerce; and to verify and increase our present stock of knowledge of this country, was a task as important as it was difficult to accomplish.

But the report had got abroad that some indications of La Peyrouse had been obtained. † The frigate La Coquille, designed for this voyage, took the name of Astrolabe: the choice of the crew, composed of about 80 men, comprising the staff and naturalists who were to accompany Mr. d'Urville, was trusted to him. He selected Mr. Jaquinot for second in command, and Mr. Gaimard as chief medical man and naturalist; the first had already been out in Mr. Freycinet's expedition, and the second in that of Mr. Duperrey.

Mr. d'Urville, before his departure, visited his native country, and staid a short time at Caën, where he was received with much interest, and admitted as correspondent to the academy of that town.

The expedition left Toulon on the 25th of April 1826.

The first news of importance that was received from it, contained the intelli-

* Annales des Sciences Naturelles, Cahier for Sept. 1825.

† Much useless recrimination took place lately, on the first discovery of the remains of La Peyrouse. Without entering into any details on this dispute, we shall give the final results as acknowledged by the French authorities. In a first voyage to the islands of Vanicolo, (the word is indifferently spelt Manicolo, Mannicolo, Vanicoro, and Vanicollo, in the various reports and correspondence which we have seen,) the English captain, Peter Dillon, had found upon these islands some remains of the shipwreck of La Peyrouse; and in a voyage undertaken at the expense of the English East Indian Company, the captain procured several objects which evidently belonged to the vessels of that celebrated navigator. Captain Dillon was charged by the king of England to offer these objects to his majesty Charles X. who was pleased to receive them. The king of France, by order of the 22d of February, elected the captain a member of the royal order of the legion of honour; and his majesty, by a decision of the same day, in execution of a decree of the 29th February 1791, granted to him an indemnification of 10,000 francs for his personal expenses during the expedition, and a life-rent of 4000 francs.

In his second voyage to the Vannicolo islands, Captain Dillon took Mr. Chaigneau, ex-consular agent of France, who had voluntarily offered himself to join in this perilous enterprise with him. The king, to reward the exertions of this gentleman, elected him member of the legion of honour.

gence that Captain d'Urville had discovered the true place of shipwreck of the illustrious though unfortunate La Peyrouse. It was on the southern coast of the island Vanikoro, and not Malicolo, that the two ships which composed the expedition perished amidst the reefs in a very obscure night. The natives interrogated on this subject, by an interpreter of English origin, taken in by the Astrolabe, declared having seen opposite one of their districts, an immense ship wrecked among the reefs, which was soon demolished and borne away by the waves; about thirty only of those who were in it, were enabled to gain the island in an open boat. The next day the savages perceived another ship like the first, wrecked before Paiou. This one, less acted upon by the winds and waves, and placed on a regular bottom only 15 to 18 feet deep, remained some time in that situation before it was broke up. The whole of the persons on board got on shore at Paiou, where they established themselves with those of the other ship, and set to work constructing a small vessel with the remains of the one which had not gone down. The French, whom they called *Mara*, were, they said, always respected by the natives, who never approached them without kissing their hands, a ceremony which they often practised towards the officers of the Astrolabe. Nevertheless several disputes took place; and in one of them the natives lost five men, of which three were chiefs, the French two of theirs. At length, after seven months labour, the little vessel was finished, and all the strangers quitted the island according to the most received opinion. Some affirmed that there remained two, but that they did not live long. With respect to that fact there can be no doubt; and their unanimous statements prove that there is no Frenchman either at Vanikoro, or in the Ourry islands, or Edgiasmeda, (Toupoua in their language,) nor even in Sainte Croix, (Intendi,) or in the neighbouring islands. There is at Sainte Croix only one white man, the offspring of a whaling vessel. As to the road which the French took on their departure from Vanikoro, Mr. d'Urville thinks that they directed themselves towards New Ireland, to gain the Molluccas or the Philippine Islands by the north of New Guinea, and that it is at the western coast of the Solomon Islands that traces of their passage may perhaps be found in future times. The state in which they were, could not have allowed them to hazard themselves through the straits of Torrès.

Mr. d'Urville's instructions were to direct himself towards these straits; but the deplorable state in which the crew of the Astrolabe found themselves, more than forty men on the sick list, and only two officers capable of exerting themselves, the fever on board, which had attacked the commander himself, and lastly, contrary winds, which prevented him gaining the south, made Mr. d'Urville give up that direction, and take the road to Guam, where he hoped to find the means of giving his crew rest, and of re-establishing the health of the sick, the number of which were increasing every day; so that after another endeavour to find the island of Taumako, which had no more success than the first, the Astrolabe took its departure on the 26th of March, to arrive at the Ladrone Islands. The navigation was neither exempt from danger, nor unfruitful in science; and that part of the Caroline Islands which Mr. Duperrey did not visit, was examined by the officers of the Astrolabe. At length, on the 2d of May, the vessel came into the harbour of Umata, upon the island of Guam. Before quitting Vanikoro, Mr. d'Urville constructed upon that island a monument, bearing the inscription, " To the memory of La Peyrouse and his companions! The Astrolabe, 14th March 1828." After several delays, the Astrolabe arrived on the 29th of September at the island of Mauritius.

The Academy of Sciences, in its meeting of the 16th of March, heard two letters read from MM. Quoy and Gaimard, dated the Isle of France, 28th August 1828. Besides details on the researches of the Astrolabe in the island of Manicolo, these letters announced, that among the objects in natural history which the expedition was bringing back, was an echidna, whose feet are armed with spurs provided with a gland, as in the ornythorynchus, and whose wounds are apparently poisonous, like those made by that animal.

The " *Journal de Caën et Normandie*," published at the same time a letter from Captain d'Urville to his mother, dated Isle of France, 30th October 1828, full of accounts of the rich harvest they had reaped in foreign lands, and hopes of his immediate return. This was at length made known to the public as having taken place the 23d of March 1829, when the vessel arrived at Marseilles, and was immediately occupied with the disembarkation of a great number of boxes, containing the riches brought home by the Astrolabe, and destined for the Museum of Paris. And thus terminated in three years, all but a month, one of what the "Journal des Voyages" calls the most glorious campaigns of the French navy.

New Guinea, New Zealand, the Archipelago of the Friendly Islands, are the spots that have been explored with the greatest care : 350 leagues of the coast of New Zealand have been surveyed, from the Cape of Contrary Winds, to Cape North, at a distance of four miles or more from the shore, and often nearer. The Archipelago of Santa Cruz, of the *Louisiad*, of Fidgi, and of the Friendly Islands, have been enriched by the discovery of nearly one hundred new islands; the position of a great number of others has been verified and rectified. New Zealand and New Guinea have furnished immense collections of mammiferæ, of birds, of reptiles, of fish, of molluscæ, of crustaceæ, of plants, and minerals. These new riches are particularly due to the exertions of Messrs. Quoy and Gaimard, naturalists, whose names had already become celebrated from the part which they took in the discoveries made by the Urania, in which they acompanied Captain Freycinet. M. Lesson, brother to the naturalist of that name, had the superintendance of the botanical department. The Astrolabe is the first vessel that brings home to Europe the remains of an expedition whose fate had excited the whole of Europe. A very strong anchor, a cannon, and two stone troughs, have been withdrawn, not without great difficulty, from beneath the waves. These remnants of the shipwreck of La Peyrouse, have been found among the reefs of the island of Vanicolo, or Vanicoro, and other cannons are still seen under the water ; but the hopes of ever finding any of the sufferers, appears to be entirely lost. We shall probably very soon have the pleasure of laying before our readers the reports which will be laid before the Academy of Sciences, on the additions made in this expedition to the different branches of science.

Professor Hansteen's Journey.

Professor Hansteen had long ago meditated a journey into Siberia, with a view of studying its natural productions, but more especially of studying those laws of magnetism which still remained to be perfected. During last winter, the public came forth to support the expenses, and the sum necessary for the purpose (4500 dollars) was voted to him by the Norwegian Diet. Naturalists and astronomers take the greatest interest in the expedition, of which Dr. Hansteen has received the most flattering proofs. Professor Erman's son, and many other men of science, were to accompany him. Letters have since been received from the Professor and his companions to the 18th of February. On the 12th of September they left Tobolsk, and travelled on sledges, the cold being at —40° of Reaumur, so that frozen quicksilver could be cut with a knife. On the 31st they arrived at Tomsh ; on the 21st of January 1829, at Krasnogarsh ; and on the 7th of February at Irkutzk, which is about 4000 versts from Tobolsk. They afterwards visited Kiachta, and crossed the frontier of China ; but the most agreeable result is, that one of the desired objects of the journey is accomplished, as the observations have proved perfectly satisfactory, and the position of a new magnetic pole is ascertained. When the letters were despatched, it was resolved that the journey should be extended to Niertchinsk, from which place Professor Hansteen would return to Krasnogarsh : his companion, Lieutenant Duc, was to go alone to Jakutzk, 2700 versts N.E. of Irkutzk, and perhaps proceed down the river Lena to the Frozen Ocean, and they intend to meet again at Jeuiseish in September or October. Dr. Erman, according to the Leipzig Liter. Zeitung. No. 254. will return into Europe by Kamtschatka and the north-west part of America, and will then accomplish a journey round the world, which three most eccentric British travellers (Ledyard, Cochrane, and Holman) have previously unsuccessfully attempted.

Ledyard, it is well known, was suddenly arrested at Irkutzk, on pretence of his being a French spy, and, by an absolute order of the Empress Catharine II. he was hurried back from Siberia in a kibilka between two guards. Capt. Cochrane's reasons for not proceeding, however specious in Great Britain, are not altogether satisfactory to those acquainted with the subject in Russia; and, as Dr Lyall has well remarked, sledges, dogs, and provisions are wanted for travelling in the land of Tchutchi, and it is not to be thought that they will be furnished without remuneration. Holman, who was stone blind, had also all his plans blasted by the Russian Government.

The discoveries of Hansteen have excited much interest in England; and the American government, who are, we understand, going to send out a scientific expedition to the south, have been written to, that a series of similar observations may be carried on. We have also heard that the intelligent and enterprising traveller, Mr Douglass, is receiving from Captain Sabine instructions in the method of making mathematical and physical observations.

Voyage of the Chevrette.

THE minister of the marine wrote to the Academy of France last January, expressing his desire that a report should be drawn up on the observations and collections made by the officers of the king's vessel, the Chevrette, during the voyage which it had executed in the Indian Seas, under the command of Mr. Fabré, lieutenant in the navy.

Accordingly, various commissions were formed out of that learned body, to examine into the labour of different kinds executed on board this vessel, which we shall introduce here, with some abbreviations, in the order in which they came before the Academy. The Baron Cuvier, M.M. Desfontaines, Geoffroy St. Hilaire, and Dumeril, were appointed to report on what concerned natural history. "It is a duty of which we have acquitted ourselves with so much the more pleasure, (say they,) as it gives us an opportunity to testify all the gratitude which naturalists owe to men who have done the greatest and most disinterested services to their science." It was not a part of the mission of these gentlemen to make collections, nor even to occupy themselves in an especial manner with natutural history; but their enlightened zeal led them to undertake a task, which they have accomplished as if they had been long prepared for it. Mr. Reynaud, chief surgeon, gave the example, and the military officers, encouraged by their chief, Captain Fabré, have seconded him with an assiduity worthy of being appealed to as an example. The lieutenant, Mr. de Blosseville, especially, and Mr. Gabert, have not only placed in the collection all that they procured in their expeditions, but they employed their moments of leisure in drawing the interesting animals, when they were so numerous that Mr. Reynaud could not accomplish the examination of all. He himself was not master of his time: deprived of the aid of the assistant-surgeon, Mr. Brossard, whom necessary duties had detained at Pondicherry, the health of the crew depended on him; but with a spirit of order and enthusiasm, every thing may be done, and this young man has given the most marked proofs of both these qualities. Nothing has been neglected. The smallest molluscæ, the frailest zoophytes, have been numbered like the fish, the birds, and the quadrupeds. All objects, whose form or colour would be altered by preparation, were drawn immediately, and notices of the places where they have been found, and of what could be observed of their properties, were registered in books appointed for that purpose. This methodical and continued attention was so much the more interesting, as, with the exception of Bourbon and Pondicherry, the shores and seas which the Chevrette has visited, are little frequented by our vessels, and none of our scientific expeditions had yet been there.

We allude particularly to Ceylon, to the country of the Birmans, and of the river of the Irraouadi, which waters it.

The Chevrette left Toulon on the 29th of May 1827, and stopped the 27th of August at the island of Bourbon; remained from the 21st of September to the 1st of October at Pondicherry; and from the 3d of November to the 1st December at Calcutta. She entered into Rangoon, a harbour of the Birman empire, upon the Irraouadi, the 21st of December, and remained there to the 9th of January 1828. After a second stay at Pondicherry, and another at Karical, she harboured from the 28th of January to the 17th of February at Trinquemale, (Trincomalee,) on the north-east coast of the island of Ceylon; came back again to Pondicherry, from whence she went to Batavia, remaining there from the 20th of May to the 10th of June; traversed the Straits of Sunda, and, after a fourth stay at Pondicherry, went to the Cape, harbouring in False Bay on the 2d of October, and remaining there to the 11th, when she took her departure to return into France. It is at these different points, and during the intermediate voyages, that the observations and collections were made.

From the authentic catalogues made in the museum of Natural History, by MM. Isidore St. Hilaire, Valenciennes, Latreille, and Audouin, the collections brought back by the Chevrette, comprehend 16 species of mammiferæ, 236 species of birds, 37 of reptiles, 238 of fish, 271 of molluscæ, 16 of annelides, 132 of crustaceæ, 590 of insects and arachnides, and 161 of zoophytes. There are more than 108 species of shells. The number of individuals of each species varies; but is in general very considerable, and the total amounts to several thousands. The most precious parts for science, consist of objects preserved in spirits. Many among those which we already possessed in a dry state, are now presented more completely to the observer, and offer to him the means of detailing their internal organization, as well as the details of their exterior. This is peculiarly advantageous in the classes of fish, of molluscæ, and of zoophytes. We thus obtain a multitude of species which had never been dissected, and which their excellent state of preservation now allow to be examined under every point of view. There are moreover in these collections, numerous species which the king's cabinet did not possess, and others also, pretty numerous, which, never having been described, are new to science itself. Three are presumed to be in this situation among the mammiferæ; 24 among the birds, of which there is a new genus in the family of Dentirostres; 20 among the reptiles, offering a new genus in the family of the Chelonia; more than 60 among the fish; 35 among the molluscæ; 12 among the annelides, of which 3 genera are certainly new; 95 among the crustaceæ, and, at the least, 20 new genera among the microscopic species. Such are, for zoology, the results of an expedition which had not natural history as an object—results in one way accidental, and arising solely from the zeal and spirit which animated the officers, as well as from the scientific knowledge which, in the present day, the medical officers of the navy acquire, in the excellent schools created by the ministry, and directed by the inspector-general, Mr. Keraudren. This spirit is such, that Mr. Brossard on his side, though engaged in another duty, would not remain behind his companions, but made also some interesting collections, from which he allowed the professor of the museum to select what might be useful to the establishment. The terrestrial productions, as might be expected in an expedition of this nature, have been less abundant than those of the sea, and this remark must naturally apply itself to the vegetable kingdom. Nevertheless, among the nearly 900 species of which the herbarium of Mr. Reynaud is composed, there are several new ones. The borders of the Iraouady especially, which have not been visited by botanists, have offered many curious plants, of which the principal belong to the grasses. Several Graminæ and Apocynæ, from Ceylon, have appeared new. At the Cape, the families of the Synantheræ, Proteaceæ, and Restiaceæ, have offered a great number of interesting species, which have enriched the herbarium of the Garden of Plants. We have the honour of placing before the eyes of the Academy, three volumes of figures, executed by Mr. Reynaud, and by MM. Blosseville and Gabert, who so generously afforded their assistance. It is easy for those acquainted with the subject, to appreciate the character of exactitude which they present; while, at the same time, naturalists must see with satisfaction the images of so many Medusæ, Biphoræ, and other transparent and gelatinous zoophytes, and of so many microscopic crustaceæ, which could not be preserved for science, but by the attention which our observers had, of drawing them alive, and in the very water in which they had been taken. We thus learn every day how many riches there remain to be explored in the vast depths of the ocean, and how little we can flatter ourselves with having filled up the frame of the great system of nature.

If, as we may hope, the minister of the marine thinks proper that the account of this expedition should be published, a selection from these figures will make a great ornament to it, and will constitute a very precious continuation of those splendid works which natural sciences already owe to the French navy,—to the voyages of Peron, of Freycinet, of Duperrey, and to that of d'Urville, which they will soon have from him; for we cannot doubt that this brave officer, and his learned companions, will arrive in a few weeks,* with the rich collections, of which our last reports may give some idea.

These rich details in natural history, added to the geographical discoveries, are a new feature in the maritime expeditions executed in these modern times by the French. They are thus distinguished very advantageously from those of other nations, and the relations rendered interesting to a class of readers, to whom the nautical and hydrographical details appear rather dry; and the acquaintance which they give with the production of different countries, is a necessary complement to the description of their coasts, and of all that which formerly constituted the almost sole object of these kinds of expeditions."

Report on the objects of Geology obtained during the Expedition of the Chevrette.

Mr. Cordier, appointed to the examination of the geological results, gave in his report at the sitting of the Academy on the 4th of May 1829.

"A great number of geological researches was not to be expected from an expedition whose places of rest have been so little varied, and who have harboured on shores, generally speaking, low, and deprived of mountains. Nevertheless, the officers of the Chevrette, amidst the multiplied labours which engaged them, have found time to collect several objects of the mineral kingdom, which are not without interest. These consist in twenty-seven species of rocks, obtained from the Cape of Good Hope, from Ceylon, from Java, from the coast of Pondicherry, from Bengal, and from the coast of Pegu: the number of specimens is about 200.

Some confirm what we already know, as much with regard to the primitive formations of the Cape of Good Hope, and of the neighbourhood of Trincomalee in Ceylon, as to the sandstones, and tertiary quartzose, and argillaceous sands, on the coast of Coromandel. These specimens offer varieties, or duplicates, which will be very useful to the museum of Natural History. Others make us acquainted, both with the position of the shelly deposits which constitute the bottom of the ocean six or seven leagues from the coast of Pegu, and with the nature of the infertile mud and fine sands, which two of the great rivers descending from the Himmalaya, the Ganges and the Irraouaddy, deposit at their mouths at the time of their annual increase.

Among these alluvial deposits, we remarked that which the Hindoos, in the neighbourhood of Calcutta, use superstitiously, to close all the natural openings of the bodies of those who are about to breathe their last.

* See first part of Geographical Collections.

The other specimens teach us the following facts, which geologists may use as so many new data :—

1. The rare rock, which we call *logite*, and which is a compound of feldspar and hypersthene, shews itself upon a sufficiently great extent of land near Trericaré, several leagues from Pondicherry, in the interior. This very ancient rock serves as a point of repose to tertiary sandstones, which, in this place, contain an immense quantity of fossil wood entirely silicified.

2. This silicified wood, as well as all that of this part of the coast of Coromandel, belongs to great stems of monocotyledonous trees,—a remarkable fact with respect to the actual vegetation of India.

3. About twenty leagues to the north of Pondicherry, there exist quarries of a *calcair grossier*, often very hard, and which, by the fossil shells which it contains, would appear to characterize a deposit of nearly the same age as the Parisian limestone.

4. The environs of Rangoon, upon the coast of Pegu, present tertiary sandstones, identical with those of the coast of Coromandel, though they are separated by 400 leagues of sea, which indicates that the causes which produced both the one and the other, were more or less general.

Lastly, A madreporitic limestone, cellular, and very hard, containing fossil shells, which all belong to genera actually alive and common, occupies an immense extent of territory on the coasts of the province of Jaffnapatnam, in the northern part of the island of Ceylon. This limestone, which appears to belong to the last tertiary period, has the greatest relations with most of the ancient limestones which form a part of the islands of Oceanica. It may be said that its presence, at the extremity of the peninsula of India, gives greater antiquity to the limits of the ante-diluvian portion of the madreporic crust, which is so prominent a feature in the southern hemisphere.

Besides the series of rocks, of which we have just spoken, the officers of the Chevrette have brought home specimens of fresh water, taken from one of the branches of the Ganges, from the Irraouaddy, and from the river of Jacatra, in the island of Java; and specimens of several mineral waters, partly from the vicinity of the celebrated Pagoda of Dagon, near Rangoon, and from the environs of Trincomalee, in Ceylon. The analysis of these different waters will be interesting: it will not perhaps be useless to verify, whether the superstitious prejudices of the Hindoos relative to the waters of the Ganges, may not in the origin have been suggested by some peculiarity of constitution. It will be equally curious to know the nature of the principles contained in the mineral waters of Trincomalee; for four species of fish, and one species of turtle, live without inconvenience in these waters, though their temperature attains 41 degrees of the centigrade thermometer."

We are obliged, for want of space, to defer the report of the labours relating to mathematical science to our next number.

Voyage of Caillé

The journey of young René Caillé, in which, alone and unprotected, he accomplished what, since the days of Houghton and Ledyard, has been a rock on which the most enterprising travellers have been wrecked, and whose journey partook so much of the marvellous, that our learned countryman, Mr John Barrow, could not prevent a little scepticism, has excited much and universal interest.

There can be no doubt of his having traversed the Joliba, or Niger, and of his having reached Tombuctoo a very short time after the death of the unfortunate Major Laing, and the coincidence between the name of Osman, which he applies to the chief of Tombuctoo, and an Arabian document, containing information of a letter having been sent from the Sultan Ahmed-ben-Mohammed-Laboo, to his Lieutenant-Governor Osman, commanding him to prevent the entrance of the

Major into Tombuctoo, and to make him leave the country if there, is remarkable.

This document was brought by the nephew of a certain Babaia, with two letters from Major Laing, to Mr. Warrington; and it further reported, that the Major was sent out of the town under the care of a sheik of the Arabs of the Desert, by name Ahmed Barbooshi, who, on arriving at his own place of residence, killed him in the most cowardly manner.

It appears by the route pursued by Mr. René Caillé, that he ascended the Joliba, or Niger, in going to Timé. His road was E.S.E. of Timbo. The point where he traversed the river does not appear far from 10° 15′ N. lat. and 11° 45′ W. long. from Paris, which, with the calculation made by Major Laing of the north latitude of the sources of the Joliba, rising in the mountain of Somaa, at 9° 15′, and 1600 feet above the level of the sea, would give us two well ascertained points. We might say the same of Bammakou, Yamina, Sego, Sansanding, Ginné, Lake Dibbo, and Kabra, not that their longitudes are at all well known, but because there can be no doubt that they are situated on the same river.

After receiving the prize offered by the Geographical Society for the successful traveller to Tombuctoo,—the cross of the legion of honour,—and moreover, from the minister of the interior, the sum of 3,000 francs, he is to continue his studies at Paris, previous to another exploratory expedition into the interior of Africa.

Travels of Champollion.—The intention of this young man's journey, celebrated for his successful attempts at deciphering hieroglyphics, and the ancient methods of writing employed in Egypt, is to study on the spot antiquities and monuments of all kinds, which, observed by the learned traveller, may, by confirming and completing the results of previous labours, lay open to us the history, institutions, and manners of a country, to whom the west owes the origin of its sciences and of its civilization. Since Mr. Champollion's departure, many letters from him have been published in the Bulletin des Sciences Historiques, in the Bulletin des Sciences Geographiques, in the Globe, (French paper,) and in our Literary Gazette.

Dr. Parrot's Excursion to Mount Ararat.—A scientific expedition has set out from Dorpat, for the exploration of the country around Mount Ararat. It is headed by Dr. Parrot, and accompanied for greater security by a military escort. Messrs. Fedorow, Hehn, Schiemann, and Behagel, accompany the expedition, in the various departments of astronomy, botany, zoology, and mineralogy; and Professor Kruse, of this university, has furnished the travellers with a manuscript chart, for the historical and antiquarian illustration of the countries of Iberia, Armenia, and the ancient Colchis, together with a copious commentary on the points to be cleared up. The late empress mother, Maria Feodorovna, shortly before her death, bequeathed 1000 rubles for the instruments and their carriage, besides 600 in addition for the astronomer of the expedition.—*Foreign Quarterly Review.*

Scientific Journey in the Morea.—The occupation of a part of Greece by the French troops, gave birth to the idea of a scientific expedition in this celebrated country. The care of exploring this classic ground, has been trusted to men whose names are well known in science.

The composition, and the different objects of the labours of the commission, as stated by the Bulletin, are as follows:

1*st Section.*—Natural Sciences, Colonel Bory de Saint-Vincent, chief of the commission; Virlet, Geology and Lithology; Pector, Zoology; Despréaux, Botany; Brulet, Entomology; Boblaye and Pétier, engineers and geographers; Bacuet, landscape-painter; and Launay, topographer.

2*d Section.*—Archæology, Mr. Dubois, chief; Quinet, history and antiquities; Schinas, history of the Grecian language; De Trézel and Amaury-Duval jun., historical-painters; Lenormand, inspector of the fine arts.

3d Section.—Architecture, MM. Blouet, Poireau, Ravoisier, and De Gournay, architect; Vietti, sculptor.

We are also informed that Mr. Lamartine, author of *Poetical Meditations*, intends going into the Morea, to join the expedition.

This commission left Toulon the 10th of February 1829, on board the Cybele, in which is also embarked Mr. Theodore Mounier, formerly superior of the staff, and a literary character, who is going into Asia. This traveller, who has already traversed all Egypt, and a part of Asia, accompanied Mr. Pacho in his last voyage.

By letters from Bory Saint-Vincent to the Baron Ferussac and to Mr. Lesson, we find that, by the 6th March 1829, they were off Navarino. Two or three journies from this place to Modon, gave them the most advantageous idea of the geological, animal, and vegetable productions. After spending ten or twelve days in the plain of Modon, to explore the environs, the bay of Navarino, the mountains which surround it, and the isles of Sphacteria and of Sapientia, it is Bory Saint-Vincent's intention to establish himself at Messina, to examine the basin of Pamisus; from thence he will pass into the valley of Eurotas, and explore the Magnus. He proposed going into the interior by the 1st of April.

Russian Voyages in the Oural and the Altai.—Mr. Englehardt has examined the geology of the steps of Sarepta, and has sought for the ancient mouth of the Wolga, and the coasts of the Caspian Sea, when the last was united to the Black Sea. From thence he went to Orenburgh. He visited Southern Ural, or Oural, Slatovust, the iron mines of Kussa, those of copper and of gold in the district of Miass, those of copper of Poljakoffsk, &c. &c. He has been partly accompanied by Dr. Hesse and Mr. Hermann. Mr. Ledebuhr has examined the Altai with Drs. Meyer and Runge. He describes his road, and speaks of the glaciers of Korun, of porphyry quarries near the sources of the Korghon, of the neighbouring plateau, 7000 feet in elevation, of a glauber salt lake near Loktiffsk, of mines of dioptase in the centre of the steps, &c. In the excursion which has been made to the very borders of China, they have collected 1600 dry, and 241 living plants, 1341 grains, 700 animals, minerals, and antiquities. Mr. Ledebuhr is going to follow the example of Mr. Englehardt, and give us a description of his voyage.

Humboldt's Journey in Siberia—The Russian journals contain long accounts of the reception of his excellency, Baron Alexander von Humboldt, and his companions, Professors Ehrenburgh and Rose, in the universities which they have visited. At St. Petersburgh, Baron Humboldt attended the examination of the pupils in the Academy attached to the Board of Works, in presence of his royal highness Duke Alexander of Würtemberg, and a brilliant audience. On the 17th of May, he attended the monthly meeting of the Imperial Mineralogical Society, of which he is a member. On the 20th, he set out for Moscow, and, on entering the university, he was received by the rector and professors, and presented with the diploma of honorary member. In all the visits which he paid to the scientific establishments there, he was received with the greatest respect.

At Kasan the same honourable reception awaited him, and the rector of the university gave him the diploma of honorary member. On the 9th of June, Baron Humboldt and his companions left Moscow to proceed to Ekatherinaburgh.—*Foreign Quarterly Review.*

Establishment of the New Colony on the Swan River, on the western coast of New Holland.——Captain Stirling, R. N. explored last year, in the ship the Success, the western coasts of New Holland, from Cape Lewin to the south-west extremity. From his report, founded on an examination of 500 miles of the coast, Government determined to form a new establishment upon Swan River, in a spot situated at 32° 40′ S. lat. This river, which derived its name from the great number of black swans which were found in it, had already been visited, for 60 miles into the interior, by Captain Freycinet's expedition. Captain Stirling explored the river to its source, and the surrounding country, which is, according to his report, very picturesque and fertile. Captain Stirling's first interview with the natives, whom he met in ascending the river, had an hostile character, but they soon established the best understanding, which was not afterwards troubled. These natives were quite savage, carrying no other clothing than the skin of the kangaroo or the opossum : they are armed with lances pointed by bones or stone. Their only utensils were hatchets of stone, hooks made with scales, and fishing-lines made with the bark of trees. During the summer months, they come in great numbers upon the coasts, feeding on fish, which they kill with their lances. They have no nets, and do not even know how to construct a boat or a raft.

At the approach of winter, they retire into the interior, where they hunt opossums, kangaroos, land-turtles, and the different birds with which the country is abundantly provided. They also feed on plants and roots. Their appearance is repulsive and wild : they are irritated by the slightest provocation, and come suddenly to hostilities. They are capricious and vindictive: their heads are very large, and disproportionate with the remainder of the body. They give proof of much agility, and their sight is remarkably piercing.

The climate of Swan River appears to be very healthy. The heat, which is great towards the middle of the day, is tempered by frequent rains and breezes that come from the mountains : the mornings and evenings offer sufficient time for labour, and the nights are fine and serene. It is probable that the heat is more intense on the shores of the sea than in the interior ; nevertheless, not one of Captain Stirling's crew suffered the least inconvenience from it. The soil appears particularly well adapted to agriculture ; springs issue from all points ; vegetation is very vigorous ; ferns and thistles attain a height of twelve feet. The principal birds of the country are the emu or cassowary, the swan, several species of ducks, quails, pigeons, parrots, falcons, and several singing birds. Seals, sharks, and whales, are frequently seen on the coast. Fish are very abundant, and of the best quality.

Captain Stirling has been named governor of the new establishment. Lieutenant Rose, who accompanied Captain King in his expedition to New Holland, will fill the office of general inspector of the colony, and many gentlemen have joined the expedition with very large grants of land. At a meeting of the Linnæan Society, (May 5. 1829,) part of a paper, entitled " Remarks on the Botany and Geology of the banks of Swan River, Isle of Buache, Geographe Bay, and Cape Naturaliste ; by Mr. Frazer, colonial botanist, of Sidney in New Holland," was read, and excited considerable interest. Mr. Frazer accompanied Captain Stirling during his survey of that part of New Holland. As the remarks of a scientific man must always be of the greatest use, we shall give them here in his own words.

" In giving my opinion of the land seen on the banks of the Swan River, I hesitate not in pronouncing it superior to any I ever saw in New South Wales, east of the Blue Mountains, not only in its local character, but in the many existing advantages which it holds out to settlers. These advantages I consider to be,

" *First*, The evident superiority of soil.

" *Secondly*, The facility with which a settler can bring the farm into a state of immediate culture, resting upon the open state of the country,—a state which allows not of a greater average than ten trees to an acre.

" *Thirdly*, The general abundance of springs, producing water of the best quality, and the consequent permanent humidity of the soil : two advantages not existing on the eastern coast.

" *Fourthly*, The advantages of water coming to the door, and the non-existence of any impediment to land carriage."

We find, in Captain King's observations on New South Wales, that Mr. Frazer has brought from the environs of the Swan River, specimens of granite, quartz, hornblende rock, limestone, and new red sandstone. The facts which we are thus enabled to draw from our knowledge of the mineral structure and hydrography of this tract, we shall take the first opportunity of laying at length before the public.

New Expedition into the Interior of Africa.—The success of Mr. Caillé has increased the desire to renew the efforts made to obtain satisfactory information on the central districts of Africa. Captain West has been selected by Government to perform this dangerous task. He goes first to Constantinople, to obtain firmans from the grand seignor for the Mussulman chiefs of Africa, and many hopes may be placed on the success of the expedition.

Captain Ross's Journey to the Arctic Regions.—We have not heard any thing of Captain Ross since his last departure from the coast of Scotland, where a slight derangement of the machinery detained him some time. It is not decidedly known whether he is to touch at Hammerfest or on the coast of Norway ; if not, it is probable we may hear of the expedition on the return of the whalers.

Prizes of the Geographical Society of Paris.—1*st*, Gold medal, value 1000 francs, for the most important discovery made in 1828. 2*d*, For discoveries in the interior of Africa, 500 francs to the traveller who may have penetrated from Darfour, upon the banks of the Misselad, &c. A similar prize for a voyage from the Misselad, or from Ouaro to Lake Tchad. 3*dly*, 2500 francs to found a prize for the traveller who may have arrived at the spot called Marawi, believed to be situated about 32° E. long. and 10° S. lat. 4*thly*, A gold medal of 2400 francs for travels in ancient Babylonia and Chaldea, to be allotted in the first general assembly of 1830. 5*th*, Oceanica, medal of 1200 francs at the same period. 6*th*, American antiquities, gold medal, value 2400 francs, for a detailed description of the ruins of Palenqua, to be given at the same period. 7*th*, 2400 francs for a voyage into the southern parts of Caramania, for 1831. 8*th*, 7000 francs for a voyage of discovery into the interior of Guiana in 1832. 9*th*, A prize of 800 francs, and one of 400 francs, for a physical description of any part of the French territory, constituting a natural region,in 1830. 10*th*, One of 100 francs for every geometrical levelling of a notable part of the course of the firths and principal rivers of France, in 1830. 11*th*, A similar prize of 100 francs, for every exact and extended barometric levelling made upon the lines dividing the great basins of France, in 1830.

Heidelberg.—The usual annual meeting of the German naturalists, Professors Tiedemann and Gmelin, managers, was to take place in this town on the 18th of September.

New Voyage round the World.—A new scientific expedition is at this moment preparing itself at Toulon. The sloop Caroline is destined for a voyage round the world. She will be commanded by Mr. Laplace, captain of a frigate. It appears that, after having touched at Teneriffe and at the Cape Verd islands, the expedition will go to Rio Janeiro, from thence to Chili, will double Cape Horn, and go to explore the coast of California, not yet sufficiently known. The Ladrone Islands, New Holland, New Guinea, and some parts of the coast of China will be visited in succession, and the expedition will return by the Straits of Sunda, Isle of France, and the Cape of Good Hope.

Oceanica. Netherland Colonies.—The engineer geographers of Netherland still continue, by the king's order, their survey of the different parts of the Netherland colonies. The minister of the marine hast just ordered the maps to be sent into Europe as they are successively drawn up. During the time of his administration, the Baron de Capellen prosecuted these labours with great activity.

Expedition of the United States.—The government of the United States has just sent off, at its own expense, three ships to explore the Pacific Ocean, seek after, recognize, and visit the numerous islands and reefs of that vast sea, whose positions are not well determined, so as to give them a fixed place upon the map. Among those who have devoted themselves to this great and useful scientific enterprise, which will last three years, are several naturalists embarked as volunteers. The command is entrusted to three of the most distinguished officers in the American navy.

Straits of Magellan.—In a letter from a British officer, attached to the Adventurer and Beagle, British discovery ships, surveying near Cape Horn, in a New York paper of the 23d ult. a channel was mentioned as having been discovered, passing through Terra del Fuego, commencing at St. Magdelen's Sound, and coming out west of Cape Noir; but it has many communications with the sea between that Cape and Christmas Sound.—*Courier, July* 18.

Survey of the Western Coast of Africa.—Accounts have been received from Captain Boteler, of his Majesty's ship Hecla, which we regret to learn are of an extremely unfavourable nature, and afford another sad proof of the insalubrity of the African climate. That officer had reached Sierra Leone in his survey of the coast. Two very fine and promising young officers, Messrs. Chaproniere and Bradley, midshipmen of the Hecla, and Doctor Burn, the surgeon of His Majesty's ship Eden, had fallen victims to the fever. Lieutenant Badgely, the acting commander of the Eden, was lying in a dangerous state, and not expected to survive; and Lieutenant Tambs, of the Hecla, had been obliged to get the Eden under weigh from Sierra Leone, and take her out to sea for the recovery of her crew. An English merchant ship, called the Lochiel, was found with the whole of her crew lying dead on board, and in that state was towed out of the river Nunez, near the Bijooga islands, by the boats of a man-of-war engaged in looking after slave-vessels.—*Lit. Gazette.*

Scientific Expedition.—His Majesty's ship Blossom, commanded by Captain Richard Owen, left Woolwich on the 28th August for Spithead, where Captain Owen is to receive his final orders. This officer has been directed, by the Admiralty, to complete the surveys of the different parts of the West Indies which have been left undone by the Spaniards, and the late admiralty surveyor in that quarter, Mr. De Mayne. Captain Owen, it is understood, will be principally employed among the Bahamas, and the coasts between Carthagena and Yucatan, more particularly to examine the dangerous shores of the latter place; and to ascertain correctly the meridian distances between the principal points in the West Indies chronometrically. He has received for this purpose a supply of the very finest instruments; and no pains have been spared in the equipment of the Blossom. Captain Owen, we are informed, has been particularly directed to report on the qualities of the star quadrant,—a late improvement of the quadrant, in which the glasses are considerably enlarged, for the purpose of gaining as much light as possible in observing the altitudes of stars with the sea horizon.

It is expected that the Blossom will proceed first to Barbadoes, for the purpose of measuring the meridian distance between that island and Madeira.

ADDENDUM.

Since our analysis of Sir R. Donkin's Dissertation was put to press, we have received "A Letter to the Publisher of the Quarterly Review, by the Author of that Dissertation," which, written in a tone of irony, is a violent lampoon upon Mr. Barrow, arising from a merited castigation inflicted upon the Dissertation by the last number of the Quarterly, in which every body knows that Mr. B. writes the geographical articles.

Military influence and presumption are certainly making rapid strides in our land, when the soldier now beards the critic for dissent on the merits of a wild hypothesis. But we very much suspect that this answer, (which only pretends to rectify a misquotation and suppression from Beechey's narrative,) owes its origin, not to any malevolence against Mr. Barrow, for whom the author professes feelings of friendship, but to the conception of a species of practical pun, for whose developement it was necessary that the punster should journey to Rome.

"As to your answer to this," says Sir Rufane in conclusion, "in the shape of a note, or in any other, I shall probably not see it, as, long before your next Number comes out, I shall be on my way to Rome; and in that classical city I presume your Review will not venture to show its face, after having spoken so irreverently of all those immortal ancient writers, who are held there in such veneration: but, should you find a safe private hand by which to send it, I shall be glad of your next number, in case you answer this Letter, and clear up the clouds which now hang over your Quarterly Publication; and if, when packing up your next Number, it should open its mouth, or leaves, and plead against a journey to Rome, the "quid Romæ faciam? mentiri nescio," you must reject the plea at once, and pack him up."—P. 44.

NATURAL-HISTORICAL COLLECTIONS.

Dr. Knox's Theory of Hermaphrodism,—the substance of a Lecture delivered to his Class of Comparative Anatomy, on Friday the 24th July last.

The only notice we can at present take of this lecture, and of the extended views it contained, is to present our readers with the few prefatory and brief remarks with which Dr. Knox introduced the lecture. He stated that it was by no means his intention to submit to the class the whole of the inquiries he had been engaged in on the subject of hermaphroditic structure; neither would he occupy their attention with the details which had led him insensibly to the adoption of those views, a portion of which it was his intention to lay before them: but being pledged to produce these inquiries elsewhere, he would limit himself entirely to a bare announcement of some of the more striking results.

The object of his inquiry had been twofold. *First*, To explain the doctrine of the ancients as to the double course of the seminal fluids from the ovaria; and this led to the *determination* of the organs minutely described by Casper, Bauhin, Malpighi, and others, in certain ruminating and pachydermatous animals,—organs which they took for portions of female structure, because they were found in females, and for which they invented functions in direct contradiction to their anatomical structure, adding thereby errors in matters of fact to errors in theory or speculation. These organs Dr. Knox proved to be the remains of *male organs*, though existing in the females of the ruminants; and this proof was fully borne out by his own dissections, by those of Mr. Hunter, and of all anatomists, though conducted by quite other views. To shew how extended the errors were on this matter, the lecturer referred to a late number of the *Annales du Museum*, where these organs, which have been so well described by Bauhin, Malpighi in his letter to Spon, Gærtner, and many others, and whose anatomical connections cannot possibly escape the notice of any careful anatomist, are denominated utero-vaginal ducts, although they have never, in any instance, been found to communicate with the uterus, and were moreover shewn by Dr. K. to have no connection whatever with *the system of female organs*.

Secondly, To determine what are male and what female generative organs, and the laws of formation with regard to these systems. The law was shewn to be simple and hermaphroditical, and the *doctrine of analogies*, as laid down by ancient and modern anatomists, was endeavoured by the lecturer to be disproved, and was declared by him to be contrary to daily observation and to common sense.

The type, apparently, agreeably to which Nature (selecting, as seems usual, the most complex,) had formed the generative organs, was hermaphroditical, and the organs being restricted to male and female, in those groups of animals whose functions and organization required that two individuals should constitute the species; but it was also shewn that the type existed in many animals, and that even in those species in which the sexes were most strikingly separated, the rudiments of all or of many of the organs, required by Nature to constitute the original type, remained as evidence of her great plan. Finally, aberrations from regular structure, as regards the generative organs, hitherto described as hermaphrodites, lusus naturæ, monsters, ill-formed males or females, &c. were reduced to the simple law of *a return to the original type.*

We shall be careful to lay before our readers the whole of the inquiry, which, we understand, it is Dr. Knox's intention first to submit to the Royal Society of Edinburgh.

Observations on MR. KENYON'S *Paper on British Land and Fresh Water Shells.* By CAPTAIN THOMAS BROWN, F. R. S. E. &c. &c.—*in a Letter to the Editors.*

GENTLEMEN,

I WAS in hopes that some person, better qualified than myself, would have given answers to Mr. Kenyon's "Remarks on British Land and Fresh Water Shells," which appeared in the Fifth Number of "Loudon's Magazine of Natural History," page 424; but as no notice has been taken of that paper, I beg with deference to offer a few observations on it, and shall follow the order in which Mr. K. has given the species.

Neritina virginea is a fresh water shell, very common in all the West India Islands; but it certainly has never been found alive in Great Britain or Ireland. I saw the shell described by Dr. Turton, as having been "found in sand at Seafield, west of Ireland," in his possession in 1814, previous to my transmitting to the Wernerian Society an "Account of the Irish Testacea," which was published in the Memoirs of the Society, Vol. II. p. 501. I omitted that species, as I considered it decidedly foreign, and the true *Nerita virginea* of Gmelin. It is to be met with of all sizes, from two lines to nearly an inch in length.

Valvata piscinalis. Mr. Kenyon is unquestionably wrong in considering the *Valvata planorbis, ossiorbis,* and *minuta,* as the fry of this species. He should keep in view that the young of land and fresh water spiral testacea, have uniformly a thinness in the outer lip; and consequently the mature shell can at once be determined by its thickness, and the solidity of its edge.

Lymnæa fragilis. Mr. Kenyon has entirely mistaken this shell, and has figured a variety of the *Lymnæa palustris* for it, and quotes Dr. Fleming. Now the Dr. quotes Montagu, and if Mr. Kenyon will refer to that author, Plate XVI. Fig. 7. he will find the figure totally different from that which he has given. Lamarck has completely misplaced this species, by inserting it amongst his Bulimi. It would be difficult to conceive how he could have gone into this error, as it was Dr. Leach who furnished him with his specimens, and who also gave me that shell, from which I made the drawings for the *Lymnæa fragilis,* in my "Illustrations of the Conchology of Great Britain and Ireland," Plate XLII. Fig 22, and 23, agreeing in every respect with Colonel Montagu's original shell, which is preserved in the British Museum, and is a species very closely allied to the *Lymnæa stagnalis.*

Lymnæa detrita. I do not consider this as a British species: it was first introduced as such by Mr. Bryer, who furnished Colonel Montagu with the specimen from which his figure was taken, Plate XI. Fig. 1. This specimen I carefully examined in the British Museum, and have no hesitation in pronouncing the *Helix detrita* of Gmelin, the *Helix acuta* of Chemnitz, and the *Bulimus Guadalupensis* of Lamarck, to be the same shell. It is a *land* shell, common in Guadaloupe, and several other West India islands; consequently Mr. Bryer's authority is very questionable. The specimen said to be found by Dr. Turton at Dublin, I also considered foreign, and omitted it in my catalogue of the Irish Testacea. If this species does inhabit England, it will be found on *terra firma*, and must have been introduced on plants, either in the egg or young state, as was the case with the *Bulimus decollatus*. Can any of your readers point out its locality in a living state?

The shell figured by Mr. Kenyon, is therefore new to me as a British species, and different in shape from any I am acquainted with. Will he be so kind as to point out its locality?

Lymnæa ovata. This shell I found of a very large size in ditches at Bury in Lancashire, in 1813, and figured it in my Illustrations, Plate XLII. Fig. 10, 11. giving the synonymes of Draparnaud.

Lymnæa peregra, I consider as the *Helix peregra* of Gmelin, the *Helix putris* of Linnæus.

Lymnæa limosa. Under this species Dr. Fleming has blended the synonymes of *Lymnæa ovata,* and *peregra,* and the *Helix putris* of Linnæus.

In 1814, I found a shell near Clonooney Barracks, King's County, Ireland, which I considered as the *Limosa* of Linnæus: it was figured and described in the Wernerian Memoirs, Vol. II. p. 531. Plate XXIV. Fig. 11. and in the Illustrations, Plate XLII. Fig. 39, 40.

I gave specimens of this shell to Dr. Turton, who agreed with me in thinking it the *Helix limosa* of Linnæus. I have since seen Gualteri's figure, referred to by Linnæus, and it agrees with mine.

Planorbis nitidus. Mr. Kenyon is quite correct in supposing that Lamarck has included two species under one.

Succinea amphibia. The *Helix putris* of Gmelin and Montagu.

Clausilia ventricosa is not the *Turbo biplicatus* of Montagu. Mr. Kenyon's figure agrees with the *Clausilia ventricosa* of Draparnaud and Pfeiffer, and is in all probability that shell; and if so, is new as a British species.

Clausilia solida. Mr. K.'s figure agrees with Montagu's *Turbo labiatus,* the *Clausilia labiata* of my Illustrations. Plate XLI. Fig. 15.

Pupa muscorum. Mr. K. is perfectly correct in stating that at least four species have been confounded by authors under this single name. In the Illustrations, I have divided it into five species, viz.

1. *Pupa muscorum,*	Plate XLI. Fig. 3.	Mr. K.'s fig.	*r.*
2. —— *unedentata,*	4.	Do.	*p.*
3. —— *marginata,*	5.	Do.	*q.*
4. —— *bidentata,*	6.	Do.	*o.*
5. —— *labiata,*	7.		

Helix sylvatica is the *Helix hortensis* of Lamarck, variety with bands, Plate XXXIX. Fig. 15. of the Illustrations, and the *Helix nemoralis* of Montagu, variety with the white lip.

Helix carthusianella of Mr. K. is the *Helix Gibsii* of the Illustrations. Plate XL. Fig. 49, 50, 51.

Helix cellaria is the *H. nitens* of British authors.

Helix sericea. This is a new shell to me as a British species.

The Fig. *a a,* is the true *H. hispida.*

Natural History of the Throstle.—An interesting fact connected with the habits of the throstle, (*Turdus musicus,*) was lately communicated to the Plinian Society by Mr. Macgillivray. On the shores of the Hebrides, he had frequently observed small heaps of shells, belonging to two species, the *Turbo littoreus* and *Trochus conuloides,* always broken, but without the animal, although many appeared quite fresh.

On frightening away a throstle, which he had seen engaged in breaking something which it held in its beak against a stone, he found one of the small heaps of whelks, among which was a fresh one, newly broken, and containing the animal. It may appear extraordinary that a bird possessed of so little muscular power should be able to break so thick and hard a shell. Throstles, it is well known, break the shells of snails, but these are very fragile; whereas a smart blow of a stone or hammer is required to break a periwinkle; nevertheless the matter becomes more credible when we find, by experiment, that a very slight force is necessary for breaking a whelk, when it is thrown against a hard body; and that the shell is fractured, when allowed to fall on such a body from a height of four or five feet.

Notice of the different causes of the Coloration of Snow and Ice.—De Saussure first remarked the red coloration of snow on the Brevent in Savoy in 1770. The same phenomenon has since been observed by Mr. Ramond in the Pyrenees, by Sommerfeldt in Norway, and in the Italian Alps and the Appenines by several naturalists.

But red snow, very frequent in the polar regions, fixed the attention of the late British travellers; and the specimens which they brought from their voyages, submitted to the examination of the most celebrated botanists and chemists, became the subject of extensive research, and gave much celebrity to this singular substance.

This red snow often covers a great extent of territory. Captain Ross says that mountains of about eight miles in length, and 600 feet in elevation, were covered with it, and that it penetrated sometimes to 10 or 12 feet in depth.

The chemical researches of De Saussure, De Sementini, Wollaston, and Thenard, only proved that this matter consisted principally of an organic substance, analagous to that of some vegetables.

Francis Bauer was one of the first naturalists who subjected it to microscopic examination. He concluded, from his researches, that the globules which form this substance, are analogous to those which form the parasitic fungi of the genus Uredo, and he gave it the name of *Uredo nivalis.* His data to establish this singular relation, were principally the existence of little pedicelli sustaining certain globules: pedicelli which no one has since been able to perceive.

Mr. R. Brown established the relationship of this substance with the *Tremella cruenta*, (Eng. Bot.) near which the generality of botanists now place it.

At the same epoch, Baron Wrangel was describing, in the Memoirs of the Academy of Science at Stockholm, a red cryptogamous plant which he had observed upon the rocks in the north of Sweden, and which he designed under the appellation of *Lepraria kermesina.* The odour of violets, which this substance emitted, led him to suppose that it had been confounded by Linnæus with his *Byssus jolithus.*

Mr. Agardh having had occasion, in 1823, to subject to a comparative examination the red snow brought from the Pole by our navigators, and the *Lepraria kermesina*, became assured of the identity of these two cryptogamous plants, and thought that its analogy with other substances differently coloured, would lead to the colouring matter of snow being placed among the most simple algæ: he made a particular genus under the name of Protococcus.

Dr. Hooker differs very little from this opinion, in placing this cryptogamous plant in the genus Palmella, which approaches very nearly that of the Protococcus; and Fries, in his *Systema Mycologicum*, proposes that a genus should be formed with several other species of Palmella, under the name of *Chlorococcum.* We thus see that those botanists who have most occupied themselves with this question, and in general with the classification of cryptogamous plants, only differ about the generic limits which must be established between this plant and those which most resemble it.

The *Protococcus nivalis* differs essentially from the *Palmella* only in as much as, that the red globules which give it its distinctive colour are placed upon a gelatinous base, and not immersed in that matter, as in the Palmella.

It results from the combined observation of all the naturalists previously alluded to, that the plant which occasions the coloration of snow, is also seen upon rocks, leaves, and other substances in cold countries: that it consists in a layer of white gelatinous matter stretched upon these surfaces, and supporting spherical globules of a lively red, containing in their interior lesser globules of a yellow colour, which escape by the rupture of the external membrane.

The generic and specific characters of the Protococcus may then be given, as Dr. Greville has traced them, in his excellent memoir on this subject.

Globuli aggregati, nudi, granulis farcti, in gelatina hyalina impositi.

Protococcus nivalis, globulis exactè sphæricis, minutissimis, vividè purpureis; gelatinâ pallidâ expansâ.

Hab. in nive alpina et polari, et supra lapides, folia, aliaque corpora in regionibus frigidis Sueciæ, Norwegiæ, Scotiæ, &c.

But it has been too hastily concluded, from the examination of this red snow, that this cryptogamous plant was the only cause of the coloration of snow and ice.

It is well known that fresh water is often coloured, in a very intense manner, either by vegetables, or by little animals which inhabit it in great numbers.

Mr. Decandolle published a curious memoir upon the red coloration of part of the waters of Lake Neufchâtel, by a Conferva of the genus Oscillatoria, to which he gave the name of *O. purpurea.* (Mem. de la Soc. de Phys. et d'Hist. Nat. de Geneve.)

Little Entomostraca often give rise to a similar coloration of the water of shallows; and Adolphe Brongniart saw the water of the canal of Gota in Sweden, near Berg, coloured for a considerable extent with a greyish green tint, by an infinity of pale green globules, rendering the water very opaque; but he unfortunately had not the time to study their structure with minute attention.

Sir Humphrey Davy has lately, in that interesting work " Salmonia, or Days of Fly Fishing," advanced an opinion, that the colour of the ocean is probably in part due to the two elementary principles, iodine and bromine, which its waters certainly contain, and which result perhaps from the decomposition of marine vegetation. These two substances dissolved in water give a yellow tint, and this tint mixed with the blue tint of pure water, may produce the green of the sea. Every thing affecting the latter colour would then be anomalous, and a fit subject for the research of naturalists.

Mr. Scoresby has lately, in Professor Jameson's Journal, published the results of a particular examination of the tints of the water of polar seas, in which he states that the different tints of green, yellow, or red, are produced by little animals of the class of *Radiata;* and the water, in freezing or in impregnating snow with its colouring matter, becomes a new source of coloration of snow and ice.

Lastly, Mr Nicolson, a correspondent of the Magazine of Natural History, differing with the opinion of former writers, describes the substance as scattered here and there in small masses, bearing some resemblance to powdered cochineal, *surrounded by a lighter shade*, which was produced by the colouring matter being partly dissolved and diffused by the deliquescent snow. This substance, from the author's garments becoming coloured with it, and from the snow on the mountains of higher elevation than the nests of little auk, (alca minor,) being perfectly white, he refers to the dung of this little bird, myriads of which were flying above Sowallick Point, on which the red snow occurred.

This observation, though capable of adding to the causes of coloration already known, will not, from the facts of the extensive continuous tracts which are covered by it,—of its existence in countries and alpine districts where the little auk is not to be met with,—and from the researches of chemistry, and the faultless observations of Bauer, Hooker, Brown, and Greville, admit of any very extensive generalization.

Earthquakes.—In mentioning the occurrence of several shocks of an earthquake at Copenhagen, we cannot avoid alluding to the singular coincidence of several earthquakes having within a few months been felt in several places remote from from one another. The first of these was on the morning of the 18th of September 1829, when, after 7 o'clock, two very strong shocks, whose motions appear to have been vertical, occurred at Calcutta. On the 21st of March 1829, the first shock of a severe earthquake was felt at Murcia in Spain, and followed by others, which rent the earth, and swallowed up or destroyed more than 3600 houses in the province. The deep communications of this earthquake are attested by the geognostic structure of the country, which is very modern, and not volcanic, (calcareous and gypseous formations, soft clay, and yellow sand.) Its motion, nevertheless, appears, from the only published accounts, to have been vertical. Its progress was marked by shocks at Colmar (Upper Rhine) on the night of August the 7th ; at Poutroye and at Beffort the shock was stronger, and accompanied by a noise like distant thunder. The earthquake was also felt (according to a letter from the Minister of the Interior to the Academy of Paris) at Saint Dié and at Strasburg. The shock felt at Copenhagen was on the 19th of August 1829, at about half-past three o'clock. Its direction was north-west ; it lasted some seconds, and was preceded by much noise. The barometer rose at 12 o'clock three inches, but was not affected at the moment of the shock. Copenhagen was similarly affected by the earthquake at Lisbon, but has not in the interval felt any other shocks.

Star-stones of Chemnitz.—An admirable monograph on the psarolites, or star-stones of Chemnitz, has appeared from the pen of Anthony Sprengel,* being an amplification of his thesis at the university of Halle. Having remarked a great similarity between the psarolites and living ferns, it occurred to Mr. Sprengel that this curious fossil, as to whose origin doubt has so long existed, might be the remains of arborescent plants ; and his continued observations tending to substantiate his supposition, he has arranged the different species according to the method of Brongniart.

All the specimens which have been hitherto discovered, are referable to Brongniart's first class, " Trunks of trees, whose internal structure is distinguishable," and to the genus Endogenites, " Trunks of fossil trees, composed of fasciculi of secreting vessels ;" though the two species, (E. bacillaris and E. echinatus,) mentioned by Brongniart, (Mem. du Mus. V. and VIII.) differ entirely from the Psarolithi. M. Sprengel was unable to follow Sternberg, who subdivides the Psarolithi into two species, which he names Palmacites macroporum and P. microporum ; 1*st*, because his system is built on analogies with living plants, which is inadmissible ; and 2*d*, because Brongniart has described a genus under the name Palmacites, altogether distinct from the Psarolithi. Accordingly, a new systematic name was necessary for the Psarolithi, which, moreover, from the great difference between them, could not be associated under one species.

The genus is therefore thus divided :

I. Endogenites Psarolithus.

Char. Spec. *End.* tubulis (fasciculis vasorum secretorum, Brongn.) parallelis cylindricis compressiusculisve, tubulos numerosos exiguos intus gerentibus.

Found scattered about the fields near Chemnitz in Saxony, a district abounding in porphyry, red psammite, (sandstone,) and lithanthrace, (secondary formations.) They occur also in matrices of siliceous lithanthrace, which lie under argillaceous schist and psammite.

In opposition to Brongniart and all other recent writers, who refer the psarolites to the family of Palms, on account of the similarity of internal structure, Sprengel suspects them to belong to the Arborescent Ferns, and comparative sections of the End. Psarol. and the Polypodium aureum and P. crassifolium, are exhibited in a plate at the end of the pamphlet.

II. Endogenites Solenites.

Char. Spec. *End.* tubulis minoribus majoribusque, minoribus End. Psarolithi, majoribus superne convergentibus attenuatis, cylindricis, gerenti-

* Commentatio de Psarolithis, ligni fossilis genere. Auctore Antonio Sprengel, Phil. Doct. Halæ 1828. pp. 42. 12mo.

bus intus tubulos minimos : centralem majorem compressum, periphericos cylindricos exiguos.

Found in a quarry of porphyry at Hückelsbergem, a village between Friberg and Chemnitz.

The solenites has a great resemblance to the root of Polypodium filix mas, when dug up at the beginning of spring. Sprengel supposes it may have been the root of the same fern, of which the End. psarolithus was the stem.

III. Endogenites Asterolithus.

Char. Spec. *End.* tubulis communibus parallelis irregulariter cylindricis, s. compressis obtuse angulatis, columellas includentibus singulas tetra-, penta-, hexa-, hepta-, octogonas tubulis farctas cylindricis, numerosis, qui ut plurimum in columellas congregati quadrangulares—octangulares, raro irregulariter sparsi sunt, rarissime iterum circumdant tubulos minimos.

Abounding with the End. Psarol. at Chemnitz.

Many writers have conjectured that the asterolites had the same origin with fossil corals, but the structure of the tubes is perfectly dissimilar. Moreover, the Coralliolithi are chiefly found in calcareous rocks, never in red psammite, as our Asterolithi. Others, as Henckel, have supposed, with equal authority, that the asterolites were allied to the columnar Asteriæ, *i. e.* Astroites, fragments of the arms and fingers of the Encrinites and Pentacrinites. Others again have imagined that they were marine Polypi, petrified in the wood which they inhabited : yet no polype ever possessed such a structure, or ever perforated wood. But those mollusca which live in submersed wood, *i, e.* the Teredines, are not very dissimilar from them.

Sprengel thinks that they are a peculiar family of plants, approaching somewhat to the ferns.

IV. Endogenites Helmintholithus.

Char. Spec. *End.* tubulis parallelis duplicis structuræ, illis End. Asterolithi, his late compressis, varie canaliculatis sinuatisque, tubulos numerosos minimos intus gerentibus.

Found near Chemnitz with the former, but much more rarely.

What has been said already with respect to the End. Asterolithus, equally applies to the End. Helmintholithus ; and indeed M. Sprengel would have comprised them under the same species, if the largest fragments of End. Asterolithi which he had examined, had shown any vestige of a vermicular form.

V. Endogenites Palmacites.

Char. Spec. *End.* tubulis parallelis confertis subregularibus compressis, altero latere subtereti, altero angulato duos s. tres tubulos exiguos continente.

A few small fragments are found in the neighbourhood of Chemnitz.

M. Sprengel refers it without any doubt to the fossil palms.

VI. Endogenites Didymosolen.

Char. Spec. *End.* tubulis parallelis geminis, quorum alter major semiteres, alter minor teres refertus tubulis minimis sex aut septem.

Found with the End. Palmacites.

M. Sprengel can find no analogy with its structure amongst plants, unless it be in the stipes of the Zamia media, and he refers it generally to the family of Cycadeæ.

New Species of Tapir.—Mr. G. Cuvier lately made a report to the Academy of Sciences of France, on the memoir of Dr. Roulin, having for its object the natural history of the tapir, and particularly that of a new species of that genus, which the author has discovered in the high regions of the Cordilleras of the Andes. The new tapir, according to Cuvier, has a much greater resemblance to the Palæotherium, than to any of the two species formerly known. The memoir, besides having added to the catalogue of animals a large quadruped, belonging to a genus which for a long time contained but a single species, throws light upon a fact which relates to the history of the antediluvian animals ; for it had even been advanced by some authors, that a genus of these animals, the Mastodon, probably still exists in the higher valleys of the Cordilleras.

CATALOGUE RAISONNÉ.

OBSERVATIONS on the Mean Annual Temperature of Funchal in Madeira. By C. HEINEKEN, M. D.

Heberden gives for Funchal, as corrected by Schouw, 67.3; De Humboldt 68.5.; but he prefers Heberden's mean; for he gave it to Risso in 1826 as the mean of Funchal. From Dr. Brewster's formula it would be 68.7; and from Dr. Heineker's observations 66.7. But this gentleman is inclined to compare his three years mean, and the result of Dr. Heberden's observations, which would give 66.3. Dr. Heineken thinks that the mean given for all low latitudes, is considerably too high.—*Edin. Journ. of Science*, No. I. N. S. p. 46.

Observations on the Characters and Affinities of Darwinia, Brunsfelsia, Browallia, Argylia, Eccremocarpus, and of a Plant improperly referred to the last Genus. By MR. DAVID DON, Librarian of the Linnean Society, &c. &c.

Mr. Don refers the Darwinia to the Nat. Ord. of Myrtacea of Brown, and describes two species, D. fascicularis and D. taxifolia, both from New Holland. The Franciscea uniflora of Hooker, is described from a specimen in the collection of the Comtesse de Vandes at Bayswater, under the name of Brunsfelsia uniflora, and referred to the Nat. Ord. Solaneæ, Juss. From the form and plicate æstivation of the corolla, Mr. Don also proposes to remove the Browallia (whose generic characters he details with great accuracy, from the Scrophularinæ to the Solaneæ. The generic characters of the Argylia, (Ed. Phil. Jour. Oct. 1823.) are now made more perfect, and a new species, gathered by Mr. Caldcleugh at Coquimbo, is added.

"A. canescens, cano-pubescens; foliorum segmentis linearibus canaliculatis, corolla tubo calycem parum excedente.
Hab. in Chili ad Coquimbo. Caldcleugh."

Herba habitu graciliore, pube copiosa brevi canescens. Flores minores.

The genus Eccremocarpus is limited to include the E. viridis of Ruiz and Pavon, and the E. longiflorus of Humboldt and Bonpland; but the E. scaber is separated as a distinct genus, (Calempalis.) These genera, together with Tourretia, Mr. Don considers as clearly referable to the Bignoniaceæ, of which they appear to him to constitute an osculant group, connecting that family with the Cobæaceæ.—*Edin. Phil. Jour.* No. XIII. p. 83.

Notice sur le genre Hedychium, de la Famille des Musacées, (Balisiers et Bananiers. By TH. LESTIBOUDOIS, Professor of Botany at Lille.

The modern and exact description which Mr. Robert Brown has given of all the Scitamineæ, endows them with a double calyx, the external trilobated, the internal with two divisions, of which the external is trilobated, and the internal one has also three lobes, the intermediate lobe being itself bi- or tri-lobated. He further describes two little bodies, which he considers to be sterile stamens, the whole five of which are in the Hedychium, according to Dr. Lestiboudois, contained in the internal limb of his second calyx.

In a previous memoir, this botanist had succeeded in establishing in the Canna indica, the regular type, and ternary number, proper to the flowers of monocotyledonous plants. After applying these researches to the abortions which are met with in the neighbouring families, more especially the Orchideæ, he endeavoured to find the analogous organs in the other genera of the *Balisiers*, and he succeeded in finding the calyx with six divisions, and the corpuscules, which represented five sterile stamens. Hitherto botanists have given one stamen to the *Balisiers*, and six to the *Bananiers*, but this character Dr. Lestiboudois considers, from these researches, to have nothing real in it. The Musa, he says, carries two sorts of flowers, the first unfruitful, having five fertile stamens and one sterile; the other fruitful, having one fertile stamen and five sterile. In the Strelitzia and the Heliconia, the abortion of a stamen may be observed, which has almost entirely disappeared, and soldered itself with a sepal. From these facts, he thinks the *Bananiers* should be re-united with the *Balisiers*, under the family name of Musaceæ.—*Annales des Sciences Naturelles, June* 1829.

Sur une mâchoire inferieure d'Antracothérium trouvée dans les grés tertiaires de la Limagne. By MM. L'ABBE CROIZET and JOBERT.

A description of some bones which have come to the Garden of Plants since the publication of Cuvier's great work, in which he describes three species of Antracotherium from the lignites of Liguria, and the fresh water deposits in the environs of Agen.

The present bones come from the tertiary sandstones which alternate with the marl and shale formations of Limagne.

It belonged to the greatest known species of the genus Antracotherium, and approximated to the rhinoceros and daman, by the simple configuration of its inferior molar teeth : it has also in the number and disposition of its incisives, the oblique direction of its canine teeth, and in the arrangement of its grinders, a striking resemblance to the pig ; whilst the apophysis, situated on the external side of the inferior maxillary bone, as well as the direction of the ascending branch, seems to indicate a kind of passage to the hippopotamus.

This, then, was a true pachydermatous animal. Contemporary with the Anoplotherium, Lophiodon, and Palæotherium, it was one of the greatest mammiferæ of the tertiary epoch, and it lived on the borders of the great lakes, where those formations were deposited which preserved its spoils. With it, other herbivorous, gnawing, and carnivorous animals, birds, and reptiles, which the authors intend describing, peopled the mountains and shores of Auvergne. At that era, no doubt a rich vegetation covered the country. It was the fourth period of the fossil vegetation of Adolphe Brongniart.

The volcanoes had not yet burst forth.*—*Ibid.*

Note sur une nouvelle Espece de Maïs. By MR. MATHIEU BONAFOUS.

The maize or Turkey corn comes originally from South America, and has been grown in Europe from the beginning of the 16th century. It presents such numberless varieties, that agriculturists cannot agree upon their nomenclature, while botanists refer all of them to the species Zea Mais, Lin. whose type in its natural state is unknown to us.

In cultivating this plant, with a view to ascertain the comparative merits of these varieties, Mr. Bonafous was led to distinguish a plant brought over some years back from California, which he proposes to designate by the name of Zea hirta, "foliis hirtis et dependentibus ; spiculis masculis sessilibus diandris triandrisve ; antheris subaureis."—*Ibid.*

Des Formations Jurassiques dans le sud-ouest de la France. BY MR. DUFRENOY.

The ancient mountains of the centre of France, extending from Burgundy to High Languedoc, are surrounded on all sides by a band of Jura limestones ; and these formations admit of the four great divisions which have been observed in the analogous deposits in England and in the north of France ; and the divisions are marked by beds of clay and marls. The lowest of these divisions would be constituted by the lias, comprising a great part of the country contained between the Rhone and the mountains of Ardeche. The oolitic formations constitute a zone which would be contained in a line which would join Cahors, Angouleme, and Rochefort, and another which would pass by Figeac, Poitiers, and the sands of Olonne. Some of the numerous subdivisions of the English geologists, are not met with in this part of France, and some fossils are in a rather different position. From what we have been able to gain from this paper, we find the following succession of beds, the inferior oolite lying indifferently on lias, or on the first-mentioned beds and the marls, with Gryphæa virgulata, dividing them from the iron and green sand formations.

* Our readers will remember, that there are two tertiary formations in Auvergne, one below the volcanic products, and the other above them.

Lias.	Lias in the east. Silicious sandstone in the west. Marls alternating with compact light blue limestone. Compact earthy limestone, sandy, oolitic. — Terebratulites, Pecten, Plagiostomæ, Ammonites.
Inferior Oolite. Cornbrash, Forest Marble, and Great oolite.	Micaceous shales, (Milhau,) Gryphæa cymbium, Belemnites, &c. Compact yellowish earthy limestone, (Ennandre,) alternating with grayish-blue compact limestone. White oolite, (Mauriac,) associated with madreporites and corals, as at Caen.
Middle Oolite. Coral rag and Oxford clay.	Compact, friable, and marly limestone. Blue clay, alternating with white marls. Bed of hard rough limestone, full of Terebratulites. Limestone, with Madreporites, &c.
Superior Oolite. Purbeck beds, Portland oolite, and Kimmeridge clay.	Blue marls. Fine-grained oolite, alternating with beds of compact earthy limestone. Marls, with Gryphæa virgulata. Hard limestone beds.

Notes on the Differences, either Original, or consequent on Disturbance, which are observable in the Secondary Stratified Rocks. By HENRY T. DE LA BECHE, ESQ. F.R.S. &c.

An inquiry into the differences in the nature of the mass of certain formations, in contradistinction to the mechanical variations of structure in the hand specimen, and into the difference of structure which may take place in analogous formations, principally developed by a reference to the difference in mineralogical structure between the oolitic formations and lias in England and the north of France, and the same formations in the Alps and in Italy.—*Phil. Mag.* No. XXXIII. p. 213.

On a Discovery of Fossil Bones in a Marl Pit near North Cliff. By the REV. WILLIAM VERNON, F.R.S. &c.

The bones of the elephant, rhinoceros, deer, ox, horse, and a large species of Felis, were found under diluvial chalk gravel, at a depth of from 15 to 20 feet, in a marl indented in such a manner as to appear to have been deposited before it, and containing both land and fresh water shells, Helix, Pupa, Lymnæa, Planorbis, and Cyclas.

The marl pit is on the eastern boundary of the red marl, where that formation approaches the low lias hills which skirt the south-western side of the Wolds. The strata are black sand, yellow sand, white gravel consisting of small pebbles, of chalk, and angular fragments of flint, with a few pieces of Gryphæa incurva, and fewer pebbles of sandstone, blue marl, irregularly penetrated by the gravel, and a blacker marl. The greater part of the bones were found in the latter bed.—*Ibid*, p. 225.

On the Discovery of Iodine and Bromine in certain Salt-Springs and Mineral Waters in England. By CHARLES DAUBENY, M.D. &c.

Professor Daubeny has found bromine in one of the Cheshire brine springs, and iodine in two or three. Also in the saline water of Cheltenham,* Leamington, Gloucester, and Tewkesbury. The professor does not mention the methods of analysis which he followed, nor the tests employed.—*Ibid*, p. 235.

On the Early History of the Steam Engine. By A. AINGER, ESQ.

It is customary in each successive year, to fill up a part of the vacant pages of the Annuaire du Bureau de Longitude, by some brief scientific essays. The year before last, we remember that portion was devoted to the discussion of the Voltaic theory of hailstones, and the utility of conductors dispersed over cultivated tracts of land; and the same pages have this year been made the receptacle of a paper on the rival pretensions of

* Mr. Ainsworth had announced the indication of the presence of iodine in the Cheltenham waters, (obtained by the use of the ordinary tests,) before the Plinian Society, at a meeting in the session of 1827.

France and Great Britain to the discovery of the steam engine. Had this notice originated with the Americans, we should have been less surprised, and were therefore not sorry to see the author, Mr. Arago, answered in a most talented manner in the Foreign Quarterly Review of Treuttel and Wurtz. The present essay, consisting of a brief exposition of every known step in the application of elastic vapour to the production of motive powers, treats the subject even in a still more masterly manner. On such a subject, we shall always keep in mind the expression of some of Mr. A.'s contemporaries, members of the Board of Longitude of France. Some researches having detained us rather a fatiguing length of time in the observatory, at a period when a question on magnetism had caused some little discussion between one of our philosophers and that patriarchal grumbler, they seemed inclined to refer to that cause the fact of our not having asked their assistance, concluding their kind offer by the remark, " Remember Mr. Arago is not the only man of science here,"—a fact to which we could bear sufficient testimony.—*Quarterly Journal of Science,* No. X. p. 332.

On Cavities containing Fluids in Rock Salt. By WILLIAM NICOL, ESQ. Lecturer on Natural Philosophy.

Globules of air, and fluids crystallizing by heat, and giving precipitates when tested with solutions of nitrate of silver, oxalate of ammonia, and carbonate of potash, were found by this gentleman in the transparent and snow white varieties of the rock salt of Cheshire.—*Edin. Phil. Journ.* No. XIII. p. 111.

On the Atomic Constitution of the Cyanide of Mercury. By J. F. W. JOHNSTON, M. A.

From this analysis, Mr. Johnston concludes that the salt is a bi-cyanide; that 100 grains of the salt give off by heat about 31 cubic inches of cyanogen : and *thirdly,* that what is wanting to make up the whole two atoms of cyanogen is converted into a blueish carbonaceous substance, consisting of carbon and azote in equal proportions.—*Edin. Journ. of Science,* No. I. p. 119.

Analysis of the Water of a Spring in the Estate of Fordel near Inverkeithing, 1829. By the REV. WILLIAM ROBERTSON, JUN.

The spring issues from that member of the coal formation which rests upon mountain limestone. Its waters which deliver bubbles of gas, principally nitrogen, do not contain much saline ingredients, carbonates of lime and magnesia predominating, with a considerable proportion of the muriates of magnesia and potash ; sulphate of magnesia, and traces of the carbonates, the muriates, and the protoxides of iron : no traces of iodine.—*Edin. Phil. Journ.* No. XIII. p. 99.

Description d'un nouvel os de la face chez l'homme. Par M. EMMANUEL ROUSSEAU, D. M. Préparateur des travaux anatomiques du Jardin du Roi, &c. &c.

M. Rousseau proclaims the discovery of a new centre of ossification in the face of man. As an additional bone, which he names the external lachrymal, or *petit unguis,* according to the terminology of Boyer, it is situated at the external and inferior part of the *grand unguis,* (lachrymal bone.) Out of ten individuals, it has occurred five or six times. Anxious to ascertain the accuracy of M. Rousseau's discovery, we have examined a large series of crania, and should be inclined to think that a new form had led him to mistake that supernumerary little bone, mentioned by Beclard as frequently connected by suture with the superior maxillary, had the author not given a figure of a cranium wherein both the bones exist.—*Ann. des Sciences Naturelles, May* 1829.

MISCELLANEOUS INTELLIGENCE.

On the Constant of the Aberration of Light.—Mr. Richardson of the Greenwich observatory, has found the constant of aberration to be 20″505 by Troughton's circle, and 20″502 by Jones' circle, from 4119 observations made during the years 1825, 6, 7, and 8.

Analysis of the Hisingerite, or Silicate of Iron, from Riddarhyttan in Sweden.—Mr. Hisinger has given an analysis of this mineral, which has for its formula,

$$f S^3 + F S + 4 A q.$$

Poggendorff's Annalen, vol. xiii. p. 505.

Analysis of the Thraulite or Silicate of Iron, from Bodenmaïs in Bavaria.—According to Dr. Kobell's analysis, the following formula may be deduced,

$$f S^2 + 3 T S + 5 A q$$

Ibid, vol. xiv. p. 467.

Seleniuret of Silver found in Seleniuret of Lead.—Professor G. Rose of Berlin, has found seleniuret of silver in the specimens of seleniuret of lead, from Tilkerode on the Harz.—*Ibid*, vol. xiv. p. 471.

Quartz Crystals containing Anthracite Coal and Liquids.—The students of Rensselaer school have found many quartz crystals containing anthracite coal. There were two specimens with liquid, and one of them had a piece of coal floating in the liquid.—*Silliman's Journal*, No. xxxii. p. 362.

Edinburgh.—On Friday evening, July 31. at the close of his lectures, Professor Graham delivered his annual prizes for the best essays and collections of plants. Three herbaria, collected in the environs of Edinburgh, appeared in competition; but one of them was declared unqualified, from some accidental irregularity in its presentation. The gold medal was adjudged to a very respectable collection of plants, made by Mr. John Bushnan, member of the Plinian Society, and the silver medal to Mr. John Balfour. The subject which had been proposed for an essay, was "the relation of the properties of plants to their natural affinities;" but there was not a single competitor. The professor, in remarking that this was the first time that such an occurrence had happened, took the opportunity of expressing his surprise that so interesting a subject should have been neglected by his class,—a subject which he thought might be made the object of an excellent thesis, and which he should take care to propose again next year, when it might be better appreciated. Professor Graham concluded by an elegant address to his pupils on the advantage to be derived from botanical studies, and by a sincere expression of his wishes for their welfare.

Glasgow.—The king has been pleased to appoint William Couper, M.D. F.R.S.E. to the chair of Natural History in this university, vacant by the death of Lockhart Muirhead, LL.D.—*Observer, Sept.* 18. Who is Dr. Couper?

Manchester Banksian Society.—A new society has been established in Manchester under this name, the object of which is the prosecution of the different branches of Natural History. The society is to form a library, to hold meetings for the reading of papers and discussions, and to give occasional lectures.

Natural History Society of Montreal.—This society has originated almost entirely from the labours of a member of the Plinian Society, Mr. Robert Armour; and from the spirit which has actuated its members, even in its earliest infancy, and from its peculiarly advantageous situation, much real benefit to natural science may be anticipated. Its museum already contains, besides many other ohjects of Natural History, 300 species of birds, 50 of quadrupeds, and 500 of insects, natives of the country. Lectureships on the various branches of Natural History, have been instituted, and are likely to diffuse the spirit of inquiry more widely among the inhabitants. An Indian Committee is also already in existence, composed of some of the most distinguished inhabitants of Montreal, which has issued a long series of queries, addressed to persons resident in the interior, on the geography of the country, its inhabitants, productions, climate, &c. A presentation of subjects on Natural History, is already on its way to the Plinian Society.

Bristol Philosophical and Literary Society.—The general annual meeting of the Society was held on May 29. 1828, when the report of the council was read; from which it appears that a variety of papers on subjects of great interest have been read before the Society at its public meetings, and every hope may be entertained, from the number and enthusiasm of its members, that this society will persevere in its dignified and honourable career.

The Cambridge Philosophical Society have lately purchased an extensive collection of British birds. The money for the purpose was raised by subscription.

Berlin.—A Society has been formed at Berlin for the promotion of geography. The members meet once a month to hear articles read on the different parts of the science. Mr. Charles Ritter has been appointed president.

Rome.—A Society has recently been formed at Rome for correspondence on subjects of Archæology, and intended to serve as a centre of communication for the archæologists of Europe to exchange their ideas, and impart their new discoveries. The society will also publish a journal of their proceedings.

The *Biblioteca Italiana* for March last, gives a detailed prospectus of a new map of Italy, and the islands of Sicily, Sardinia, and Malta, by the Cavaliere Antonio Litta, in 84 sheets.

In the preface to a late number of the Italian monthly journal, the *Antologia*, published at Florence, there are some particulars stated which give but a poor idea of the extent of the reading public in Italy. It is there stated that this journal began in 1821 with 100 subscribers, and that with No. 100 (in its ninth year,) it now numbers 530 subscribers. It is not saying too much, that this is one of the best, if not the very best, journal published in Italy. Two of the scientific journals of that country having also ceased within the last two years, (Baron Zach's *Correspondance Astronomique*, &c. and Brugnatelli's *Giornale di Fisica*,) Mr. Vieusseux, the proprietor of the *Antologia*, conceived the moment favourable for starting a new one. In June 1828, therefore, he issued proposals for commencing a new scientific journal, to be entitled *Annali Italiani di Scienza*, for which he solicited the aid both of *contributors* and *subscribers*. At the end of ten months it appeared that *two* of the *former* had offered, *both out of Italy*, and *six* of the *latter* had sent in their names! It will not surprise any one, therefore, to hear that the scheme has been abandoned.—*Foreign Quarterly Review.*

The demise of that illustrious trio of scientific men, Dr. Wollaston, Sir Humphry Davy, and Dr. Young, has occasioned three vacancies in the foreign members of the Institute of France. Dr. Wollaston has been replaced by Dr. Olbers of Bremen, the astronomer. The other two remain to be filled up. It is rather remarkable, that at the present moment there is not a single English foreign member of that body, a circumstance which has not happened for many years. Of *corresponding members* there are several.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

Acts of the Geographical Society of Paris.

Meeting of the 3*d April* 1829.—His Excellency the Minister of Ecclesiastical Affairs, answered to the request of the Society, that he would open a correspondence with foreign missions, and said he would hasten, for the interest of science, to second their efforts, and assist in the accomplishment of their views.

Mr. Jouannin communicated fragments of his travels, entitled, "Remembrances of a Residence at Brousse, in Bithynia, in the year 1825, and Hot Springs of Brousse."

Mr. Warden communicated a notice of Major St. John Blacker, containing a relation of his journey into the Himmaleh, and a description of the Basin of Setledge.

Meeting of the 10*th April* 1829.—Mr. Giraud communicated a notice of the expedition sent by the Government of the United States, to explore the Red River of Louisiana.

Mr. Bottin gave an account of the memoirs of Marshal Suchet, Duke of Albufera, upon the campaigns in Spain, from 1808 to 1814.

Meeting of the 1*st May* 1829.—Mr. Huber sent the continuation of some geographical and historical remarks on the Island of Cuba.

Mr. Giraud addressed a note upon the communication between the Lake of Woods and Lake Winnepeck in North America.

Mr. Warden communicated some new details on the journey of Major Blacker in the Himmaleh.

Mr. Gauttier d'Arc announced to the Society his departure for Greece as vice-consul, attached to the scientific mission, offered his services, and demanded instructions from the Society.

Meeting of the 15*th May* 1829.—Sir John Franklin thanked the Society for its suffrage, and for the gold medal which it had awarded to his last expedition to the Polar Seas.

Mr. Thomas sent some observations to the Society, upon the geographical position of several islands situated to the north-west, to the north, and to the north-east of the Isle of Bourbon, from the indications given by Horsburgh and Lislet-Geoffroy.

Baron Derfelden communicated new details on the intended publication of a chart of the eastern colonies of Holland.

Mr. Abrahamson sent the continuation of his map for his atlas of Denmark.

Mr. Jullien called the attention of the Society to the earthquake, of whose action Spain had just been the theatre. He thought it would be important for the interest of science and humanity, to send several observers upon the spot, to obtain information of the circumstances which preceded, accompanied, and followed the phenomenon.

Academy of Sciences.

Meeting of the 29*th July* 1829.—Mr. Becquerel acquainted the Academy with the result of several experiments, in which he has succeeded in decomposing the carbonate of sulphur by electric actions of very little intensity.

Mr. J. Pinet addressed a letter containing the details of an experiment on germination.

Mr. Flourens made a verbal report on a work of Mr. Vatel, entitled, "Elements of Veterinary Pathology," &c.

Mr. Milne Edwards communicated to the Academy several new observations upon the generation of Crustaceæ.

The author has demonstrated that, on issuing from the egg, the young Cymatheæ differ very much from their mother, and from what they will themselves become. Instead of their thorax being composed of seven rings and fourteen ambulatory feet, they only present six thoracic rings and twelve feet. The important difference which the structure of the Cymatheæ presents at the different periods of their life-time, coincides with remarkable modifications in form, and constitutes a species of metamorphosis analogous to that which the Onisci and certain Entomostraca undergo.

Mr. Moreau de Jonnès read a memoir, entitled, "Statistical Researches on the Extent and Nature of the Pastures in different parts of Europe."

Dr. Rigail presented to the Academy a sound destined to facilitate the introduction of lithontriptic instruments.

Meeting of the 3d August 1829.—Mr. Daniel addressed to the Academy a letter on the hiccough. In the memoir, the author mentioned the following experiment :—" Let a dog fast eight or ten hours, place the animal on its back, and pour cold water on its stomach, and hiccough will be immediately produced ; out of twenty-three dogs, the hiccough was excited in twenty-two ; the same effects were produced in calves and in bulls."

Dr. Desportes sent to the Academy an observation he had made of a young pigeon living during two days in its shell, from which it could not extricate itself; and existing even some time afterwards, though deprived of encephalon and the upper part of the spinal marrow.

Mr. Dumeril made two reports on the memoirs of Mr. Benoiston de Chateauneuf, relative to the influence of poverty on the mortality of men in the different countries of Europe, since the beginning of the nineteenth century.

Mr. Cordier communicated a new fact in the theory of the formations of the basin of Paris, by the discovery of the bones of the Palæotherium in a bed of *Calcaire grossier*.

Mr. Becquerel read a memoir, entitled, " On the Thermo-Electric Properties of Metals."

Meeting of the 17*th of August* 1829.—Mr. Chevreul read a memoir relative to the experiments performed by Mr. Donné on the means of neutralizing the action of vegetable alkalies on the animal economy.

Mr. De Blainville, read a letter from Mr. Dubled, associated professor to the Faculty of Medicine, relative to the communication of the lymphatic vessels with the veins.

Mr. Gay Lussac read a memoir on phosphoric acid, in which he stated, that the observations of Messrs Clark and Engelhardt appear to him to have some analogy, and that the opinions of the former, relative to the cause of the new properties acquired by phosphate of soda after calcination require to be modified.

Mr. De Rossel, in the name of the commission composed of himself, MM. De Beaupré, and Freycinet, delivered a very favourable report on the voyage of the Astrolabe, commanded by Captain Dumont d'Urville.

Mr. Dumeril made a highly advantageous report on the memoir of Mr. Lugol relative to the use of iodine against scrofulous disease.

Meeting of August the 24*th.*—Messrs Caventou and François announced to the Academy that they had discovered a particular chemical principle in the root of a shrub from Brazil, of the family of the Rubiaceæ, the Kaiauca Chiococca, known in the province of Bahia under the name of vair-prela, (black root.) The principle extracted from this root is a tonic without being an excitant. It is a mild purgative but a very strong diuretic.

Mr. Dumeril, in his own name, and that of Mr. Flourens, reported favourably on Mr. Roulin's memoir on smalted maize.

Mr. Henry Cassini did the same with regard to a work of Mr. Achille Richard on the family of the Rubiaceæ.

Mr. Girard delivered a highly commendatory report on M. Duten's "History of the Internal Navigation of France," with a statement of the canals necessary for completing the system.

Mr. De Blainville read a memoir on the birds called Ganga which he said should be classed with the *pigeons*, not as hitherto with the Gallinaceæ.

Mr. Dumeril made a favourable report on a letter of Dr. Paillard on the efficacy of deuto-ioduret of mercury against syphilitic and scrofulous ulcerations.

LITERARY NOTICES.

Works in the Press.

We understand that the forthcoming Volume of CONSTABLE'S MISCELLANY, will contain an "Autumn in Italy, being a Personal Narrative of a Tour through the Austrian, Tuscan, Roman, and Sardinian States. By J. D. Sinclair, Esq."

The REV. WILLIAM TURNER of Newcastle has in the Press, for the use of Schools, Selections from Pliny's Natural History, with English Notes, in 12mo.

The publication of CAPTAIN MIGNAN'S Travels in Babylonia and Chaldæa, is deferred till October.

A History of China, translated from the Chinese of Choo-Foo-Tsze, by P. P. Thoms, many years resident at Macao in China, is announced for early publication. It is stated to commence with the reign of Fuh-he, according to Chinese chronology B.C. 3000, and to reach the reign of Min-te, A.D. 300, including a period of 3,3000 years.

We are informed that CAPTAIN BROWN has in the Press, a Work to be entitled "Biographical Sketches and Authentic Anecdotes of Horses; with a Historical Introduction, and an Appendix on the Diseases and Medical Treatment of the Horse." It is to be illustrated by figures of the different breeds, and Portraits of celebrated or remarkable Horses; these are to be engraved on steel by Mr. Lizars, in his *best style*. This Work is intended as a companion for the Work on Dogs, by the same Author, recently published, which has deservedly met with so favourable a reception.

In the Press, Part XXI. the Eighth of the Class Aves, of the ANIMAL KINGDOM; described and arranged in conformity with its Organization, by the BARON CUVIER, Member of the Institute of France, &c. &c. &c. With additional descriptions of all the Species hitherto named, and of many not before noticed. By Edward Griffiths, E. L. S. A. S. and others. Embellished with Sixteen Engravings, in a superior style of execution, by different artists of distinguished eminence; and, among the rest, many are by Mr. Landseer. Most of them are from original drawings made from Nature, and several represent species altogether new, or never before figured. The paper and type of this work are in a corresponding style of excellence.

List of New Books.

Journal of a Passage from the Pacific to the Atlantic, crossing the Andes in the northern provinces of Peru, and descending the river Maranon or Amazon. By H. J. MAW, R. N. 8vo. 12s.

Jones and Kingston's Flora Devoniensis, 8vo. 16s.

Illustrations of the Geology of Yorkshire. By JOHN PHILLIPS, F. G. S. 4to. £1 : 11 : 6, bds.

Picture of Australia, post 8vo. 10s. 6d. bds.

Memoire sur la Population comparee de l'Egypte, ancienne et moderne. Par M. Jomard. Paris 1829. Imp. Roy.

Description de la Ville et des Environs du Kaire. Par M. Jomard. With plates, 1829. Imp. Roy.

A System of Ancient and Intermediate Geography. By Charles Authon, Professor of Languages in the Colombian College. 8vo. New York 1829.

REFERENCES TO THE PLATES.

PLATE I. Fig. 1. Anatina brevirostris.
2. ——— right valve magnified.
3. ——— left valve do.
4. ——— a section showing the thickness of the shell.
5. Cyclas fontinalis, size of nature.
6. ——— a magnified view of the left valve.
7. ——— a section magnified, showing the thickness of the shell.
8. Crassina ovata.
9. ——— a section showing the thickness of the shell.
10. and 11. Cyclostoma marmorea.
12. Helix vitrea, size of nature.
13. and 14. ——— top and bottom magnified.

PLATE II. Fig. 1. Section of Mr. Kemp's galvanic trough.
N. B. The letters of reference have been by mistake omitted; but the explanation is obvious.
Fig. 2. Mr. Rhind's cavitary worm, the size of nature.
3. ——— head, magnified.
4. ——— point of the tail, magnified.
5. ——— transverse section of the body.

ERRATA.

Page 7. Line 32. *for* Nymphaæ *read* Nymphæa.
—— 13. —— 23. } *for* was *read* were.
—— 14. —— 26. }
—— 37. —— 41. *after* Egypt, *add* or of Bornou.
—— 39. —— 17. 18. 35. 47. *for* desart *read* desert.
—— 51. —— 42. *for* statute *read* statue.

The name of the Irrawaddy is variously spelt in the reports. Hence it has crept into our pages under the different forms of Irraouadi, Irraouaddy, Iraouady, &c. It is similar with Vanicolo.

Throughout the Catalogue Raisonné, an error has been made in the insertion of the references, which ought to precede the original remarks upon the different memoirs.

Letters and Communications (post paid,) Advertisements, and Books for Review, to be addressed to the EDITORS, at MR. LIZARS', 5. St. David Street, Edinburgh, or to the Agents in London and Dublin, where Contributions will be thankfully received and acknowledged.

W. CARTWRIGHT, Printer, Edinburgh.

THE

EDINBURGH JOURNAL

OF

NATURAL AND GEOGRAPHICAL SCIENCE.

NOVEMBER, 1829.

ORIGINAL COMMUNICATIONS.

ART. I. *Remarks on the Errors of the Oriental Tables, and the Effects which these have produced on Modern Geographers, in their Maps of Oriental Regions.* By JAMES BELL, ESQ.

IN our abridged account of the origin, progress, and present state of geographical science, as given in our edition of Rollin's History of the Arts and Sciences of the Ancients, (566–617,) we exhibited a short and compendious view of the oriental geographers, from Al-Fargani down to Ulugh Beigh, and shewed, that they all followed Ptolemy's system, both in astronomy and geography, and, that in the latter, they made no improvement in the method of ascertaining longitudes and taking latitudes. It was mentioned likewise, that they had made us in some degree better acquainted with the geography of the regions beyond the Tigris, and south of the Jaxartes, and furnished us with some caravan-routes through these countries, and from thence to China. It was remarked, that their astronomical observations were few and inaccurate, and by no means entitled to the confidence which has been placed in them by modern geographers, as De Lisle, Strahlenberg, D'Anville, and Rennell, not to mention more which might be named. Their geographical knowledge was almost entirely confined to those regions where the faith of the Arabian prophet was professed and established. They thought it profane to study the language and history of the Djours or Infidels, and equally so to exalt them by describing the regions where they dwelt. Their geographical tables were almost wholly like those of Ptolemy, and wholly founded on the basis of itineraries, and are only of use where better materials cannot be had. We shewed from Abulfeda, how little dependence was to be placed on oriental geographers, and concluded our sketch with a short account of the tables of Ulugh Beigh, who flourished in the middle of the 15th century. These tables were meant ostensibly to correct all those which had preceded them, and must consequently be viewed as the most correct of all the Oriental Tables of longitudes and latitudes. It was observed, however, that many gross errors still remain,—that his longitudes were calculated from the meridian of the Fortunate Isles; but that not a few of them neither correspond in his own tables, nor in those of Nasroddin-al-Toosi, with that meridian, nor with that of Ceuta. A few examples of these errors were given, to establish the charge of incorrectness in tables professedly made to correct the errors of all those which preceded them; but to enter into any lengthened discussion to prove the incorrectness of Oriental Tables in general, and what effects these errors have produced on all the systems of modern geography down to the present time, would have swelled our abridgment, and subjected us to the charge of tedious discussion in a work professedly popular, as general readers are for the greater part quite indisposed to what is denominated dry geographical dissertations.

The following remarks are intended more fully to substantiate the charges advanced; but, for the sake of connection, we shall repeat those which we mentioned in our account of Ulugh Beigh's tables.

Ulugh Beigh, who professed to correct the errors of preceding tables, places Rome 4° 28′ W. of Constantinople, whereas the latter is 10° 28′ S. of the former. Again, Rome is placed by him 55° 27′ S. of the Canaries, which are only 30° 7′ W. of the former. Athens is, in his table, 50′ S. of Constantinople, though it is really 5° 2′ W. of that city. He places the mouth of the Indus 102° E. of the Canaries, or 15° too much. Cashmere is placed in nearly the same longitude as the mouth of the Indus, though it is nearly 9° E. of that position. The city of Peking, (the Cambalu of Oriental geographers,) is placed in 46° N. latitude, in the tables of Abulfeda and Ulugh Beigh, which is 6° 6′ N. of its true latitude, or 420 British miles too far N. Samarcand, the very residence of Ulugh Beigh himself, is placed 99° 16′ E. of the Canaries, or Fortunate Islands, or 17° 21′ too far E. the longitude of Samarcand being estimated at 64° 15′ E. of Greenwich, or 81° 15′ E. of Ferro. By the same table, the longitude of Aleppo is made 72° 10′ E. of the same meridian, being 17° 20′ too much. Yet Rennel has fixed the longitude of Samarcand entirely on the authority of Ulugh Beigh, who makes it 27° 6′ E. of Aleppo, and 14° 16′ E. of Casbin. It is true Rennel does not adopt the longitude of Aleppo given by Ulugh Beigh, as that was manifestly enormous; but he has adopted his longitude of Samarcand, as given from Aleppo, without any other proof than that of comparing the intermediate distances between Casbin and Samarcand, with the intermediate longitudes and latitudes recorded in the Oriental Tables. The longitudes of Aleppo and Casbin are past dispute, the one being given by observation, from the Connoissance des Temps, and the other by the observations of Beauchamp. But for that of Samarcand, we have only the sole observation of Ulugh Beigh, founded on routes; and we have the authority of Fraser for saying that all the longitudes between Casbin and Mesched are wrong, being all too far west, as Nishapore, Mesched, and Heraut; and we may be pretty confident that those from Heraut to Samarcand are in a similar state. Mr. Waddington has been compelled to place Samarcand a full degree farther E. of Casbin than either Ulugh Beigh or Rennel; and what dependence therefore can we have on the accuracy of Oriental Tables, when Ulugh Beigh was mistaken in the very longitude of his own residence. Till we have farther evidence for the longitude of Samarcand than that of Ulugh Beigh, or any other oriental geographer whomsoever, even though given by a Rennel or a Waddington, I can place no dependence on *its assumed* longitude.

Further, Cashgar is placed by Nasroddin-al-Toosi, and most of the oriental geographers, in 44° N. lat. and 107° 26′ E. of the Canaries, or 8° 10′ E. of Samarcand. Now its true position, as fixed in the great Chinese map, constructed at Peking in 1765, by orders of the emperor Kien-long, by fathers Allerstein, D'Arocha, and Espinha, is 39° 25′ N. lat. and 76° E. long. of Greenwich, 94° 2′ E. of Ferro, or 4° 35′ S. and 13° 24′ W. of its position in these boasted tables, and 3° farther E. of Samarcand than as given by Nasroddin or Ulugh Beigh. Cashgar, consequently, is between 4 and 500 miles out of its true position in respect of Samarcand. Even Rennel, seduced by their authority, places it in 42° 45′ N. lat. or more than 200 miles N. of its real site, and 4° too far W. Strahlenberg and De la Croix placed it in 43° N. lat. By the same authority, namely Nasroddin, Yarkund is placed in 44° N. lat. instead of 38° 19′, its true latitude in the great Chinese map abovementioned, or 5° 41′ S. of its position in Nasroddin, or nigh 400 British miles. By the same tables, Khotan in eastern Toorkistaun is placed in 42° N. lat. or 4° too far N. It must be remarked, however, in justice to the illustrious D'Anville, that he came very near the true latitude of Cashgar, placing it in 40° N. lat. or only 35′ too much. De Lisle, on the other hand, placed Cashgar in 37° 30′ N. lat. or nigh two degrees too far S. and placed Yarkund to the N. E. of Cashgar, in 40° N. lat. whereas it is to the S. E. of that place. In the Jesuits' map of Tibet in Du Halde, Cashgar is placed in 39° 33′ N. lat. or only 8′ too far N. and Yarkund in 38° 17′; yet they have erred in the longitude of Cashgar not less than 6° 17′, placing it in 82° 17′, instead of 76°, its true longitude, E. of Greenwich. The Oriental Tables have also erred 4° in the longitude of Tashkunt, placing it so far too much W. Now, if the tables of Nasroddin and Ulugh Beigh have erred so grievously, not to say in longitudes merely, but even in the latitudes above specified, how can we be sure of the positions of the cities of Toorkistaun and Mawlanahar, as laid down in these tables, on which, till verified, no more dependence can be placed than on those of Ptolemy; for no other method of taking longitudes was adopted by them than was used by the geographer of Alexandria. The fact is, the Oriental Tables are almost mere transcripts of each other, and those of Ulugh Beigh are evidently transcribed from those of Nasroddin.

For instance, the cities in Mawalnahar, laid down in both tables, agree punctually, except in the case of Samarcand, wherein they differ 23 minutes, Nasroddin placing it in 40° N. lat. instead of 39° 17′, as given in Ulugh Beigh. Now as we know that the latter determined the latitude of his own capital, we may be pretty confident that its latitude is correct, but we cannot depend on any of the rest. Can we conceive that Samarcand was the only faulty latitude in that part of Nasroddin's tables? The bare fact of the disagreement in this solitary instance of Samarcand, and their punctual agreement in all the rest, is a plain proof that the latitude of Samarcand was the only one observed by Ulugh Beigh in all his dominions, and that if he had taken the latitudes of the other cities, as Khojund, Otrar, Tashkunt, Tonkat, Esfijab, Taraz, Aksikhat, Andecand, Khowakund or Kokaun, Balk, Bokhara, Zarnuck, Soganian, Termid, and others, his table could not possibly have agreed so well with that of Nasroddin. Tashkunt we do know to be 33 minutes too far S. in the tables of Nasroddin, Abulfeda, and Ulugh Beigh, which make it 42° 30′ N. lat. whilst in the great map of China, made from observation, its true latitude is 43° 3′ N. By the same tables, Cashmere is placed 3° W. of its true position.

Rennel admits that the positions of Candshar, Caubul, and Multaun, are erroneously set down in these tables, and that in the whole southern line, between the Caspian Sea and Lahore, through Heraut, the numbers are either falsely written, or erroneously calculated; and how therefore can we depend upon them in any line? He admits that the longitudes of these tables were calculated to the computed distance,—a very uncertain mode of fixing either longitudes or latitudes; for unless we know the nature of the intervening space, the degree of winding of the roads, and what proportion of sinuosity should be allowed, how can we tell what is the longitude or latitude of any place? For instance, we have a striking proof in the case of Cashgar, how little dependence can be placed on itineraries to fix the latitude of a place. Rennel having placed Cashgar in 42° 45′ N. lat. by itineraries from Bokhara, Tashkunt, and Samarcand, and fixed its longitude at 71° 44′ S. of Greenwich, endeavours to confirm the same by the route from Cashmere through Little Tibet, given in the travels of Bornier. This gentleman states from information, that 44 day's journey of a caravan are allowed for the intervening space. Rennel allows 12 geographical miles of direct daily travelling to accomplish this, and accordingly finds the latitude of Cashgar to be 42° 45′, or 528 geographical miles of direct distance from Cashmere. Now, Cashgar is found by celestial observations to be only 5°, or 300 geographical miles N. of Cashmere, instead of 8° 25′ by the method he employed. This being the case, the daily rate of caravan travelling across the intervening space, is reduced to 7 geographical miles of direct distance. He first assumed the latitude of 42° 45′ N. as true, then infers the daily rate of direct travelling from this assumed latitude, and thence finds the assumed latitude to be true. Now, allowing the direct distance to be 300 geographical miles, and allowing one-half more to be added for inflection, the daily rate of travelling will be 10 geographical miles of road measure between Cashmere and Cashgar for a caravan, a rate abundantly sufficient for a route through a country the most mountainous imaginable.

We find from Elphinston, that 51 days are occupied in the route from Cashmere to Yarkund, by Ladauk. Now Yarkund is but 4° to the N. and 2° 30′ to the E. of Cashmere; so that the direct distance is very little more than that between Cashmere and Cashgar. Had Rennel allowed 60 cosses to a degree of horizontal distance, as he has very properly done in the map of the upper course of the Gogra, instead of 42 cosses to a degree, as in the plains of Hindoostan, he would not have erred so egregiously in his latitude of Cashgar and censured D'Anville for placing it in 40° N. lat. He has, in fact, committed the same error, in adjusting the quantum of space between Cashmere and Cashgar, which he charged on Father Tieffentaller in the construction of the map of the Gogra.

Having praised the tables of Nasroddin, Abulfeda, and Ulugh Beigh, and regretted that our maps should be so incorrect, whilst possessing these tables in our language, as well as the life of Timoor by Sherefeddin, Rennel proceeds to say, that in discussing the position of Cashgar, he has entirely laid out of the question the Chinese and Tartarian geography of Du Halde. It will be asked why has he done so. To this query, Rennel gives the following notable answer. *Because it does not agree with the Oriental Tables above mentioned, and because of the errors committed in the upper course of the Ganges in the map of the Lamas.* Unfortunately for the justice of this severe censure, the latitude and longitude of the source of the Ganges in their map, are more correct than his own, although the Lamas confounded the sources of the Indus and Sutlej with those of the Ganges, as has been shown in our defence of the Lamas' map, in the "Critical Researches on Philology and Geography," Dissert. 2d. It must be remembered, that if the positions in Western Chinese Tartary, Lesser Bucharia, and Tibet, are laid down, not from observation, but from routes and itineraries, so are those (longitudes at least) laid down in the Oriental Tables. In this respect, the Tartarian geography of Du Halde and these tables are alike. I see no reason why the *computed,* not *observed,* latitudes and longitudes of the Oriental Tables, should be preferred to the computed ones of the Lamas and Tartars. It is *astronomical observation alone,* that can determine the point, and *not opinion.* It is astonishing that Rennel should have paid no attention, whilst determining the comparative merits of both, to the 11th volume of the *Histoire Generale de la Chine,* published at Paris in 1780, where, in the appendix, there is a copious list of longitudes and latitudes belonging to Lesser Bucharia, taken by *observation,* not by *routes.* He seems also to have been ignorant of the great Chinese map, quoted in this discussion. Had he seen and consulted these when determining the comparative merits of Nasroddin, Abulfeda, and Ulugh Beigh, with the Chinese and Tartarian geography, he would not have passed so severe a censure on the maps of Du Halde. He would have seen, that though the western Imaus is removed several degrees farther W. in that map than in the Jesuits' map of Tibet in Du Halde, and therefore that this position of that range so far agrees with his own opinion; yet it is still 2° farther E. at least, than it is placed in his map, and that the positions of Tashkunt, Namagan, Auksoo, Outchiferman, Cashgar, Yarkund, Khotan, Badakshan, are all several degrees further E. and more S. than in the Oriental Tables he commends so much, and therefore so far annihilates all dependency upon them; and consequently, what reliance can be placed on the positions in Mawalnahar and Western Toorkistaun, when these tables are so much out in the Lesser Bucharia? This great Chinese map, therefore, completely overthrows his opinion, that the capital of Cashgar ought to be removed, along with the range to the north of it, at least several degrees to the N. W. in conformity to the authority of Strahlenberg and Shahnavaz Khan, neither of whom ever saw Cashgar, but knew it only from report. This much must be said in favour of Abulfeda, however, that he was an honest, laborious compiler, and never states a latitude or longitude without adducing his authority; and therefore whatever errors are in his tables, are not so properly his own, as those of his informants. He could not do otherwise. It would be wise if modern geographers, in giving us lists of longitudes and latitudes, would, in this respect, follow his example in giving us their authorities, and by what means these were taken, that we may not confound such as are taken by observation with those that are given on the basis of itineraries, or which rest on conjecture and uncertain calculations.

We have another notable instance of oriental ignorance in their account of Tibet, called by them Tobbot. According to them it reaches from Khorasan to China, having part of India on the south. Yet it contains only 10° of longitude, reaching from 100 to 110°. Consequently the western extremity of China is only 10° E. of Khorasan. They make its breadth equal to its length, thus making Tibet a perfect square. Ibn-al-Wardi tells us, that the capital of Tibet has the same name as the country, and that Tibet makes part of the country of the Turks. The Turks and Tibetians are of course the same people. In this Ibn-al-Wardi agrees with Edrisi, who makes Tobbot a part of Toorkistaun, and its capital city of the same name. In fact, what the oriental geographers call Tobbot or Tibet, is not the country properly so called, but the tract between Cashmere and Cashgar, including Ladauk, and the course of the upper Indus, for of Great Tibet they had no knowledge.

This tract, called in modern times Baltistaun or Little Tibet, was also called Turkhend or Toorkistaun on the Indus, because it was conquered first by the Huns, and then by the Turks or Tukiosk of the Chinese historians, and so constituted a part of Eastern Toorkistaun, or Little Bucharia. The name Turks is the generic appellation bestowed by all the oriental geographers to the nomadic tribes of Asia, known to them, in the same way as the name Scythian was applied, by the Greek and Roman historians and geographers, to all these wandering tribes which they knew, as Little Tibet, to the E. of Bucharia, to the N. of Cashmere, to the S. of Eastern Toorkistaun, and to the W. of Tibet, strictly so called, was always inhabited by pastoral tribes, (for by no other can it be inhabited.) The oriental geographers, ignorant of their true name, gave them that of Turks; for, till the great invasion of Jinghiz Khan revealed the name of Tartars, this latter appellation is not to be found in any oriental authors. These oriental geographers tell us that Tibet is full of well inhabited cities, towns, and villages, and that the people are so good humoured and cheerful, that they breathe nothing but joy and pleasure,—another proof of ignorance; for the country is so cold, mountainous, and rugged, as to be utterly incapable of supporting a great population, and as for cities and villages, they are but very thinly scattered, and neither large nor populous. These geographers further tell us of a mountain called Gebal-al-Sumoun, or the Mountain of Poison, which inspires all those with melancholy who come near enough but to smell it; nay, even their tongues turn so black, as ever after to remain in that state. There is some truth here mingled with fiction; for it plainly alludes to the *serar*, or Himmaleh wind, believed by the Hindoos to be pregnant with poison, and the effects of which were felt by Moorcrofte, Fraser, and Webb, whilst endeavouring to scale the tremendous steeps of the sublime Imaus.

"I was obliged," says Moorcrofte, "to continue my *oblique* march, (in order to avoid the effect of the direct wind;) but on turning my back to the wind, felt a sudden fulness in my head, accompanied with giddiness. I threw myself on the ground with precipitation. After a short time, the gasping for breath became less frequent. The action of the head was less violent, and I quitted the turf; but although I walked as leisurely as possibly I could, I was twice attacked by the same symptoms, and thought it most prudent to desist ascending any higher. The imperious necessity for stopping to breathe at every four or five steps, was only felt whilst ascending. When the impetuous action of the heart was reduced by remaining quiet in one place, no difficulty in breathing was felt; nor even was it perceived in descending, even in a run, where this was practicable; but several times at our encampment, when about to fall asleep, I have been interrupted by the same sensation. Although not aware of any remarkable degree of heat or cold; yet I found my hands, neck, and face, very red, and the skin sore, and blood had oozed from my lips,—a circumstance which I do not re-recollect to have happened to me before."

Having surmounted the pass of Nitee, Moorcrofte was seized with the same symptoms. " I awoke at an early hour, and was immediately seized with difficulty of breathing, and great oppression about the heart, which was removed for a few seconds by sighing deeply. When on the point of falling asleep, the sense of suffocation came on, and the sighing became very frequent and distressing. However, as the air became warmer, this affection somewhat subsided." The Hindoos, in endeavouring to dissuade Mr. Fraser from crossing the lateral ridges from the source of the Jumna to Gangotree, told him that, during the chief part of two days march in crossing a high hill with much snow, the air was poisonous to such a degree as to affect the travellers, particularly those carrying loads,—that they become senseless, and are perfectly incapable of motion. They cannot account for this phenomenon, but believe that it proceeds from the powerful perfume of myriads of flowers in the small vallies and on the hill slopes, and that it was most felt in the months of May and June. They talked wildly of *a serar*, or mountain wind, pregnant with this mysterious poison. Whilst Fraser was crossing, in pursuance of his resolution, the pass of Bamsooroo, 15447 feet above the level of the sea, all his attendants complained of the Bis, or poisoned wind. " I now suspected," says he, " that the supposed poison was nothing more than the effect of extreme atmospheric rarefaction, from our great elevation, which rendered it impossible fully to inflate the lungs."

Mr. Webb confirms the statements above adduced, not only from his own observations, but also from those of the mountaineers themselves, who are as sensible of it as strangers, and further assures us, that neither horses nor yaks are exempt from its influence. The natives call it *Bis-Kehuwa*, or the poisoned atmosphere, and conceive it to be owing to the presence of certain flowers, and that it is induced by walking or motion of any kind. While at Nitee, one of his attendants was seized with these painful sensations whilst re-ascending the banks of the Nitee torrent in the morning, He lost suddenly the use of his limbs and of his recollection; animation indeed was not quite suspended, but it appeared to Webb a milder kind of apoplexy. His extremities became cold; and after vainly attempting his recovery by friction, and applying hot stones to his palms and feet for several hours, he ventured to give him an emetic. A large quantity of foam was thrown up, and in two or three days he recovered. Webb believes this secretion of foam to be a peculiar effect of inhaling noxious vapours.

Similar sensations were felt by Captain Gerard in ascending the pass of Brouang, in the Southern Himmaleh. Dr. Govan, on the other hand, who ascended the Shotul Pass, at an elevation of 15556 feet, denies that he felt any other inconvenience or difficult respiration, than what arose from the exertion of ascending, and which ceased whenever the body remained at rest. The poisonous flower, said by the natives to produce, by its deleterious effluvia, giddiness, fainting, somnolency, and asthma, is a species of that well known poisonous plant, called *aconite* or wolf's-bane, described both by Theophrastus and Pliny, as growing amongst bare rocks, or rugged cliffs destitute of sand or soil. This species of aconite is called *Beikh* or *Beis* by the inhabitants of Bischur and Gurwhal, and the supposed poisoned wind obtains the same appellation. Dr. Govan, as well as all those who accompanied him, was repeatedly exposed to its influence, both by day and night, when ascending the Himmaleh, and is inclined to attribute this belief of its producing the effects above described, to the circumstance of this plant always occurring at very high elevations, where travellers actually experience these painful sensations. This poisonous plant, in fact, occupies the highest situation in the forest belt investing the sides of the Himmaleh, it not having been met with, much below 12000 feet of elevation. Dr. Govan, indeed, once experienced a degree of sickness and giddiness, with difficult respiration, in crossing Manu-Ku-Kanda, between the Touse and Jumnotree, in October 1818; but this was during the exertion of ascending, not while in a state of rest, and several of the servants would willingly have remained behind, to sleep for a short time on the snow. But here the poisonous plant was not to be found for many miles; and as the situation did not exceed 12000 feet of elevation, Dr. Govan was inclined to refer the sensations experienced, to the exertion of walking more than ancle deep in snow for more than six hours, during which the feet were benumbed, and the head exposed to the very powerful action of the solar rays.

Mr. Fraser expressly denies that the painful sensations which he and his party felt in ascending the lateral ridge between the Jumna and Ganges, were at all owing to the scent of flowers. For though a profusion of them occurred in his first day's march, yet the principal part of them had no smell, and nothing was felt in the air except a cold and somewhat raw wind. His chief distress was felt after reaching the lofty pass of Bamsooroo, beyond the region of all vegetation whatever, and which could not consequently be affected by the perfume of flowers. What proved beyond all doubt, that this great elevation was the cause of all their distress, was, that as they descended, and approached the region of vegetation and wood, all these violent symptoms, as severe head-aches, pain and oppression in the chest, sickness, and vomiting, with somnolency, gradually lessened and vanished. It seems therefore clear, that the natives are quite mistaken in attributing these effects to the scent of flowers, or to poisoned atmosphere, and that there can be as little doubt that the appellation of Gebal-al-Sumoun, or Mountain of Poison, bestowed by the oriental geographers on the mountains of Tobbot, (Little Tibet,) originated in a similar way, namely, the belief that the atmosphere of that mountain was poisoned by the scent of flowers.

Respecting Sherefeddin's life of Timoor Bek, which Rennel says throws so much light on oriental geography, we can only say that De Lisle's maps appended to it are grossly erroneous, and that

D'Anville obtained very little assistance from it in compiling his map of the Persian empire, which, with all the lights borrowed from it, is still a very meagre performance. Mr. Waddington, in his map prefixed to the Memoirs of the Emperor Baber, has not been able to throw much new light on the subject, having no additional materials but such as were supplied by Elphinston's map of Caubul, and the marches of Baber. The latter, indeed, have enabled him to approximate the relative positions of the cities of Mawalnahar to each other, and to correct a number of erroneous latitudes. But the longitudes of Bokhara and Samarcand, in respect of Greenwich, and on which all the rest depend, are not yet satisfactorily determined, only they are removed a little more to the E. than in former maps. My opinion is, that both these positions are still too far W. The extraordinary error in the position of Mesched in Khorasan, discovered by Mr. Fraser, by which it was removed not less than 2° 42′, or 155 British miles in respect of longitude, and a full degree of latitude from its true situation, being so much actually farther E. and S. than it was set down in former maps, greatly strengthens my suspicion, that the longitudes of Bokhara and Samarcand are too far W. and consequently that of Balk. Waddington still retains the old errors of placing Tashkunt in nearly 65° E. long. whilst the great Chinese map makes it 68° 54′. Khoojund, consequently, will be in 70° E. long. instead of 66° 49′, as in Waddington's map. If the great Chinese map be correct, Samarcand can hardly be in less than 68° E. long. and Bokhara in 65. Heraut has been fixed in 63° 14′ by Captain Grant, or 2° 9′ farther E. than in D'Anville's map; and if so, Bokhara, which lies to the N. E. can hardly be much less than 65° of longitude. Observations alone can determine the question; and it is not probable, from the deplorable fate of the much lamented Moorcrofte, that Europeans will be enabled to settle the longitude mentioned above, for a long time to come. In the mean time, Waddington's map, which is the best we yet have of the regions beyond the Oxus, clearly shows how little help is to be obtained from the Oriental Tables, in settling the true longitudes and latitudes of the cities of Mawalnahar and Western Toorkistaun.

In Nasroddin's tables, the region of the Beloor Taugh is placed 4° E. of Badakshan. Now this latter city is placed, in the great Chinese map, in 72° 37′ E. long. which would make the longitude of the Beloor 76° 37′, or 37′ farther E. than the longitude of Cashgar itself. But it must be remarked, that Mr. Fraser has solved this difficulty, by informing us that there are two cities called Badakshan, the western one lying on the Kokcha, called also Fyzabad in Elphinston, whilst the latter is a city of considerable importance, bearing the same name as the province, and near the foot of the Beloor. It must therefore be from the former, or the Western Badakdakshan, that the Beloor is placed 4° E. in Nasroddin, otherwise the longitude would not only be erroneous, but also in perfect contradiction to the account given by the Chinese general of his pursuit and capture of the Mohammedan chiefs. He states, that when pursuing them across the Beloor to Badakshan, two large lakes occurred in his route, called Ifil-Kol, and Polon-Kol,—that they lay between two parallel ridges of mountains, on the western slope of the Beloor,—and that, from the latter of the ridges, Badakshan may be seen. This eastern Badakshan cannot therefore be 4° W. of the Beloor, but, on the contrary, on its western declivity, not far from the central range. Sherefeddin, in his life of Timoor, mentions the kings of Badakshan, which implies that there were more cities and districts than one called Badakshan.

ART. II.—*Experiments to show that two or more streams of Electricity may be made to circulate, in opposite directions, upon the same wire, without neutralizing each other.* By K. T. Kemp, Esq. Lecturer on Chemistry, &c. &c.

1. A stream of electricity from a single copper plate, C, four inches square, (Plate III. Fig. 1.) and one of zinc, Z, constituting the simple galvanic circle, was made to circulate along the wires A B, which were so connected with a needle apparatus, as to form a continuous metallic wire, passing below a magnetised needle. The needle stood nearly at right angles to its natural position. The stream of electricity, as shown in the figure, circulated in the direction of the arrows,—from the copper to the zinc.

A stream of electricity from a battery, C D, of sixty pairs of plates, two inches square, was, at the same time, made to circulate along the wire in an opposite direction to the stream from the single pair of plates. Not the slightest effect was produced on the deviation of the needle.

When the streams of electricity from the battery were made to circulate along the wire, in the *same* direction as that from the single pair of plates, a very slight increased effect was produced.

To show that electricity did actually circulate from the battery, the wire I K was cut, and the extremities inserted into water, and decomposition was instantly effected, which continued during the experiment.

2. A stream of electricity from a powerful electrifying machine was likewise passed along the wire, below the needle, in an opposite direction to that from the single pair of plates. No effect was produced, neither did any effect take place when the stream went in the same direction with that of the simple galvanic circle.

When an electric battery was discharged through the wire conducting the electricity of the single pair of plates, no effect was produced, either when it was circulating in the direction of the current from the single pair of plates, or when opposed to it. *

* This experiment was exhibited before the Royal Physical Society, at its meeting of Tuesday 20th January 1829.

3. *The following Experiment was performed, to show that a wire, forming an unbroken metallic circuit, between the opposite poles of a battery, may have either the negative or positive state induced upon any portion of it, by being made to form, at the same time, the circuit of another galvanic battery.*

Two galvanic batteries, A B and C D, (Plate III. Fig. 2.) consisting each of thirty plates two inches square, were placed parallel to, and at a little distance from each other: the one, A B, had a continuous metallic communication of platina wire between its poles, bent as seen in the figure.

Two glass siphons, E F and G H, were so placed between the batteries, as to receive the bent portions of the wire I K, into one of their limbs, F and G. The siphons were filled with an infusion of red cabbage, to which a small quantity of the sulphate of soda was added, and which indicates, by its change of colour, the different electric states of the wire in connection with it; the positive wire turning the infusion red, the negative, green. When the battery A B was charged, the circuit being then completed, the electricity circulated along the wire from P the positive pole, to N the negative. In this instance, no change took place in the colour of the liquid in the siphon, the circuit being unbroken.

The other battery, C D, was now filled, and platina wires were brought from its poles into the other limbs of the siphons, that coming from P, the positive pole, being terminated in the limb H of the siphon G H, and that from the negative, being terminated in the limb E of the other siphon E F.

The electricity of the battery A B, circulated, as has been stated, from P its positive pole, to N the negative, along the unbroken circuit of the wire. The electricity of the battery C D, also circulated from P the positive pole, to N the negative, both in the same direction. The wire coming from P, the positive pole of the battery C D, whose extremity was inserted into the limb H of the siphon G H, induced upon the unbroken wire in the other limb G of the siphon G H, through the medium of the liquid, the opposite or negative state, although it was, at the same time, conveying the positive electricity of the battery A B. This fact was beautifully illustrated by the change of colour that took place in the opposite limbs of the siphons, the colour of the infusion in the limb H becoming red, while that in the limb G became green.

In like manner, the wire coming from N, the negative pole of the battery C D, the extremity of which was inserted into the limb E of the siphon E F, induced the positive state upon the bent part of the platina wire in the other limb of the syphon F, although it was, at the same time, conducting the negative electricity of the battery A B. This was also shown by the liquid becoming green in the limb E, and red in the limb F.

The continuous metallic wire, I K, was now cut, and its extremities were terminated in a third siphon, L M, indicated by dotted lines in the figure. These portions of the wire retained the states of the poles of the battery A B, whatever state might be induced upon the bent parts of it by the battery C D. This was shown by the liquid in the limb L of the siphon becoming green, and in that of M becoming red.

When the battery C D had its poles reversed, a corresponding change took place upon the states of the bent portion of the wire I K, immersed in the siphons E F and G H, while its extremities, which terminated in the siphon L M, retained their original states of the poles of the battery A B.

4. *The following Experiment shows that the wires coming from the poles of the galvanic battery, may have induced upon both of them, either the positive or negative state, by combining with them the electricity of other batteries.*

The batteries A B and C D (Plate III. Fig. 3.) were charged, and the wires coming from their poles terminated in the two lateral siphons, EF and GH, which were filled with the solution used in the last experiment, and arranged in exactly the same manner. In place of the middle siphon there was substituted a siphon-like tube, composed of three limbs, ORQ, also filled with the vegetable solution. The extremities of the wires, I and K, coming from the poles of the battery AB, were now placed into the two lateral limbs, O and Q, of the siphon. Thus far the experiment was exactly the same as the former: the wires I and K, from the battery A B, retained the same electric states as its poles, notwithstanding that the electricity of the battery CD, circulated along the wire at the same time.

Another battery S was then filled, and a wire T, from N its negative pole, made to communicate with the positive pole of the battery AB. Another wire, represented by a dotted line, was then brought from its positive pole, and its extremity terminated in the central tube B of the siphon-shaped vessel.

The wires I and K both gave negative electricity, as the liquid with which they were connected in the tubes O and Q, was changed into green, while that in the tube R assumed a red colour.

In this arrangement, the negative electricities of the batteries S and CD, passes along the wire K, together with the positive electricity of the battery AB. Apparently, the two negative electricities exert a stronger influence on the wire than the positive electricity does, and consequently it changes the solution of the salt into a green colour; the wire I being in the same electric state as the pole of the battery with which it is connected, namely negative, also changes the solution in the other limb of the vessel into green. The other wire, which is inserted into the middle tube of the siphon vessel, being in connection only with the positive pole of the battery S, gives positive electricity, changing the liquid in the tube to a red colour.

In performing this experiment, the wires should be placed into the three tubes of the siphon vessel as nearly as possible at the same time.

(To be continued.)

ART. III. *Description of the Landes of Acquitania.* By WILLIAM AINSWORTH, ESQ. M.R.C.S.E. &c.

(Continued from Page 11.*)*

THE existence of these lagunæ is a fact of much interest; and to explain their origin, we must enter into a notice of the other hydrographical features of the Landes.

The rivers and rivulets supplying the Dordogne, coming from the volcanic rocks of Auvergne and the Cevennes, and the streams descending from the central Pyrenees, giving rise to the Garonne, form, in the part of a sphere which they describe, one of the most extensive hydrographical basins of France. The two rivers unite a few miles beyond Bordeaux, and the firth (fleuve) formed by their union, is called La Gironde.

This basin is divided into departments, whose nomenclature is after an admirable system founded on the natural position of these divisions, partly after the river or its branches, partly after the elevated sites, or hydrographical plateaux from which they originate.

The course of the Garonne is, generally speaking, direct. Rising from the Pyrenees, it runs part of its course in a direction nearly due north, till sweeping round, it pursues for nearly two hundred miles a north-westerly direction, often tortuous, but, except at its origin, seldom precipitous; it in no place forms chains of small lakes, though connecting ponds sometimes occur at its sides. Its slope is not very rapid, the elevation of the bed of the river being at Thoulouse not more than 460 feet. Like that of the Adour, its bed is seldom expanded; shoals, islands, and sand-banks, are therefore not very frequent.

The Parisian limestone, as we have already stated, forms cliffs in the vicinity of Bordeaux of about 200 feet high, following at a small distance the direction of the river, between which are some excellent natural pastures. Some parts are also devoted to the cultivation of the vine; and nearer the river, are small plantations of basket willows. The same land, more sandy on the Acquitanic side, is occupied by willow plantations and the gardens which supply the town of Bordeaux with esculent vegetables. More towards the bank of the river, the ground is overgrown with the Arundo phragmites, Lythrum salicaria, &c. The Scirpus maritimus descends almost half way to low water mark.

It has been remarked of rivers in general, that as they approach the sea, their course becomes more tortuous, and this circumstance is said to acquaint the natives of large continents of their approach to the shores of the ocean, and this is in some degree the case with the river Garonne; but, as in the Forth, whose windings are most remarkable near Stirling, its irregularities occur near Marmande, or previous to its exit into the firth of the Gironde. But as the existence of this physical fact, must depend on the mineralogical nature of the bed, so it is liable to much inconstancy; and while, in the same country, the Rhine and the Seine are in the same positions remarkably tortuous, the Loire, under similar circumstances, only becomes more direct in its course.

Rivers and rivulets running into the sea, that might, under ordinary circumstances, be considered to join a prolongation of another river forming the hydrographical basin of that country, may be considered as forming part of that basin; but this is not the case with the Adour, whose waters empty themselves into the ocean at wide angles to the Garonne, leaving between the two, the waste sandy space, which has been the object of our present descriptions.

The Adour, though chiefly supplied by large streams descending from the Pyrenees, is also nourished by some rivers from the north-east, bordering the extensive plains of the Landes. The bed of the Adour, whose width at its mouth was near 900 feet, was reduced to 372 feet by a decree of the late emperor, accompanied with a prohibition to cut the pines on its borders. It is unnecessary to illustrate at length the fact of the changes undergone in the course of this river: it is at once attested by valid historical records, contained in the registers of Bayonne, in those of Cape Breton, and of Vieux Boucau, and by physical phenomena, whose indices may be traced at every step. It is one of those changes so ordinarily produced by motions of the sand, and yet so interesting in districts of this nature. Nor can we see how far originally such changes may have been influential in driving back the Garonne to the rocks above Bordeaux on the one hand, or the Adour to the rocks of Cape St. Martin and the Basque country on the other, leaving between them these plains, still covered with a virgin soil. On them the uniformity of level, the little imbibing power of the pan, and the retentive properties of the substratum, give rise, as previously mentioned, to extensive sheets of water, and for four months in the year the Landes are every where occupied by mares, or collections of water, seldom exceeding two feet in depth. These expanded sheets are soon evaporated by the heat of summer, leaving few traces of their existence. Plants, whether aquatic or terrestrial, germinate in the frigid and temperate zones during the mild seasons of the year; few aquatic plants, therefore, mark the residence of these winter waters. Some plants are observed to undergo a slight change: the Plantago coronopifolia, growing on the oceanic shores with hoary leaves, has its leaves smooth when met with on these spots. Now and then a few Junci are to be met with; among them Juncus gracilis, J. Jacquini, J. bufonius; also Peplis Portula, Elatine Hydropiper, E. Alsinastrum, Chara vulgaris, (often very characteristic,) Phalaris oryzoides, Isnardia palustris, Litorella lacustris, Pilularia globulifera; where there is a little water, the Conferva reticulata may be found.

These mares increase so much during some seasons, that their waters form running streams, which course down the very slight inclination of the Landes towards the sea. Meeting there with the sand-hills, they are arrested, and form ponds of greater or less extent, which are also supplied by spring waters, descending either as rivulets or small rivers. These lagunæ mostly empty their waters into the sea by a common outlet; but this often changes its place, and is sometimes blocked up altogether, obliging the waters to return to the bosom of the hills, and the size of the pond becomes greatly increased. One of the largest of these, the *Etang* of Orx, runs from north to south, (the general direction of the whole series, which is parallel to the line of the coast,) a distance of eight miles, upon one and a quarter of a mile wide, and a depth of from 15 to 18 feet towards the centre; it covers with its waters 8 to 9000 English acres of land, and, according to a report of Col. Bory St. Vincent, its waters are elevated about 15 feet above the level of the ordinary tides.

The laguna of Hossegors is 9842 feet long, by 984 feet broad, and 9 feet deep; it is bordered on the east by a chain of downs, from 1000 to 1300 feet of elevation; on the west by other downs, which separate it from the ocean, and are clothed with vines half way up their acclivities.

The laguna of Mouson is from 1 to 200 yards broad, and 26 feet deep. It discharges itself by a rivulet into the basin of Boucau: its name is derived from a tradition, according to which a Captain Mouson having a vessel in the laguna, then communicating with the sea by a navigable river, neglected, upon being informed of a sudden change in the sands, to make his escape, and his vessel was in consequence stranded.

Between the 24th and the 27th of June 1802, several sand-hills in the ponds of Biscarosse, from 40 to 50 feet above the level of the pond, gave way beneath, for a length of 5 to 6000 feet, upon a width of 300, and were reduced to a level with the water. The pine trees followed the motion of the sands; but their roots were too much bared to enable them to draw sufficient moisture for their nourishment. The waters of the present pond, are only elevated about 12 feet above the level of low tides.

The basin of Arcachon having two exits into the ocean, cannot be considered as a true laguna, though its origin may be traced to pretty nearly similar circumstances, with certain modifications connected with the inconstancy of the situation, and little fixity of the downs. It forms, in its present condition, an arm of the sea, nearly 50 miles in circumference. Its entrances are the Passe du Nord and the Passe du Sud. Several pines, arranged in the form of a cone, and placed upon the downs, serve as guides to navigators entering the roads. These signals are termed *balises*. They are three in number; and some seamen are employed to keep them constantly in a convenient situation with respect to the pass.

The basin has the form of a triangle; its present entrance being at the angle which points towards the south-west, and extending in the north-east from Cerez to the mouth of the Eyre. To the north and south are mountains of sand, generally covered with pine trees and other plants. In the centre is a large space, known by the name of the Island of Birds, about two miles in circumference at low tides. There is not a tree in the island, but a very small garden occurs in the vicinity of a hut built to shelter the person who watches the cattle nourished on this bleak spot: in the neighbourhood of this hut, is an excellent spring of fresh water. This island is daily increasing in size, and has never been known to have been submerged. About a mile and a quarter from the island, a bank of sand has formed itself, and courses north and south, tending to unite itself with the northern shore, and to block up the pass of that side almost entirely. What was formerly called the Basin of the Pilot, has been filled up fifteen years back; and the island designated as the Isle of Mat, in the chart of Blaco, no longer exists.

Scattered along the oriental base of the downs, in a direction from north to south, there occur other lagunæ, many of them extremely beautiful in their scenery, and fed by picturesque streams. The rivulet of Palas is bordered on each side by downs covered with pines, from 47 to 62 feet up their acclivities. In following the canal of Horslieux, which leads to the sea, a magnificent plain opens itself before the traveller; it is known by the name of Pelindres, and occupies 1800 acres of land. About twenty years ago, a Roman road, that traversed the present laguna of St. Leon, was still visible during low water. Springs, abundant in some parts of the Landes, are also met with on the sea-shore, where the strata of argillaceous ironstone crop out. These points of the coast are generally made the site of the summer huts of the fishermen, or of the wooden guard-houses of the men employed in the preventive service. Fresh water is also obtained by boring the sand wherever there are indications of moisture. The inhabitants of the Landes are, however, generally supplied by wells; it only requires frequently to bore from four to five feet in depth, to arrive at the retentive substratum. The fountain of St. Roch issues from the sand, and is apparently only about a foot in depth. A weight of 36 lbs. sinks to a depth of 14 feet; a rod penetrated 18 feet, but it was rejected with so much violence, as to rise perpendicularly, and be thrown to a considerable distance from the spring. The ear is struck, on approaching it, by a distant grumbling noise, which, according to the inhabitants, increases in stormy weather. The spring furnishes about 20 cubic feet of water in the minute. As tested by Lafêre *fils*, excepting indications of the presence of iron, the acetate of lead, nitrate of silver, and oxalate of ammonia, were the only reagents whose effects were sensible.

The character of the vegetation of these lagunæ naturally depends upon whether or not they are affected by the tides. That of the basin of Arcachon is entirely marine: its sides are seldom wooded. Occasional hedges of the Tamarix Gallica are met with, and the shores are strewed with great quantities of Zostera marina. The borders of other lagunæ are oftentimes clothed with extensive woods, and we have had occasion to allude to the nature of their productions before. In the ponds neighbouring the sea, we meet with the Conferva capillaris, C. catenata, C. glomerata, Ulva compressa, U. Linza, U. intestinalis, Riccia minima, Lemna trisulca, Chara flexilis, Menyanthis trifoliata, (only at the laguna of Souston,) Alisma Plantago, A. natans, A. ranunculoides, A. Damasonium, Marsilea quadrifolia, Nymphæa lutea, N. alba, Typha latifolia, T. angustifolia, several species of Potamogeton, &c. On the borders of the lagunæ, Hottonia palustris, Convolvulus soldanella, Acorus calamus, Epilobium palustre, Hibiscus palustris, Sonchus palustris. A boggy, peat soil is formed by the Myrica Gale, Sphagnum palustre, Anthericum ossifragum, Cineraria palustris, Narcissus Pseudo-Narcissus, N. Tazzetta, Lythrum salicaria, Hypericum hircinum, Hieracium paludosum, Gnaphalium uliginosum, Serapias longifolia, Equisetum palustre, E. eburneum, &c. In the saline marshes, Hippurus vulgaris, Salicornia fruticosa, &c. In moist, shady spots, Viburnum opulus, V. tinus, Narcissus Jonquilla, Anthoceros lævis, A. punctatus, Marchantia stellata, M. umbellata Scop., Targionia hypophylla. The banks of the Adour present some plants of interest. Among them, Salix purpurea, S. fragilis, Myagrum perfoliatum, Trifolium strictum, Inula pulicaria, Fraxinus excelsior, &c.

The downs and hills of sand which line the coast, and retain the waters of the lagunæ, whose forms and situation are constantly modulated by their motions, demand our next attention.

The general direction of the currents in the Bay of Biscay is from north to south, or sweeping down the basin. The coast is every where level and continuous, presenting a sterile and open shore,—a certain indication of little depth of water for a great distance; yet on few shores is the action of water more violent, rising even at ordinary tides with great fury, throwing to a great distance on the shore the wrecks of ships, or the trunks of pine trees long buffeted by the wind.

Sometimes specimens of shells and plants from the tropics are stranded on these shores; but excepting a few species, principally belonging to the genera Mactra, Venus, Unio, Solen, Tellina, Strombus, Murex, Pecten, Ostrea, Anomia, Ortygia, Buccinum, and Voluta, and a few pebbles thrown up by the tide, generally quartzose, sometimes hydrated, offering varieties of chalcedony, jasper, and agate, no quantity of organic or inorganic substances is thrown up, along the whole line of the shore, to disturb the uniformity of that deep, oceanic bed of sand, which seems to be brought up from its home to cover the surface of the earth. As the tide recedes, these sands (more especially in the summer season) become almost instantaneously dry, and are swept more or less directly onwards, accumulating and forming hills of various magnitude. In some cases, these first hills are almost immediately in the vicinity of the line of high water.

A range of hills follows the southern side of the basin of Arcachon, forming a cape, which advances close upon the waters of the sea; but on turning round this promontory of moving hills, a large plain of sand fixes the eye, extending for about 20 miles along the coast, and from 3 to 4 miles inwards. In one spot is a range of huts, inhabited during a few months in the summer by the fishermen of the Teste, and further inland, upon a rise of the sand, a building of wood, for the preventive service, whose occupation on the coast is principally to guard the property of the shipwrecked from the plundering hand of the natives. *

The sand of the first hills are carried onwards by the same continued action, forming other hills, and thus two, three, or more ranges, divided by longitudinal vallies, are found; while winds from opposite points of the compass, sweep at intervals along their acclivities, bearing sands before them, through the entrance of the vallies over the plains below.

These chains of hills, as they occur on the shore of the Gulf of Gascony, embrace, from the mouth of the Gironde to that of the Adour, an extent of 75 leagues, or 189 miles. Sometimes they are disposed in a regular and continuous chain, sometimes they form elevated plateaux and plains, and sometimes isolated mounts, leaving between one another vallies frequently moist and marshy, denominated *Lêtes*, which have oftentimes from seven to ten miles uninterrupted extent, and which may be followed, in the interior, as far as the crest of mountainets which domineer over the vallies of the Garonne and the Adour. The elevation of these hills is also remarkable. We are accustomed to form our opinion of the height of downs, from the descriptions we meet with of those of Scotland, Holland, and the north of France; but while at Newport and at Calais they scarcely attain an elevation of 30 feet, nor at Dunkerque above 20, along the coast of the Landes the culminating points of these mountains of sand, rise to more than 380 English feet above the level of the sea.

It is a magnificent spectacle to see hills, whose origin and progress lie before the eye, following the same order, and presenting the same phenomena of configuration as mountain chains, with transverse and longitudinal vallies, with a crest of unequal elevation, and with transverse and lateral chains. Nor is the shape of the hills which border a valley constantly uniform from the crest to the base, but, on the contrary, frequently interrupted by plains and escarpments, which have not, however, their representatives on the opposite side.

* These are sometimes the only places of shelter to be met with for miles on the coast, and in them the writer has ever met with the kindest and most hospitable reception.

On the coast of Flanders, between Ostend and Zealand, the downs are not more than 200 feet in thickness, forming a single ray of small hills; but this chain of downs attains a breadth of from five to six miles, its height diminishing in its progress from north to south, so much so, that at the lowest extremity the crest is not elevated above 12 to 15 feet. The forms of the summits is dome-shaped, and sometimes more or less acute; their outline is often serrated, and their slope mostly gentle and undulating.

The sand of which the hills are constituted, consists of small grains of quartz, sometimes, but seldom, mixed with the detritus of shells.

The ocean is supposed to deposit upon the coast a quantity of this sand, valued at 34.9383 feet, (10 metres 6.49 millimetres,) for every 6.5618 feet (2 metres) in length, or 44,104,380 cubic feet, (1,245,405 cubic metres,) for the whole length of 766,132.61 feet, (233,1513 metres,) at 5 toises 2 feet French for every progressive toise, or 640,000 cubic toises for the whole length of 120,000 toises from the northerly point to the mouth of the Adour. *(Journal de Santé et d'Hist. Nat. par Capelle, Bordeaux* 1797.*)*

From their extent and elevation, and from the continued level of the Landes, these hills are seen in the evening like streaks of snow for 30 miles round; but when the air is heated, the refraction increases their height, and their appearance becomes really striking.

It is in the *Lêtes* or deep vallies alone, that quicksands, known in these districts by the name of *Bedouses,* sometimes *Blouses* or *Tremblans,* are met with. It is a fact, with which every peasant is acquainted, that cattle are generally endowed with an instinctive perception to avoid them, and thus the traveller, when he cannot trust to his own caution, may follow their tracks.

They originate generally from the accumulation of a small quantity of water becoming covered with sand, which, transported by the winds, falls like rain on their surface, ordinarily tranquil and sheltered. The sand remains in equilibrium, as it were, in the middle of the waters, forming an infinity of little vaulted supports; these sustain others, and the last rise many feet above the waters, the superior layers becoming white, and mingling with surrounding sands, which forms a trap scarcely to be avoided by the most experienced.

They also sometimes originate from the support given to the sands by Nuphars, Potamogetons, Menyanthes, &c. from which the same appearances may result. In cases of accident, great tranquillity must be observed, and the sands, accumulating under the feet, will soon afford a firm support.

The object which has given the most interest to the natural history of downs, has been their progress inwards, and their well known power of burying, in their advance, the monuments of art, and the products of industry; and wherever extensive downs occur, too many proofs of such facts are constantly met with in the records of history, in the physical indices of the country, and often in the oral traditions of the people: though their motions are not as those of the tempest or the whirlwind, but slow and insidious; for the sands of the ocean will, in their silent progression, bury a forest while they scarcely disturb the leaf of a tree.

The attention of agriculturists was soon directed to an object of so much importance. The aid of natural history was claimed, and, in almost all the litoral countries of Europe, prizes have been offered for proposals to arrest these alarming invasions. It is evident that, the action of the water continuing the same, a similar quantity of sand must be deposited, and downs or hills will result from its accumulation; the question is therefore only how to arrest their further progress.

On the northern coasts of the Firth of Forth, where the progressive advance of the sands is slow, the stoppage is in the most part effected by nature; the Arundo arenaria growing in successive crops, gaining such strength as to overtop the sands in their next advance, and assisting towards the elevation of the downs. But it does not follow, that plants of this nature are always capable of arresting the encroachment of the ocean's sands; for many facts prove to the contrary. From the very principle of its growth, and from the manner in which it overtops the sand, its long culm becoming blanched, and performing the part of a root, while the lengthened stalk sends out new verdant leaves, it breaks the sands, and arrests their motions. If the latter were in such quantities as to bury the whole plant, its dissemination would be of little use. Hence in the rapid formations, and the sudden changes which mark the progress and existence of the downs on the shore of the Bay of Biscay, a formidable opponent is met with to the use of such simple means, and methods more adapted to the energies of the circumstances are put in force.

In most parts of these tracts, no attempt is made to regulate either the formation or the motions of the first ranges. They are regarded as truly under the dominion of the winds and waves, and beyond the control of man; and it is only on their advance into the interior, that a barrier is placed by extensive plantations, disseminated first in the vallies, and drawn gradually up the acclivities, even to the summits of the inland ranges. Near Mimizan, planks of deal are, at government's expense, forced into the sands in regular order, and close opposition. On the accumulation of sand taking place up their sides, they are elevated higher and higher, and thus artificial downs are gradually formed.

Clayonnage is also employed; it consists in forming on the surface small compartments in clay and straw, from 12 to 18 inches in height, parallel to the direction of the winds which most frequently prevail, and sowing between them Arundo arenaria, Elymus arenarius; and arborescent leguminosæ, as the great Ulex, species of Genista, Spartium, &c. These plants maintain the soil, to which the pine tree is afterwards confided.

On the plains the most common method consists in planting the fir, (Pinus maritimus,) and protecting the young plants by dead branches held down by wooden hooks, and climbing and trailing plants, as the Clematis, Tamus, Bryonia, &c.

The maritime fir seems marked by nature as a plant peculiarly adapted to break the motions of the sands. Its whirled branches, circularly arranged round its firm upright trunk; its leaves, forming so many points, exerting great influence, yet offering no resistance that might be fatal, render it by its whole structure capable of resisting the strongest hurricane, and yet of being affected by the slightest breeze. The effect which the pine trees have in diminishing the intensity of storms in mountainous countries has been already remarked, (Hericart de Thury Journal des Mines, No. 101.) In the Alps of Switzerland they are called *abrîte orage.*

Vines are also planted on these downs. The vine of Rota in Andalusia, celebrated for its excellent wine of Tintella, grows on the most mobile sands. The oak springs from a soil formed of the detritus of a few herbaceous plants, and, supported by the roots of the fir tree, soon spreads its lofty branches; and that part of the downs may then be truly considered as secure from the further progress of the sands.

We have been induced to notice thus shortly the means adapted to fetter down the sands of the south-west of France, because we are aware that in this country the subject has attracted the attention of naturalists, and various methods have been proposed to impede their progress. Those we have described, present methods highly worthy of imitation. *Clayonnage* is only necessary on the extremely mobile summits of the higher downs. But with the exception of some sarmentous plants, as the vine, traveller's joy, &c. nothing would prevent the adaptation of the other means,—among the most prominent of which is the use of the fir, on whose fertility depends the riches of the whole Landes, and whose products suffice for the consumption of the whole navy of France.

The downs of the coast near the basin of Arcachon, lie upon an ancient forest of pines. In some places, and particularly at Cape Breton and at Vieux Boucau, volcanic productions are found, whose appearance is supposed not to date back more than 30 years, (Mag. Encyclop. 8 année T. I.) They consist principally of leucostines or volcanic rocks, with feldspathic bases, and pyroxenic or augitic rocks, with some specimens of schorl. We observed also pumice, basalt, and tufaite.

Some excellent meadows have been saved from the devastation of the sands and sea, by strong dikes. Near them occur leucostines and phonolites, (clinkstone, Jam.) of a dark black colour, and pebbles of quartz and agates.

Near the Teste there occur some strata of argillaceous ironstone, which crop out and show themselves again, about three miles more to thesouth-east, at the marsh of Branque Caraon, passing beneath downs of 360 feet in elevation.

In describing the vegetation of these tracts, we must proceed by those divisions, which, in the vegetable kingdom, are marked out by the habitats and localities of the plants themselves.

The filamentous, laminar, and slightly arborescent plants of the ocean, differ materially from those inhabiting the downs, both in their structure and external characters, by which they are marked out as forming a distinct division of vegetable productions; they obey, however, in their distribution, laws similar to those which regulate the dissemination of ærophytes, or terrestrial plants, which, by causes dependent on their organization, are strengthened against atmospheric vicissitudes; or, on the contrary, are, by the possession of a more subtle organization, capable of adaptation, without effort, to the exigencies of climate and the caprices of seasons. Thus, as lichens and mosses, equally independent of elevation and latitude, are every where dispersed, requiring for their developement only a small number of circumstances; so some hydrophytes re-produce themselves in distant countries, and fuci of the north of Scotland re-appear on the shore of Van Dieman's Land.

But in some species their localities become conditions of existence; some placing themselves on a spot which the tides cover, and leave bare every day, as others inhabit spots which the tide uncovers only in the syzygies or the equinoxes; some prefer rough and agitated seas, others calm and tranquil spots; some live and die in the space of a few hours or months, while others survive the tempests of many winters.

But all have bands or zones of particular habitations in the different depths of the ocean; regions in which the column of supported water, and the relative quantity of light and caloric are in harmony with the disposition of their organs. Plants will flourish in the centre of these zones, and perish towards its limits. The seeds which escape from them, appear also, by their specific gravity, to place themselves in equilibrium with the column of water, which they displace, and to swim in the zone where the plants will alone vegetate.

C. D'Orbigny, in the *Memoires du Museum, Tom. VI.* has enumerated the marine plants growing on the shores of the Gulf of Gascony, and arranged them in their zones, drawn up to correspond with a table of the tides on those shores by Fleurian de Bellevue.

From these documents, we find that there are 34 species of ulvæ growing between the first and sixth zone; in the latter he only finds the U. tomentosa, which he considers to be a polypus: 63 species of fucus, of which the F. pygnæus and F. amphibius alone belong to the first zone; while the F. loreus, F. fibrosus, F. sanguineus, and F. coronopifolius, belong to the sixth zone: 29 species of Ceramium, of which none are found in the first zone, nor do they extend beyond the fifth, in which occurs the Ceramium coccineum and C. ægagrophilum, the latter of which is rare. Two species of Diatoma, D. rigidum and D. flocculosum, occur in the second zone, in which also are found the Zostera marina and Z. mediterranea; but the latter rarely.

The numerical proportions of these plants, as drawn up from the tables given by C. D'Orbigny, are as follows:

	Ulvæ.	Fuci.	Ceramia.	Diatomæ.	Zosteræ.
1st Zone,	4	2	0	0	0
2d Do.	14	15	9	2	2
3d Do.	6	13	12	0	0
4th Do.	6	13	4	0	0
5th Do.	0	6	4	0	0
6th Do.	1?	5	0	0	0

The first zone extends from a French foot below the line of high water to a depth of 20 feet. The second zone extends from 5 to 30 feet in depth. The third from 15 to 35 feet. The fourth from 20 to 40 feet. The fifth from 30 to 60 feet. And lastly, the sixth zone from 40 to 100 feet, beyond which, in these seas, there is no vegetation.

When the sands attain little elevation in the neighbourhood of the sea, no plants occur for some hundred yards beyond the line of high water. When, however, sand-hills succeed, the vallies at their base will present the vegetation of the downs where most barren.

Sometimes a range of hills, as at the entrance of the basin of Arcachon, runs in a direction nearly at right angles to that of the shore, and such an arrangement is accompanied with extensive lateral plains, sometimes only a few feet elevated above the level of the sea. The reed of the sands forms the characteristic vegetation of these tracts, whose appearance is moreover diversified by stray plants of a few vagabond species; among them Cucubalus fabarius, most abundant among the newly formed plantations of fir trees, Salsola Kali, S. Tragus, S. Soda, Polygonum maritimum, Elymus arenarius, Chenopodium maritimum, Crithmum maritimum, Agrostis stoloniferæ, Arenaria peploides, A. rubra, Reseda sesamoides, Atriplex portulacoides, Eryngium maritimum.

The lofty range of sand-hills which border the coast, are generally entirely naked, nor is their barrenness relieved by a single moss, or the green blade of a grass.

In the plains which extend themselves at the base of most longitudinal vallies, the means of fettering down these sands are generally put in force; and in consequence the fir tree, and other evergreens, rise up the acclivities of succeeding ranges, enlivened by numerous flowering leguminosæ, compositæ, &c.

On these spots we particularly remarked the Heliotropium europæum, Athanasia maritima, Gnaphalium Stoechas, (about the latter end of September, this beautiful plant gilds the southern aspect of many downs,) G. arenarium, Carex arenaria, Antirrhinum glaucum, Cheiranthus maritimus, Daphne gnidium, Statice limonium, S. Armeria, Gentiana maritima, Onosma echioides, &c.

The vallies contained between the ranges, generally called *Lêtes* or *Lesques,* when covered with brushwood are denominated *Barthes.* Sometimes these vallies are moist and marshy, at other times, the presence of fresh water is scarcely detected by the slight moisture on the surface: in these vallies occur the Plantago psyllium, P. subulata, P. maritima, Beta maritima, Scilla amoena, Rumex maritimus, Dianthus arenarius, D. virgineus, D. prolifer, Spergula saginoides, Euphorbia Paralias, Bunias kakile, Apium palustre, &c.

Such are the general features of the vegetation of the downs. The dark funereal tint of the pine forests, contrasting in the distance with the brilliant whiteness of the acclivities of sand, or crowning the blue waters of the lagunæ, adds a sad and still solemnity to the scene. A vast plain, formed of undulating and unequal basins, over which, from the presence of a rush or a reed, are scattered a few green spots,—a few flowering plants gathered in a miniature oasis,—deeply excavated vallies, with aquatic plants, and sometimes a few shrubs, inhabited alone by the larger birds of prey, and seldom traversed by the foot of man or domestic animals, present in their combination the fierce outline of a desert; and if the love of natural science leads man to attempt the passage of these hills, the laborious progress in a yielding sand, the uniformity of soil and vegetation, the fear of quicksands, the refracted heat, and want of fresh water, demand all his patience for the accomplishment of his purpose.

Before we finish the natural history of these tracts, it will be necessary to notice cursorily their animal productions, which, by leading us to consider the physical characters of its human inhabitants, will introduce its civil and statistical history.

The rarer species of birds and quadrupeds, choose for their residence spots the least frequented by man, whose progress into the interior has the same influence upon the zoology as it has upon the vegetation of a newly civilized country. From the description which we have given of the Landes, and of the extensive downs which border the coasts, it may naturally have been concluded that they are the resort of the few untamed carnivorous quadrupeds, and larger birds of prey, which still inhabit the more unfrequented spots of the European continent.

Of these none are more dreaded than the wolves. In the deep recesses of these forests, they can without danger rear their offspring and propagate their race; and so frequent are they, that no master of a farm goes to his daily labour without a gun, nor is a single shepherd to be met with without that necessary appendage. These spots are also the resort of the numerous species of mammalia which may be found scattered over the whole continent.

The arrian vulture (Vultur cinereus, Lin.) and the white vulture (Cathartes Percnopterus, Tem.) prefer the great Landes of Boutegre, where they assemble in flocks round the dead bodies of animals, both of sheep killed by the wolves, or of the latter when shot by the vigilant shepherd. At that time they are so fierce that no dogs dare approach them.*

* A large flock of vultures followed the scattered troops, during the late peninsular war, on their passage through the Pyrenees, feeding like princes on the remnants of a starving army.

The shores afford a great variety of marsh and aquatic birds. The migration of these birds, which return in spring from the north of Africa, the islands of the Archipelago, and of the Mediterranean, the coasts of Barbary and Spain, is much regulated by the direction of rivers, and the situation of the larger lakes, leading them always to choose for their point of departure the spots where the passage from the great sea to the lakes and rivers of the interior is shortest, and less occupied by dry territory. The track mostly followed by all aquatic birds is, however, by the sea side; and thus all birds coming from the coasts of Western Africa and Spain to the north, pass along the shores of the Bay of Biscay. But the large flocks which assemble in the north gulf of the Mediterranean, follow the Po, traverse the Appenine Alps, rest on the waters of the lakes of Switzerland, or descend the Rhine finally to join the Baltic.

Besides the sparrow-hawk and merlin, frequenting the villages and cultivated spots, there occurs in the Pignadas the white falcon, (Falco Brachydactylus, Wolf,) met with principally in the oriental parts of Europe, feeding on lizards and serpents, but said to prefer the latter. To these may be added the Falco Lanarius, F. Buteo, and F. Rufus.

In the marshes, lagunæ, and *lêtes* of the downs, most of the waders and runners, found in similar spots in the British islands, are to be met with, and with them spoonbills, storks, cranes, &c.

On the Landes the fine variety of green lizard, (Lacerta agilis, Lin.) whose length often exceeds a foot, marked on each side by a series of spots, of an azure blue colour, is met with in the early part of the year. The more common variety is very abundant, varying considerably in its appearance, from brown to a light green, but never attaining the size, rapidity of motion, nor external colouring of the former.

The chirp of various grasshoppers is heard in the heather shrubs, while the green-bodied Mantis, capable of a longer flight, roams across their solitudes, representing with its bright brilliant wings, the butterfly of the flowering meadows of the north.

Certain Coprides, the Ateuchus Sacer, Latr. revered by the ancient Egyptians, on whose monuments it is generally figured, some Curculionedes, the shining Pimelia (P. muricata, Latr.) and the Ægialia arenaria, delight to live in the downs. They may be seen retracting their antennæ and feet, abandoning themselves to the winds, and allowing their diminutive bodies to be borne with the sands to very great distances; but oftentimes small birds of prey watch and seize them on their journey. The gigantic Forficula, (F. gigantea, Fabr.) Cicindela flexuosa, C. Scalaris, Scarites sabulosus, Panagæus quadripustulatus, Dejean. Nebria arenaria, Brachycerus barbarus, B. muricatus, are also insects of the downs. Among the rarer species to be met with in the Landes, we may mention the Cymindis lineata, Dejean. Zuphium olens, Scarites terricola, Harpalus megacephalus, Abax ovalis, Licinus agricola,

L. selphoides, Carabus alyssidotus, Dejean. Tillus unifasciatus, Clerus octo-punctatus, Silpha granulata, Melolontha occidentalis, M. pini, M. campestris. Among the Trachelides, Mylabris geminata, and Meloe punctatus, near Bordeaux. Among the Cantharides, Cantharis dubia, Sitaris humeralis. Among the rarer leaping insects, were the Tridactylus variegata, Gryllus Burdegalensis, G. italicus, Locusta tuberculata, L. serrata, also Truxalus nasutus, Acrydium lineola, and Latreille has described three species found in the vicinity of Bordeaux, under the names of Acrydium cœrulans, A. stridulum, A. strepens. The Sphynx of Tithymale, (S. Euphorbiæ, Latr.) whose beautiful caterpillar feeds on the leaves of the Euphorbia Paralias, is also a remarkable insect of these coasts.

We must return to the fisheries, which bring in a fair proportion of the revenue of some of the most flourishing villages of the Landes, and more especially to that of the basin of Arcachon, which is very productive, containing most of the scaly inhabitants of the Bay of Biscay. Sardines, a small species of Clupea, whose esteemed varieties are known by the name of royan and ruten, soles, turbot, conger eel, ray, sturgeon, and even porpoises, are taken in this arm of the sea. The oyster and mussel also multiply in great abundance. Of the latter, the principal beds consist of the Mytilus pellucidus.

In the shallows of the basin termed *Crassats*, which low tides leave uncovered, Hippocampis medusæ, which were also thrown abundantly ashore along the coast; Spatangi and some beautiful Echini, with spikes of pearly whiteness, are also met with.

The eel migrates from the ponds into the sea from October to February,—the fishermen say from the fall of the leaves of the Betula alnus,—and are supposed to re-ascend into the fresh water, from March to June and July, in enormous quantities.

The fish caught in the lagunæ, are mostly tench, carp, gudgeon, eels, pike, lampreys, dace, and perch. The latter have not, it is stated, been inhabitants of these ponds for more than 30 years. They passed there from fish-ponds, and tend by their destructive disposition to expel the other species.

The degree of importance of all natural productions, depend so much on their value as far as regards the conveniencies, necessities, and luxuries of man, that the demonstration of the agricultural and natural riches of a country, must always be sought for in the number and enjoyments of its inhabitants; and certainly in the district now under our view, the infertility of the country will be found to correspond entirely with the physical characters of its inhabitants, exerting also as much influence on the moral deportment and intellectual advantages, as could be expected, when we estimate the counterbalancing effect of so immediate a vicinity to the Bretons and Gascons, long acted upon by wars of liberty and of religion, subjugated in the dark ages by fanaticism and credulity, enlightened during the chivalrous reigns of the dukes of Thoulouse and of the English monarchs, and now so much above par in the two qualities of moral and intellectual acquirements.

The Landais himself, known under the name of *Marensin* of Couzeot or Cocozates, is of little stature, attenuated, and of a yellow, or colourless tint. His long dark hair generally falls in natural ringlets on his shoulders. His fibres are rigid; but there is a want of activity and flexibility in the muscles, and a slight tendency to erithism. Irritability of disposition, great liability to intermittent fever, and habitual inebriety, are also characteristic of the Landais. His mental developement is in harmony with his physical structure: he is obstinate to excess, a slave to old methods, an enemy to all improvements, taciturn but not wicked, ardent in his love, and jealous even to cruelty. He braves with much carelessness the intemperance of the weather, lying, during the fine seasons of the year, on straw when at home, and in his coat when travelling. The use of *Echasses* or *Xcanques*, or long poles with the thigh bone of an ox fastened at a moderate height from the ground, as a support for the foot, is general, more especially among the shepherds, who, by thus extending their horizontal view over the sameness of the Landes, are enabled to distinguish the approach of wolves at a greater distance. These stilts also serve to increase the rapidity of progressive movements over the heather, and in winter to cross mares and streams of water.

The food of the Landais is as poor as his country is unproductive. Few fields of wheat are met with in the whole tract; but the quantity of Indian corn, Zea maïs, and millet, Panicum miliaceum and P. Italicum, exceeds the consumption of the country, forming thus a productive branch of external commerce; six other species of Panicum are indigenous to these parts, but none of them are cultivated.

Observation has proved that sablonous earths agree better with the yellow seeded variety of the Zea maïs, and argillaceous soils with that whose seed is white; and it was a fact well known to Parmentier, that barren soil best suited this plant. In a French work lately published, "Voyage au Kentoucky," it is decidedly stated that it delights most in new lands. In rich lands the corn grows into mere grass; and before it can be raised with success, they require to be made poorer. It flourishes nowhere so well as in the plains at the foot of the Appenine Alps, on the fern tracts (filicitæ) of the Pyrenees, and on the heaths of the Landes. The virgin soil of the Barrens of North America, have been from the same cause found favourable to its growth. The novelist Cooper, in his statistical work termed "Notes of a Travelling Bachelor," speaks of it as the favourite plant of America, as an infallible test of the quality of soil and nature of climate; and where it will not grow, the husbandman will not dwell.

Cobbett has lately been enthusiastic for its introduction into our own country. From very different considerations than those which appear to have actuated that turbulent democrat, we think its dissemination in some places, more especially in certain parts of North Britain and Ireland, might be very successful; in some places it would be of the most important utility, and under every circumstance, highly worthy of being attempted.

The little corn which is cultivated in the Landes are, Hordeum vulgare, H. distichon, Secale cereale, Triticum æstivum, T. hybernum, and T. turgidum. The Trifolium incarnatum, indigenous in the department of Arriege, (Eastern Pyrenees,) has for several years past been very much employed in the formation of artificial pastures, to the exclusion of all other forage. The Olea Europæa, native of Corsica and ancient Languedoc, a friend to light and warm soils, would very probably succeed in Maransin, and in habitations surrounded by pignadas. The Asparagus officinalis, universally disseminated on the moving sands, as well as in the vineyards of the Teste, may be looked upon as acclimated and indigenous.

The leaves of the Æsculus hippocastanum are much burnt for potash, of which they furnish three-fourths of their weight.

The fruit of the Trapa natans, much eaten by the peasants of Limousin, and which grows in the ponds bordering the coast, is unnoticed by the Landais. They eat several Fungi; among them Agaricus solitarius, Boletus edulis, &c. They make a soup with the seeds of the Dolichos unguiculatus, cabbage and turnips, with a little pork. They make an abundant use of pepper, garlic, and *piment,* (Capsicum annuum;) the latter they eat for breakfast, often without any condiment. Soups are also made of the flour of maize and millet; while the abundance of acorns allows them to feed numerous pigs, from which they obtain a moderate supply of bacon for the greater part of the year.

Vineyards are met with in the neighbourhood of some villages, and frequently on the mobile sands; but they do not any where form plantations sufficiently extensive to constitute an important branch of commerce. Much wine appears, however, to have been made at Cape Breton when it was a harbour.

The commerce of the Landes depends, then, principally upon their pignadas, their iron works, their cork trees, and their fisheries.

The basin of Arcachon supplies Bordeaux with a great variety of fish and crustacea, which are carried from thence into the interior, We have already had occasion to notice the products of the lagunæ; but from Lent to Easter the fisheries take place in the open sea, the fishermen then living in the huts which are fixed on the wild solitude of the Downs, casting their nets in depths with which they are well acquainted; so much so, that the fishermen of the Teste, of Cape Breton, of St. Jean de Luz, and Biarritz, will meet in the very same parallels. They use the term *Can* to denote these spots; it is of Gascon origin, signifying margin: their bottoms are rocky, and generally of considerable depth. The principal *Cans* are those of *de la Barriere, de Carriscarix, de Tambour, de Plassate, de Sarricote,* and *de Bagues,* being from 130 *to* 240 *brasses* in depth. The Can de Tambour abounds in corals of different species, from 7 to 32 inches in length. It is also upon these spots that grow the larger fuci which the sea throws up.

Upon the shallows of the basin of Arcachon, in the cold dark nights of winter, a great quantity of wild ducks are taken, by means of nets from 350 to 400 feet in length, fastened to poles of from 9 to 10 feet high, and disposed in zigzag or in numerous convolutions; and in the sweep which the birds make in their descent, they are entrapped.

Iron is not now a very lucrative branch of commerce, though extracted in considerable quantities. In some places, some private founderies have been of great value. That of St. Julien, much worked in the time of the late emperor, and valued in 1804 at 22,000 francs annually, is not at present worth one-third that sum.

The bark of the cork tree, (Quercus suber,) forms another branch of commerce, more or less lucrative in different parts of the Landes. In the north the plantations are the most extensive, and there it is carried on with the greatest vigour.

But it is in the numerous and extensive pignadas that the Landais finds his principal resources. These forests extend from the Teste de Buch to Bayonne, upon a width of from 10 to 12 miles. Little pignadas are also scattered on the plains, and much attention is paid to their progress up the sand hills and through the vallies of the downs.

Serious injury to these forests has often been sustained from fires. On the 23d of August 1803, (4 Thermidor, An. II.) a fire broke out in the part called Pinsole, communicating itself to all the pignadas which border the ponds of Soustons, and to those situated on the south of that laguna, as far as Labielle, being all entirely destroyed. The fire broke out near Pinsole, from causes which were never ascertained: it was not stopped for three days afterwards, but the fire was not completely extinguished for two months afterwards. Among the downs which form part of the parishes of Teste Gujan and the Teste de Buch, there exists an extensive forest, totally burnt in 1716, which was very soon afterwards a blooming forest of young and vigorous trees,—a fact which appears constantly to accompany these accidents; and indeed their very occurrence, in such situations, can only give us room to speculate upon the intimate relation which they bear to geological changes yet very little understood.

The produce of this forest is valued at 18,000 francs. The constant necessity of cleaving the trees, and of collecting the products, gives employment to a considerable portion of the male population, who, furnished with ladders and sharp axes, run about the woods with great activity, selecting the tree fit for cutting. A small piece is chipped off the base, and this is economically cut into a vase of very simple construction, to receive the more fluid parts of the produce, and this first chip is gradually carried as near the top of the tree as possible, and then another is begun at an opposite part of the trunk.

The process of distillation necessary to obtain the last products, are performed in furnaces scattered over the country, and the result borne by oxen to its destination. The roads at the border of the pignadas traced by these beasts, are almost the only ones to be met with in the country. They are termed *common,* (high-way ;) but are not at all good for that purpose sinking deep into the sand. The progress is at all times laborious, and the traffic and communications in the country is very trivial.

The territory of the Landes contain, however, several small towns and considerable villages, scattered more particularly along the line of the lagunæ ; and as their history is interesting, in marking the revolutions which natural changes produce in the history of man, we shall briefly allude to some of the principal.

On the borders of the basin of Arcachon, at nearly its most westerly point, occurs a group of houses, the resort of bathers from Bordeaux, and even occasionally of idlers from Great Britain. Its present denomination is Teste or Tête de Buch, the ancient Boios or Testa Boïiorum, retrograding to the first ages of the Gallic era, when it constituted one of the twelve cities of the Novempopulania. This town had, before the revolution, a chief under the title of chaptal, a seignorship of great antiquity ; among them figured Jean de Graille, who lived in 1360, and was one of the greatest captains of the age. He served under Edward, was taken prisoner in France, and perished in prison, for not having been willing to take an oath not to fight against that country. Paul Merula tells us, in his Cosmogony, published at Amsterdam, p. 431, that the chaptaux of Buch were once governors of Acquitania, and that the illustrious family of De Candalle, to whom the chaptalat belonged, was nearly allied to the kings of Navarre and Hungary ; and it will be remembered that Jeanne d'Albert, mother to Henry IV. of France, was also a De Candalle. Its present population, consisting of proprietors, fisherman, and resin-makers, amounts to 2,300 souls, who are disseminated over a surface of more than a square league.

The ancient port of Mimizan, mentioned in the "Catalogue des Rôles Gascons et Normans," said to be deposited in the Tower of London, is buried under the sands, and the town is represented by a handful of houses grouped around a church, whose size, structure, and architectural monuments, proclaims to have belonged to a once opulent place. The central parish church-yard was to the west ; the place where it was supposed to have been is still pointed out, and is now covered with downs from 90 to 100 feet in height. The steeple of the abbey was an ancient light-house ; it is now separated from the sea by three ranges of sand-hills, or nearly three miles in distance.

The actual town of St. Julien is more than a league from the place which it formerly occupied ; the ancient town, with the harbour of Conti, situated at the base of an arm of the sea, between Mimizan and St. Julien, have disappeared. Its ancient site is unknown, unless the manuscript already quoted alludes to it, "ad costas maris de Sancto Julieno seu de sart."

The town of Vieux Boucau, (old mouth,) celebrated when the Adour bathed its walls, is now composed only of about thirty inhabited houses, and as many more which are allowed to fall to ruin, and which, with the abandoned vineyards, and the wide uncultivated plains between it and the sea, give a strange picture of desolation to what was once a flourishing port and mart of commerce. From 1242 to 1483, this town was of little importance; it was only when the Adour, in 1597, came to bathe the territory of Plech, (Playe or Boucau,) that it aggrandized and became opulent. In 1630, the harbour was still capable of receiving men-of-war, like the other towns: plains and hills of sand now separate it from the ocean.

Cape Breton is situated on the right bank of a great rivulet, fed by the waters of the basin of Orx, about half a mile from the sea, from which it is separated by downs mostly covered with vineyards. This town contained a monastery of Templars, which was afterwards given over to the Knights of Malta by Jean 22d, and was allowed to crumble to ruins in the hands of these defenders of the faith.

In 1302, Edward I. granted privileges of commerce to Cape Breton, similar to those possessed by Bayonne; but in the present day these have been transferred to the latter town and Bordeaux alone.

In 1736, a Monsieur Dupius found in the vicinity a number of cinerary urns, supposed to have been the remains of a temple erected by pagan antiquity to Jupiter.

In terminating this description, we see two general facts,—a tract of country constantly on the increase, though liable in some parts to the overwhelming motion of sand,—and a stubborn infertile soil, gradually becoming more and more fit for cultivation, its hills becoming more stable, its waters less changeable, and the dominion of man every day more strengthened.

It is only very lately that assistance has been sought in the developement of the history of man, from a study of his physical characters; and it will probably be a long time yet before the investigation of the phenomena displayed in the formation of the earth's crust, of the succession of plants and of animals, of the changes of climate, and the consequent dispersion of existing races, will assist in unravelling the gradual subjugation of new territories by the human species. Yet without making them at all general, science is every day stumbling on isolated facts containing the principles of such changes. It is but a short time since we have been made acquainted with deposits, which have been produced by causes neither violent nor irregular in their action, and that have all taken place in the bosom of the same fluid, whatever diversity there may have been in the habitation of the animals and vegetables whose remains they contain. At a still later period of the investigation, it has appeared probable, that these deposits are so much the older the more remote, and so much the newer, the nearer the basins in which they are observed, are to our present seas.

From their immediate vicinity to a great nation, territories of this kind may rank high in importance, from their harbours, or from the shelter they may afford to warring tribes; but, as in the present case, less influential in a political point of view than when ruled by English monarchs, the Landes, from increase of inhabitants and cultivation, are now of a really greater statistical importance; and the efforts of man will ever be found more fruitful when directed in seconding the indices of physical changes, in draining marshes, in staying the sands, or in cultivating the land, than when rearing artificial monuments, so frail against the powers of nature.

SCIENTIFIC REVIEWS.

Narrative of a Journey from Calcutta to Europe, by way of Egypt, in the years 1827 *and* 1828. By MRS. CHARLES LUSHINGTON. London. Murray, 1829.

WHEN our eye first glanced upon the title of this work, it struck us that its perusal would afford some insight into the possibility and comparative advantages of another route to the East Indies; and indeed we find, by the introduction, that its amiable author, being bound to transmit to her friends notes of so enterprising a journey, was induced, by the additional stimulus of appearing in print, to give the public the results of her experience of a return from Calcutta by way of Egypt. We have often thought that any route would be preferable to passing that fearful number of weeks at sea, to which Europeans have been hitherto accustomed, not to mention those fierce encounters with Cape storms, in comparison with which the dangers of an overland journey would be mere claims to additional energies; and, passing whichever way, through countries abounding in natural phenomena, and pregnant with the finest historical associations, the traveller would arrive at his destiny, not spent by fatigue, but powerful with knowledge, and like a giant that had braced his limbs in the mountain air. Mr. Buckingham had pointed out several roads as feasible; and now that a lady has smoothed the paths of one of these, we think the practicability will undergo a more patient hearing, though we have long been of opinion, that the only opposition would lie in the difficulties of procuring conveyances in countries where there is so little communication between the inhabitants; and not in any overt acts of violence from the natives, or opposition on the part of the authorities.

Mrs. Lushington left Calcutta on board the Ganges, an experimental steam-vessel, intended for either a vessel of war or dispatch, on the 26th of September 1827; but for want of coal, they were obliged to beat under sail to Trincomalé, whose capacious harbour, strewed with singular outrigged vessels, seems to have excited her admiration, though with its general appearance she expresses herself disappointed: of the hot springs, where the late French expedition found turtles and fish, she makes no mention. Leaving this place on a fine evening, they passed the formidable rocks called the Basses during the night of the 12th of October, and anchored soon after in the harbour of the Point de Galle, whose entrance is marked by several bold rocks, against which the sea beats with violence. The view of the town from the sea, though not so magnificent, is more cheerful than that of Trincomalé. The surrounding country exhibits roads cut through topes or groves of cocoa-nut trees, rustic bridges over winding streams, hills, and deep dells, and huts made of palm-leaves, woven in a variety of plaits. The natives are an elegant but effeminate race: the men scarcely to be distinguished from the women by their dress, which consists of a vest and loose robe of cotton; their hair long, and gathered up in knots and braids, fastened behind with gold bodkins, or large combs of tortoise-shell, of a fanciful shape. Instead of the umbrella, the more wealthy natives have a gigantic fan, made of the talipot leaf, carried to protect them from the sun.

A Mrs. Gibson has established a school here, the first in the island; and it has succeeded very well. On leaving Ceylon, Adams' Peak was visible from the deck at the estimated distance of 100 miles. Cape Cormorin, which our traveller next passed, she was surprized to find a very low land; but the mountains (Ghauts) in the vicinity, were extremely picturesque.

The arrival of the first steamer which had ever visited Bombay, was attended with many demonstrations of joy and gratification. The epoch of our author's arrival, was also that at which Mr. Elphinstone (to whom we are indebted for so much information on the neighbouring regions,) relinquished his government.

Our author, soon after her arrival, departed on board the Palinurus of 190 tons, with Mr. Elphinstone, Mr. Steele, Messrs. Wallace and Gordon, and Mr. Lushington, for Cosseir, passing in a few days Cape Aden and the straits of Babelmandel, and reaching Mocha on the 1st of December.

At the straits of Babelmandel, a rush of the sea appears to have divided a bed of hard black rock, and thus to have forced a channel for itself of two or three miles in breadth, the rock rising on each side, bleak, barren, and cheerless, with only a few blades of grass endeavouring to force themselves through its crevices.

Mocha, with its plastered and white-washed houses of unbaked brick, appeared as if excavated from a quarry of marble, and no tree or shrub broke the uniformity of colour. Our travellers were here well received by the governor, and there were songs of love and war, and the music of rude guitars, of flagelets, and tabors. The facades and cornices of the houses were seen varied in every shape of fretwork and arabesque, and the white terraces of each building, with little verandahs closed or open, in many fantastic patterns. A grove of green dates on the one side, and the curious bee-hive huts of the Bedouins and Jews on the other, constitute the peculiar features of the town.

Mrs. L. was disappointed to find coffee of an inferior quality at Mocha, and this coincides with Mr. Buckingham's statement. Besides this article, dates, honey, and a few shells, are articles of export, and from the coast of Aden, or Abyssinia, are derived supplies of grain, horses, asses, and long-tailed sheep.

Our travellers proceeded up the Red Sea, passing their time very pleasantly. They noticed a dangerous shoal in long. 34° 53′ E. lat. 25° 20′ N. about one mile in length, N. N. W. and S. S. E., distant from the Egyptian shore about three leagues. It is steep, and at a distance of half a mile there is no ground at 100 fathoms. Captain Denton named it Elphinstone Reef.

On the 26th of December they reached Cosseir, having made a passage of twenty-three days from Mocha, and thirty-nine from Bombay. In Cosseir the hills, oven-shaped houses, and sands, appeared all of the same colour. Here they heard of the death of Mr. Salt, and of the battle of Navarino, but had not to complain of the Effendi.

Accommodated with camels, which as we have, from previous authorities, been led to understand, are not distinguished from the dromedary in Egypt, but in what regards swiftness and dispatch, the cavalcade, after conquering the first difficulties, and in the teeth of the inconveniences of unequal riding, (particularly incommodious to a female,) upsetting of loads, pilfering of Arabs, vociferating Lascars, and roaring camels, departed for the desert.

" Though much variety of country or occurrence cannot be expected in the Desert, I may (says Mrs. Lushington) assert with truth that the passage through it was to me very interesting and agreeable. For the first three stages the road was diversified by some inequalities of ground, and remarkable passes through the rocky mountains; but the course of our journey in general lay through an arid plain of sand and stones, about two or three miles in breadth, bounded by rocks of sandstone of an almost uniform appearance. On the second day's march I saw one or two trees, and the road was so varied, that I could then scarcely believe myself in a desert, which I had always pictured to my imagination as a dreary and interminable plain, with heavy loose sand, curled into clouds by every breath of wind."

From similar " pictures of the imagination," the opinion most generally formed of deserts is completely erroneous, and presents a subject of inquiry, of which we hope soon to trace the more exact features in the pages of this Journal. Nothing could excel the climate of the deserts in these regions, nor was the effects of the sun ever injurious.

About twelve or fifteen miles from Legayta, they first gained a sight of the fertile country on the banks of the Nile. The contrast with the desert was not very striking. The irrigating wheels turned by oxen, and the ploughs, Mrs. L. says, were quite Indian.

Mrs. Lushington having arrived in the valley of the Nile, whose stages are about as well known as those from Geneva to Rome, and her descriptions of the vast remnants of former times, which adorn in colossal imagery the banks of this proud river, presenting few features of novelty, we shall pass with her rapidly as her own maash, (which bore no semblance to Cleopatra's galley,) swept down the stream of the Isis, leaving our readers to paint to themselves, or seek, in the perusal of the little volume, the picture of her admiration on beholding the profusion of pillars covered with sculpture perhaps 3000 years old, standing, prostrated, inclining against each other, broken or whole on the fields of Carnac,—the astonishment of the Turks on seeing a lady write,—her fear and disgust at first seeing a mummy opened,—her sudden descent from the back of a donkey to that of an Arab,—the disputes and discussions about boat fees,—and her first sight of the Pyramids, which, to her imaginative eyes, were no more than the pigmy efforts of human imperfection to rival the surrounding mountains.

With much trouble she succeeded in ascending to the top of the great pyramid of Ghizeh, though when there she could not from fear enjoy the scenery, of which we, however, obtain a good notion, in the statement that it consisted of an immense extent of cultivated country, divided into fields of yellow flax and green wheat, with the Nile and its various canals, and a vast tract of desert on the other side.

There is much encomium on the pasha's conduct with respect to strangers, and some account of the military college at Cairo; but the introduction of European arts and sciences, appears to be yet quite in its infancy.

After descending the Nile to Fouah, and meeting with some obstacle in a mound of earth, they entered the canal, and finally reached Alexandria, which they found full of Franks. We have here some account of the estimation in which the pasha is held at Alexandria; and we shall quote our author's words.

"But notwithstanding the kindness which the Pasha manifests towards the Franks, (says Mrs. L.) he is not popular with those at Alexandria, in consequence of the dulness of trade, resulting from his monopolies. Neither has he friends among the Turks or Arabs; the former complaining that the new system of tactics has thrown them out of employment, while the latter hate him for forcing them into the military service. On the whole, the best informed persons said that the state of his government rendered him very anxious; especially as he had already incurred the displeasure of the porte, by repeatedly urging the sultan to acquiesce in the demands of the allies.

"His country, too, was nearly ruined by the Greek war; not only from the vast sums he had expended in his co-operation with the porte; but also from the depopulation occasioned by the hosts of troops whom he had been compelled to send into the Morea,—thereby draining his provinces of their cultivators."

Continuing her recital, she observes,

"At the house of the English consul, I had the pleasure of seeing Lady Georgiana Wolfe, whose interesting projects enhanced the gratification of meeting with a countrywoman in that distant land. Her ladyship meditated the establishment of a school at Jerusalem, for the superintendence of which she was qualifying herself by the assiduous study of Arabic. On the feasibility and utility of this plan opinions may differ; but nobody, I think, can witness its author's self-devotion, without wishing that it may be rewarded with success.

"Our stay at Alexandria was limited to four days; on the last of which divine service was performed at the consulate, and a very long but not a very bad sermon preached in English, by a Swiss missionary, attired in a Turkish dress, forming a heterogeneous compound for a pulpit."—P. 187.

On the 10th of February they embarked on board the Columbia, an English merchantman of 500 tons, laden with the pasha's cotton, and consigned to Liverpool, and after suffering from very boisterous weather, were towed into the quarantine harbour of Malta. The period of residence in the lazaretto for passengers from the eastward, is generally twenty-five days; under the most favourable circumstances it is not less than twenty-two, the day of entrance and departure being included.

We shall not detain our readers by noticing any of Mrs. L.'s remarks on Malta. Suffice it that she left this singular and beautiful island, with its knightly memorials, its strong and well fortified harbour, its churches with monuments of the grand masters, and its tombs of some of our bravest commanders, to be conveyed by the Dartmouth frigate to Syracuse.

And now that we have brought our narrator to the beaten ground of Sicily, our privilege of analysis may be further curtailed, and we may leave our traveller to visit, without incurring our displeasure, Dionysius' ear, Messina, Pompeii, Naples, Rome, Florence, Leghorn, Nice, to cross the Simplon and gain Geneva, visit several parts of Switzerland, and, passing through Lyons, stay a short period at Paris, and finally reach Dover on the 6th September 1828.

It will be perceived in this journey, at least in that part of it interesting to the general reader as a novel route, that many of the accommodations were entirely accidental, and among these we may particularly mention the steam-boat to Bombay, and the frigate to Syracuse; and how much, in the absence of these, we can depend upon the constancy of trading vessels, our author does not tell us; and delays at Alexandria might also be equally inconvenient with delays at Malta. In the appendix there is some advice to travellers leaving Bengal for Egypt; and although the work contains little additional information on the countries visited, yet if so many persons publish continental tours, which, from their sale, must have their admirers, how many more must feel themselves inclined to navigate the Red Sea, cross the desert from Cosseir to the Nile, and wander down its date-covered, classical banks, with so interesting and courageous a female as Mrs. Lushington has proved herself to be?

A New System of Geology, in which the Great Revolutions of the Earth and Animated Nature, are reconciled at once to Modern Science and Sacred History. By ANDREW URE, M.D. F.R.S.E. &c. Longman & Co. London, 1820.

Outlines of Geology, being the Substance of a Course of Lectures delivered at the Royal Institution. By W. T. BRANDE, F.R.S. Post 8vo. Murray. London, 1829.

THERE is a deep felt interest connected with the progress of every branch of science, which lasts as long as the elements of that science remain uncontroverted and changeless. And we view with admiration the rapid and dazzling rise of a new branch of philosophy, which promises in its elevation to throw open the first pages of the hidden history of the globe, and to unfold the primitive picture of organization.

Geology, or more properly Geognosy, the science on which the works before us treat, is on all hands allowed to offer one of the most admirable examples of the brilliant ascendancy of a branch of observation, which assumed in so short a time the constancy and infallibility of a science, and that of such extent and universality, that the meteor course of the greatest intellects, could scarcely follow the bright train of facts which sprung from this new science.

Originating in the most simple materials,—becoming more extensive in its progress, and finally embracing so many objects of research, that the study of the fossil kingdom became linked with the natural history of the terrestrial surface. Physical Geography was alone wanted, that it should embrace the whole science of observation.

It therefore naturally resulted that, unprepared for the new pursuits which geognosy would lay open, even its oldest professors were liable to err in their opinions with the youngest student of its principles; but certainly error will no where be found to have crept so far, as where the correlative branches of natural science are not made the necessary companions of all geognostic researches.

These observations have been called forth, not solely on account of the two works before us, but because erroneous opinions still keep their place in most of the elementary works of our country, while the last two of these which have been given to the public, have not even been brought down to the present state of the science. In consequence of which, more especially when geographical remarks, that is to say, observations on the identical rocks from which analogous formations have been named, cannot, as in the United States, and other countries distant from the present centres of science, be easily made, a career of error is begun, whose course is so rapid, that, as in the first-mentioned country, it is laying the foundation of a new science, when the names used in Europe to denominate one thing are applied to characterize another, and are applied to a different nature of deposits, and to formations of dissimilar ages.

It is certain that De Humboldt, in applying his knowledge of European formations to the structure of the Andes, found himself at a loss, and expressly states the entire uselessness of what he terms oryctognostic characters in recognizing the age of a mountain rock. But it is equally certain that errors have sprung from an inattention to these facts, or whence should we trace the necessity of Mr. De la Beche's excellent paper on the differences in structure which are observable in secondary stratified rocks?

How constant it is to find the characters of a mountain given in our elementary works as certain, when, in the present state of the science, we should only be engaged in studying its varieties; or, if we must teach before we know, we should be occupied in detailing the various appearances which the same formations may assume in different countries; for we know that a formation represented by an oolitic structure in one country, may become a compact limestone in another,—that the blue clay by geognosts termed lias, may become a compact hard dark limestone, and, if Von Buch is right, may be penetrated through with pyroxene or augite!

The detection and study of the organic remains, buried in the formations which constitute the crust of the globe, while they gave a new character to geognostic research, and led to the developement of some most striking truths, from being pursued with too much enthusiasm, and from placing too unbounded a reliance on their constancy, have led to grave errors in facts.

We do not find that exactly the same shells characterize the superior order of formations of England and France, or the supermedial formations of the north and of the south of France; and the more modern the rock, as might be expected from the difference of climate, the greater do we perceive the difference in organic remains.

The higher animals, met with in certain beds of the superior formation, have now been found more extensively dispersed. They must have lived in countries where successive catastrophes took place. Thus, animals resided by the banks of a great lake in Auvergne, before its volcanoes had burst forth, and the Palæotherium wandered on the banks of the ancient sea or lake of Lutetia, from the deposition of the oldest to the occurrence of almost the newest beds which now occupy the situation of former waters.

The tropical animals, found in the company of ruminants and carnivorous animals of the north, have been found wandering from their supposed cavernous haunts to the blue marls of Yorkshire; and amidst the numerous and beautiful facts which industry is daily pouring into the clear stream of geognostical science, we find the source of a new certainty, which will flow to that science, as surely as truth will ever be found by those who worship her for herself.

Positive geognosy, in contradistinction to geology, used by De Humboldt as historical, is a science which consists in the constant position of the masses, or the relation of one rock to another. And it thus belongs to the geognost to study the differences which occur in the mechanical texture and chemical nature of the same formations, in different geographical situations,—to study the laws by which these rocks have been regulated in the order of their superposition, and the accidents that may subsequently have happened to them,—to trace the relation that exists between the organic remains in the representatives of similar catastrophes,—and to study the share which the sudden or the continuous action of the agents employed by nature, could have had in producing the present configuration of our planet: and to these soon may be added, the investigation of the succession of deposits, and of organic creations, in their relation to existing races.

The numerous theories whose exposition adorn the beginnings of elementary works, are not entirely useless. They contain many facts of importance to be known. They show the method of reasoning which ensued when geognosy first became a positive science; and we think that they can but impress the reader with the absurdity of attempting to unravel, by bold speculation, those sublime facts, which in no one case has nature allowed us to explain without patient investigation and industrious research. Of the two volumes under review, Dr. Ure's work, "a System," and, besides, an attempt to "reconcile modern science and sacred history," contains most records of this kind; and thus stand prominent, researches on the historical character of Moses, on the illogical procedure of geological theorists, and on the new era of practical geology, of which era his notion is not, however, very complete or satisfactory.

Of the book on the creation we must speak favourably, as being adapted to modern discoveries; and though we do not at all admire discussions of that nature, yet it has always happened hitherto, that when the views of science did not exactly coincide with the Mosaic records, it has ever originated in the imperfection of our knowledge. And the late discoveries of the propagation of heat, Dr Young's beautiful statement respecting a disregarded property of light, and our increased knowledge of the properties of the atmosphere, may all be read with interest, as testimonies of this important truth.

Whether we consider rocks solely according to the analogy of their composition, or according to the laws of their super-position, we shall not find that in the primitive or inferior order, the analysis of the formations given by either of the two authors, will lead to a very clear conception of the truth. A method wholly oryctognostical, multiplies the names of rocks more than the wants of geognosy require, when positions alone are considered; and thus the study of a small granitic tract, might in some situations furnish us with many mineralogical varieties; but in point of position, we are acquainted with, 1. Granite alternating with no other rocks, though affording support to many, rich in quartz, and less abundant in mica. 2. Granite alternating with gneiss, sometimes super-imposed on the former, and accompanied with subordinate beds. 3. Stanniferous granites. 4. Whitestone, (Eurite.) 5. Granite posterior to gneiss. 6. Granite posterior to mica slate. 7. Granite and gneiss posterior to clay slate, (Kielvig and Shetland islands.) Now while Dr. Ure does delineate some of the mineralogical features of this most important rock, he merely alludes to its alternation, premising afterwards, that " veins which proceed from them, traverse the adjoining rocks, together with those similar veins which, though of the same mineral-composition, cannot be traced in the same manner to a fountain head," and consequently that they must be " included among granites." Does this inform us that this very fact is of primary importance in the deductions we should form of the relative age of the mother rock? Is the vein or the rock pierced? Veins of granite in granite, or veins of granite in gneiss? Are such facts of no importance? The occurrence of granite on rocks of posterior formations, is apparently no where mentioned. Professor Brande has scarcely at all troubled himself with the subject, and thus it is that foreigners have to visit the mines of Cornwall, that we may become acquainted with the age of rocks worked from the time of the Phœnicians, (Dechen and d'Oenhenosen in the Annals of Philosophy,) and the same remarks will apply to descriptions given of the whole of the inferior order of rocks in these two works.

" A rock with more or less of a slaty texture, but distinguished from slate by its less perfect lamellar fracture, and above all by its imbedded fragments, and being, at the same time, essentially argillaceous, appears to constitute legitimate greywacke," says the Professor in page 114, while Dr. Ure designates greywacke as " a rock commonly composed of grains or fragments of quartz and Lydian stone, among which bits of clay slate are disseminated. These parts are agglutinated by a cement of an argillaceous kind, usually impregnated with coarse siliceous matter. The size of the grains of quartz and Lydian stone, *rarely exceeds a nut,* but the pieces of clay slate are sometimes as large as the hand," (p. 141.) Now if we told our readers that greywacke is a name given to those deposits, of heterogeneous composition, which occur between the last of the primitive rocks, and between transition slates and porphyries, and the old red sandstone, zechstein, and coal formations, and that they are one of the first strongly marked, partly mechanical, partly chemical deposits, we think they would be able to form a better idea of the probable character of such a formation, than by comparing the discordant evidence of two systematists, and would thus be prepared better to comprehend how, in the Lammermuir range of hills, the fragments becoming so comminuted as to be no longer discernible, the rock takes there a schistose texture, approaching to clay slate, a fact with which Dr. Ure seems, however, to have been slightly acquainted; or may at the foot of the slates of South Wales, or the granite of Malvern Hills, present the feature of huge boulder stones, *many feet in diameter,* imbedded in an argillaceous, and oftentimes coarse silicious cement. This might be called greywacke passing into conglomerate; but it would be naming similar formations from their oryctognostic differences, and would induce error into the science.

We will continue with the county we have got into, as we believe it was there where Professor Buckland obtained his data for some part of his geological equivalents, (On the Structure of the Alps, and their Relation with the Rocks of England, 1821,) and which have been transferred into the "System" of Dr. Ure, and form the basis of his classification.

The members of the greywacke formation, constitute some barren tracts in North Wales, ranges of hills south of the Malverns, and some isolated hills, as May Hill, Gloucestershire. The conglomerates which form the remarkable scenery of the banks of the Wye, of Tintern, and Chepstow, have been considered as belonging to the old red sandstone, on which reposes the mountain or carboniferous limestone, supporting the coal basin of Coleford and the Forest, in which the measures all dip towards the centre. Beyond, to the north-west, associated with the greywacke of Mitchell Dean, lies a band of transition limestone, of different character, and with different organic remains. Whence comes it, then, that the Professor, in p. 104, opens his chapter on limestone, by stating that the transition limestone of the Wernerian school, appears to be the same with that usually called mountain limestone by English geologists?

The idea given of old red sandstone is not correct. It does not "accompany," but lies under the coal deposits; and its situation is not "upon the lowest secondary rocks," being itself the oldest and lowest of that order. On what authority, also, does Mr. Brande state the sandstone of Hawthornden to be red marl?

Between the new red sandstone with saliferous deposits, and the Jura limestone, we have two formations a-wanting in England,—the muschelkalk and the quadersandstein,—and they are consequently unnoticed in the two elementary works before us.

A distinction may be immediately perceived between the practical geologist and the historian of the science, by the manner in which the latter details the succession of formations, where he invariably omits the description of those beds apparently incongruous in structure with the mass of the formation, but whose occurrence between beds of the same nature, serve to mark the different dates of their deposition; and thus in the long series of rocks, assemblages of monuments of different epochas, from the first dawn of organic life on the globe, to the appearance of fragmentary rocks, and to the catastrophes which buried ancient vegetation and the first forms of animal life, we pretty constantly have sandy, calcareous, or argillaceous beds, mostly formed by mechanical sediment, separating the members of the same series, which would otherwise lie in opposition. Thus it is that in the complicated deposits of the oolites, or Jura limestone, the different beds could scarcely ever be recognized without a minute study of the fossil remains, and the oryctognostic characters of the intervening sands and clays.

From the description given of the tertiary formations, a series of deposits, of most modern origin, whose discovery has only sprung from the tide of researches induced by an appeal to the assistance of other branches of observation, and which have tended so much towards elucidating the theory of the latest catastrophes, and the succession of organic creations; the mind might be led much astray by granting a constancy of character which merely exists in the descriptions, and by neglecting those interposed beds which most of all served to establish a difference between the epochs of the deposition of these mineral strata, of the origin of whose fossils we are still uncertain. Thus, above the gypsum with bones, we have blue clays, limestones, oyster beds, marls with menelites, schiste happante, &c. &c. Erom the descriptions given of the upper fresh water formations, we should have much difficulty in recognizing the yellowish white marl of the Isle of Wight; the argillo-ferruginous sand, marl, and silicious meuliere, filled with cavities with shells of the plateau of Montmorency; or the silex, marl, and compact limestone of the chateau Landon; but an error applicable to one series of formations, when views no more practical have guided the delineation of the remainder, will be found repeated throughout, leaving it an undeniable fact, that the geologist could seldom, from the mineralogical description of rocks which are contained in these elementary works, pursue his studies with any chance of success, unless indeed nature had supplied him with that talent for filling up minor details, which could alone spring from a facility of conception which it is wrong to suppose to be possessed by every beginner whose steps we propose to guide, or to spring naturally from the perusal of the great features of a science, of which we have intended to write a system.

We have finished with our criticisms upon these volumes; for, viewed in another light, they are works worthy of attentive perusal. As an introductory outline to one of the most extensive and most interesting of the sciences of observation, Professor Brande's work is peculiarly well adapted; it is embellished with interesting and sometimes valuable wood-cuts; his views on theoretic subjects are impartial and devoid of prejudice; and his picture of the present state of things is very fair.

" If we look upon the landscape that surrounds us, we every where discern the fingers of that 'slow but sure destroyer, Time,' busy in modifying the present aspect and appearance of things. The bold and rugged outline of the mountain chain, full of broken peaks, abrupt precipices, extensive rifts and caverns,—the deepening of the valley beneath, covered with a fertile soil, brought down by the neighbouring streams, and bound together and enriched by organic remains,—the rapid and disturbed river expanding into the calm and undisturbed lake, whence it again issues, as it were, in renovated purity, and with new powers of fertilization,—are so many monuments of the devastation which a former order of things has suffered, and the records of the changes that are now going on." —*Out. of Geol.* p. 193.

For those again who wish to take a step beyond the "Outlines," Dr. Ure's work, certainly, in its whole, embraces the great features of the science, and some of the more prominent facts on which geognosy as a science is now based. Of the introduction and the first book we have already spoken. We have also spoken our mind freely of the part of the work devoted to practical geognosy, and it only remains to direct the reader's attention to the last book, on the deluge, in which the author professes to treat of the physical records of an universal deluge,—of the causes of geological catastrophes,—of the constitution of the primeval world,—and of the present earth and the era of its emergence; and however much we may differ in opinion with the author on certain hypothetical conclusions, we must still assert, that in treating these subjects he shows much industry and research, and we cannot do more justice to his motives than by quoting his concluding observation.

"I now dismiss these lucubrations, humbly hoping that they may promote the study of a new, but magnificent field of knowledge, and a far greater good than all physical science can bestow, one which the finest philosophical spirit of the age, justly declares he would prefer to every other blessing, as most delightful and most useful to him,—a firm religious belief."

Traité général d'Anatomie Comparée, par J.-F. MECKEL; *Traduit de l'Allemand, et augmenté de Notes, par* MM. REISTER *et* ALPH. SANSON. Tom. III. Part 2. Paris, 1829.

WHILST man, through overweening admiration of his own mental powers, knew not where to set the bounds of his superiority over the lower tribes of beings, he scorned comparison, even in his corporeal structure, with "the brutes" below him. But when he found that the same organs and processes were employed for the sustenance of the life of a beast as of himself, he was constrained to elevate his fellow-creature in closer approximation to his rank, and ceased to apply the term "brute" except to inert matter. And yet, even in this day, to speak of "man and other animals," is held by many as the language of treason against the Lord of the creation.

The anatomy of the lower animals thus became a subordinate and posterior consideration to the examination into the structure of man. The human frame was accordingly made the standard of comparison, and the description of other animal bodies was named comparative anatomy.

Comparative anatomy, from the amazing results and surprizing theories which have sprung from its prosecution, now assumes the highest rank among the sciences connected with the knowledge of living beings. It is made the basis of the classification of the animal kingdom; and in the natural system of plants, we see that its authors have at least entered on the path of certainty, by founding their arrangement on the analogies and varieties of anatomical structure.

From comparative anatomy have emerged speculations of the most astonishing description, so vast in their embrace, that by the unity which they approach, men cease to gaze in mere wonder at the origin of the determinate forms of living bodies, but believe that they can trace in the structure of a crystal the rudiments of that power,—that "elective affinity," which has shown perfectibility in the composition of man. The transcendental anatomy of the French, has given birth to the philosophic anatomy of the German school, which has, at the same time, by a morbid principle of growth, exceeded the absurdities of its parent, and, by the greater determination and accuracy of its masters, far excelled her in the exposition of facts.

Amongst the systems emanating from Germany, the treatise of M. Meckel stands prominent. Too minute in its details not to be exceedingly voluminous, this second part of the third volume of the work, only terminates the description of the bones. So complete, indeed, is this work, that the French translators, who had undertaken to add notes when requisite, confess that no room existed for their labour.

The part just published, contains the conclusion of the description of the skeleton of mammalia,—the bones of the limbs and of the head; concluding with general observations on the crania of the mammifera.

The work is essentially practical, but enlarged by many interesting notes, from the pen of the translators, on the different theories which have been advanced in connection with the text. In this new part, for instance, there is an analysis of the views of M. Serres on the developement of the cranium, (p. 392,)—an explanation of the law which he ascribes to the formation of articular cavities, (p. 146,)—and of the law of osseous protuberances, (p. 194.) And when treating of the internal plate of the skull, an abstract of the memoir of M. Vimont is appended, which, from its phrenological importance, and from the fact, that the Academy of Sciences still hesitate in expressing an opinion respecting it, we cannot do better than present to our readers.

" The study of the varieties of form exhibited by the crania of the human species, has led M. Gall to suspect that there must be a coincidence between the configuration of the osseous envelope and that of the inclosed organ. This anatomist has demonstrated that the hard parts are moulded upon the soft; and the accidents of volume, and superficial disposition of the encephalic parts, having appeared to him to be connected with the energy and variety of their functions, he thought that the external form of the cranium might indicate the intellectual aptitude and innate feelings.

" Fortunate observations," thus write the translators, " have confirmed these ingenious suppositions. In general, the human species and birds, amongst whom the skull is commonly, in the greatest portion of its circumference, formed of an unique plate, furnished to M. Gall useful facts in support of his system. The anatomy of other animals, however, did not seem to accord with these interpretations, because of considerable prominences which exist on the heads of many of them, and because of the figure of the two tables, which are frequently found separated by a considerable space. Extended labours were necessary to solve the physico-philosophic question hidden under the veil of these anatomical difficulties; and the capacity of the cranium in many species, and often in numerous individuals of the same species, must be examined,—add to which the knowledge of their manners and dispositions,—before it could be determined what cerebral parts constantly presented a developement in relation with the faculties observed.

" It is only by means of researches thus numerous and varied, that it would be possible to generalize the facts destined for the base of any doctrine, and that one would be permitted to consider, rectify, confirm, and extend the views of the German physiologists. Dr. Vimont proposed to himself this great task; and he presented a memoir on this subject to the Royal Institute of France in 1827. This skilful and zealous anatomist is convinced, from thousands of facts, that the form of the cranium being given, one may have an idea, allowing for the exceptions above mentioned, of the propensities and capacities of animals. The following are some general anatomical and physiological propositions expressed in the memoir of this distinguished physician:—

" *First anatomical proposition.*—The internal surface of the crania of animals belonging to the family of *Feræ*, (the mole excepted,) presents a configuration corresponding strictly with the elevations formed by the convolutions of the brain.

" *Second.*—The external surface of the crania of the *Rodentia* is smooth, and answers perfectly to the form of the brain in these animals, on which there is no trace of convolutions. Depressions or hollows in the cranium, indicate the parts of the brain which are most developed.

" *Third.*—The crania of all *birds,* (some birds of prey excepted, as Strix flammea and S. otus,) are found in perfect harmony with the form of their brain: the internal surface of the cranium is as smooth as the encephalon; many depressions indicate the most developed portions of the brain.

" *First physiological proposition.*—The more the anterior and inferior part of the frontal bone of quadrupeds and birds are developed, the more perfectible are the animals."

M. Vimont did not content himself with making researches, on this subject, from class to class, from order to order, from genus to genus, but studied even the individuals of the same family.

" *Second.*—All animals endowed in a very high degree with attachment for their young, have the part of the cranium which is placed on the sides of the parietal suture, towards the internal and posterior third of the parietal bone, more developed than those which have this faculty only in a small degree. Compare the heads of the dog and the bitch, the male and female cat, the male and female weeper, (Cebus apella, Desm.)

" *Third.*—In the *travelling animals,* and especially in the class of animals of periodical passage, the part of the cranium placed above and behind the orbital margin, is expanded in a sensible degree: some present so remarkable a developement of the organ which gives to animals the faculty of guiding themselves, (locality,) that the margin of the orbit appears arched and rounded.

" *Fourth.*—All animals which live on flesh, or which have a propensity for destroying, have a particular part of the cranium whose developement corresponds with that of this faculty. Thus all the *feræ,* without exception, have the squamous portion of the temporal bone enlarged in a perceptible manner. We may cite for example, the tiger, the cat, the fox, the martin, the weasel, the ermine.

" In the carnivorous birds, properly so called, the portion of the cranium situated behind the orbit, corresponds with the organ of carnivorous instinct, and presents a remarkable developement. In the omnivorous birds, the enlargement is a little more posterior.

" What we have said of the faculties of educability, of attachment for the young, of the faculty of self-guidance, &c. is applicable to all the seventeen faculties which M. Vimont has described in his memoir. Every person who would make numerous researches upon the crania of circumspect, cunning, courageous, mild, constructing, contriving animals, &c. &c. would be convinced, M. Vimont assures us, that there really exists a correspondence between the conformation of the crania of these animals and their psychological acts. The number of observations collected by this author is so considerable, the proofs which he has given in support of his researches, which are based upon a profound study of the brain and the skull, are so varied and beautiful, that *they seem to give to his propositions all the power of demonstrated truths.*"—P. 365.

Such is the language of the translators of Meckel with regard to a science, which has been attacked in this school with an animosity which would indicate some other stimulus than the mere quest of truth.

The Animal Kingdom, described and arranged in conformity with its Organization; by the Baron Cuvier. *Translated, with large Additional Descriptions of all the Species hitherto named, and of many not before noticed, and other Original Matter; by* C. Griffith, F. R. S. C. Hamilton Smith, F. R. S. and E. Pidgeon. London. Parts I. to XX.

It is no longer necessary to deplore the utter neglect which the study of natural history for a long time experienced in this country.

A reproach of this kind is not now applicable to us. The period is past in which such writers as Kirby and Spence were forced to enter into an elaborate defence of their favourite science, to shield it from the ridicule of ignorance, and to recommend the result of their researches to the attention even of the learned. We are no longer called upon to vindicate the interest and utility of any branch of the study of nature. We have merely to announce our subject to insure a hearing; and if we fail of commanding consideration, the fault will be in ourselves. The popularity of natural science is widely spread. She has stept forth from the museum, the study, and the dissecting-room, to mingle in the crowded societies of men.

But to whom and to what is this favourable revolution to be attributed? We shall ever be ready to acknowledge the full extent of our obligations, on this score, to those distinguished countrymen, whose efforts in this cause have been so exemplary and so successful. But without derogating, in the remotest degree, from their merits, we must candidly acknowledge, that the impetus which set their energies in motion, did not arise among ourselves. To the honourable spirit of rivalry in science with our Gallic neighbours, which was aroused among us after the destructive one of war had subsided, the origin of our efforts in this kind must be traced. We owe much, very much, to the naturalists of Germany and France. From them we received the shock which re-awakened us into vital action, after a long, and apparently a hopeless lethargy. From the time of Willoughby and Ray, until, comparatively speaking, within a recent period, little had been done in zoological researches commensurate with the dignity of the British name. At all events, whatever might have been the merit of certain individuals, the general apathy to such pursuits was incontestible; and in this apathy might we still have remained, but for the example of strangers. Thus much is due to candour and to truth. It may be patriotism to arrogate every virtue exclusively to ourselves; but assuredly it is neither justice nor wisdom.

Among the illustrious names of the Continent which are, "*per ora virum*," in connexion with natural science, stands decisively pre-eminent that of CUVIER, whose "Regne Animal" forms the basis of the work at present under our consideration. His labours in comparative anatomy, and, above all, his researches into fossil osteology, entitle him to the eternal gratitude of all true lovers of knowledge. Identified with past creations, his fame can perish only with the present, by a revolution similar to those whose existence he has so ably demonstrated.

The "Regne Animal," though little more than a synoptical view of the animal kingdom, is the best and most natural system of zoology yet offered to the world. Its great merit consists in exhibiting, as nearly as possible, the relations of existing beings, without attempting a degree of precision which is unattainable, and which perhaps does not exist in nature itself. It will be well if future naturalists imitate this example, and do not vainly endeavour to make nature bend to their own preconceived or slightly founded theories.

To enter into any detailed view of a work so long before the public, aud so well received, as the English " Animal Kingdom," would be quite superfluous. It is sufficient to observe, that it contains a translation of the " Regne Animal," an additional enumeration of species, with descriptions, and a copious supplement of popular and interesting matter, partly original, and partly derived from the best authorities, both native and foreign. This last part will be found most amusing to the general reader, and, in our opinion, the most useful in tending to increase the popularity of the subject. The dry details of classification are assuredly indispensible to the student of zoology ; but to relieve them by agreeable descriptions, philosophical discussion, and the beauties of style, is a laudable task, for the execution of which our acknowledgments are due to the editors of " The Animal Kingdom."

As to the progress of this work,—" The Mammalia" has been completed for some time, and the part on " The Birds" is nearly completed. The No. last published, (the 20th,) contains the conclusion of the supplement on " Scansores," the translation, &c. of the " Gallinæ, and a part of the supplement on the same order. It is but justice to observe, that the majority of the engraved illustrations are in a style of superior execution.——W. T.

GEOGRAPHICAL COLLECTIONS.

Report made to the Academy of Sciences, by a commission formed of Messrs. De Rossel, Mathieu, and Arago, on the mathematical labours executed on board the Chevrette during her late voyage.

After stating the appointment of the commission, and the route pursued by this vessel, an account of which we have given in our last, the reporters said, that in that lengthened navigation, Captain Fabré had chronometrically fixed the position of one of the Cape de Verd islands.

" He assured himself that the islands of St. George, Roguepiz, and the Seven Brothers, had no existence in the position assigned to them by the *Oriental Neptune* of Daprès. He recognized the northern part of a passage situated in the archipelago of the Maldive Islands, and which vessels going from Europe to the coast of Coromandel, may in future follow with advantage and security.

Mr. Blosseville surveyed the course of the Irrawaddy from Rangoon to Dauoubiou ; Mr. Janneret the arm of the river between Rangoon and the sea ; and Mr. Payuet that branch which extends to Pegu, the ancient capital of the kingdom.

In the north of Ceylon, Mr. de Blosseville surveyed the coast from Cape Ralmas to the fort of Hano-en-Hiel, and drew up a detailed chart of the harbour of Kaits and its environs. In going to Batavia, the same officer observed a sufficient number of points, to be able to make some important rectifications, both to the charts of the Straits of Sunda, and to those of the northern parts of Java. The roads of Batavia were also the theatre of his indefatigable zeal.

The Chevrette was furnished with a set of magnetical instruments for making observations on land. These instruments were examined in Paris before their departure, and have been subjected to a similar examination on their return. During the journey they have been made use of whenever the vessel put into harbour, and thus the expedition has procured for us measures of the variation, of the inclination, and of the magnetic intensity for Toulon, the Isle of Bourbon, Pondicherry, Calcutta, Chandernagor, Rangoon, Daoubiou, Karical, Trincomalee, Jaffnapatnam, Aripo, Changani, Batavia, and Simon's Town.

All the observations have been made with the greatest care. The results of the different needles have every where agreed, as much as an experimenter in a sedentary observatory might have desired. The observations on the horizontal needle, will fix several points of the line of no variation. The observations on the inclination will be no less useful; for they will serve to trace the magnetic equator, whose position in India is only founded on ancient and rather imperfect admeasurements.

The discussion of these precious observations, will no doubt confirm what has already been discovered upon the motion which gradually transports the line of no inclination from east to west; and they may also assist in deciding a yet uncertain question, viz, whether the motion of this curve is or is not accompanied by any change in its form.

The attentive examination which we have made of the observations of intensity, has shown us that their discussion will be accompanied with some difficulty: the needles have in fact lost, during the voyage, a notable part of the magnetism with which they were endowed at the moment of departure; but the attention which was given to observations made at Pondicherry, in several places where they stopped, and the observations of Paris in 1827, compared with those of the commencement of 1829, will permit us, we have every hope, to determine the amount of that loss, and to obtain comparative results.

Your commissioners do not think that they should pass over to another part of the report, without bringing into notice the names of the observers who studied magnetical phenomena. We shall in consequence mention, that the observations of Paris of 1827 and 1829, are those of Mr. de Blosseville. The observations made at Toulon, previous to the departure of the expedition, belong to the commander and to the young lieutenant whom we have just named. The measures made of this inclination at Pondicherry, at the first stay, and of the variation, inclination, and intensity at Rangoon, are by Messrs. Fabré and Janneret. Every where else, the researches on terrestrial magnetism, have been exclusively entrusted to Mr. de Blosseville.

In this occupation, extremely fatiguing and delicate, this officer had been often seconded by a young seaman, Mr. Bassé, who perished at Batavia, the victim of his zeal.

The meteorological observations made on board the Chevrette, during the different navigations, will constitute one of the most interesting acquisitions which natural philosophy has for some time reeeived. These observations are detailed with the greatest order in four registers: the instruments employed had been compared with the most exact that could be obtained, previous to the departure of the expedition, and have been verified on its return. The errors which might have arisen from the radiation of the vessel, have been avoided as much as possible. In fact, this part of the labour will leave nothing to be desired with respect to exactitude.

To judge of its extent, we may mention that the temperature of the atmosphere, and that of the ocean, have been registered from hour to hour, as well by night as by day, during the whole duration of the voyage. The barometer has been observed regularly, during thirteen months, ordinarily twelve or fifteen times a-day; in other circumstances, from half hour to half hour, or from ten minutes to ten minutes. This multitude of observations will throw some light on the mean height of the barometer at the level of the sea, and upon the amount of the diurnal periods at a distance from the shores; that is to say, in circumstances where the temperature of the atmosphere varies very little during the 24 hours.

We shall now also have an opportunity to see if the remark made by Flinders at New Holland, concerning the unequal influences which the land and sea breezes exert on atmospheric pressure, is equally applicable to the Indian Ocean, Some comparative observations made at sea, with the assistance of thermometers whose bulbs were black and white, will have so much the more interest, that Sir Edward Parry and Sir John Franklin occupied themselves near the Pole with similar researches; and it has been thought, that from them it might be deduced, that solar radiation is the less powerful as we approach the equator.

Natural philosophers will also learn with satisfaction, that our navigators have determined the temperature of the sea at great depths, by using thermometrographs of very excellent construction. Experiments of this kind have always excited much curiosity, because they give occasion to search how there occurs, under the tropics, those inferior beds in which the temperature appears to be much beneath that which the surface of the sea can acquire by radiation, and they excite the zeal of seamen so much the more at the present moment, as it appears to have resulted from some recent experiments, that salt water has not, like fresh water, a maximum of density previous to the degree of congelation; and nevertheless this has been made the starting-point in all discussions to which the diminution in the temperature of the waters of the ocean have given birth.

The great undertaking of which we have just presented the analysis, was executed by Mr. de Blosseville and Messrs. Legay and Vidal, whom the former had instructed in making observations, and whose zeal never for one moment abated. We may add, that Mr. de Blosseville had procured, at his own expense, a part of the instruments which he employed.

Among the detached labours which we have met with in the registers of the expedition, we may mention observations on tides, the determination of the elevation and temperature of some hot springs in Ceylon, and lastly, physiological experiments, in which Mr. Reynaud, chief surgeon of the ship, and Mr. de Blosseville, both assisted, upon the temperature of man, and of different animals.

By choosing in the crew of the Chevrette, a good number of sailors of different countries, ages, and constitutions, these young observers have been able to measure the modifications which different climates effect on the heat of the blood, and to add some interesting results to those which Mr. John Davy has already published on the subject.

We have thus confined ourselves to the act of presenting to the Academy, the inventory of the different observations by which the voyage of the Chevrette has enriched science. It is not that we have always resisted the desire of drawing some consequences from them ourselves; but the difficulty of these deductions is so little when compared with that with which such numerous observations must have been accompanied, under the burning sun of a tropical climate, that we have looked upon it as a duty, even with the risk of offering you a report rather devoid of interest, to leave entirely to the authors of the labour, the pleasure of first publishing the results to which they may lead."

The commissioners, after stating that under every point of view, the journey of the Chevrette will occupy a distinguished rank among those voyages from which science has reaped the greatest benefits, proposed that the gratitude of the Academy should be testified towards the zealous and intelligent officers, and hoped that, in the publication of the observations, the superintendence of each department would be given to those who had particularly occupied themselves with first collecting its materials.

Account of Mr. Rifaud's Travels.

The travels of Mr. Rifaud, which have occupied twenty-two years of that gentleman's life, out of which thirteen have been passed in Egypt, have excited much interest in France.

The quantity of materials which he has collected is enormous. His drawings amount to more than six thousand. His notes are contained in fourteen manuscript volumes; and his collections contain specimens of all kinds in the natural history, the antiquities, the arts and curiosities of the countries which he has explored.

Mr. Rifaud has been presented to several learned societies, who named commissioners to examine the materials which he has brought back, and reports have been given in to the Academy of Sciences, to the Academy of Inscriptions and of Belles Letters, to that of the Fine Arts, to the Geographical Society, and to the Asiatic Society.

This traveller, born at Marseilles, was destined at first for the profession of a sculptor. Full of ardour for his art, he visited the principal towns of France, and remained some time at Paris. In 1805, having gone to visit Italy, and the metropolis of the fine arts, he was led to travel through Spain, the Balearic Islands, Malta, and, in 1809, he landed at Smyrna, and explored many parts of Turkey, Romelia, and Anatolia, that unfortunate country, says Mr. Rifaud, where the glowing colours of the painter are dimmed, and the poet's lyre is no longer heard,—where man, under the despotic influence of the sword and the Koran, is dead to the inspirations of genius.

In 1812, our traveller embarked, with several countrymen, to avoid the pest which desolated Smyrna. Some Albanian soldiers, who were going to offer their services to the Pacha of Egypt, brought the plague on board; and before they had arrived at Chio, seventeen of these unfortunates had been already thrown overboard, and ten others were left on that celebrated island.

Driven from Tchesmé, where they were going to land, they coursed off to Rhodes, where, obliged to bivouac upon a land equally desolated by the cruel disease which had every where been their companion, they took into immediate consideration the possibility of reaching Cyprus, or Alexandria.

Out of five Europeans who quitted Rhodes, two disembarked to go to Tarnaca; a third, Mr. Frederick Catati, labouring under the plague, was conducted to Damietta, where he became convalescent, and finally recovered.

The only companion who was with Mr. Rifaud, left him alone in Cyprus, the ancient conquest of the Lusignans, and where he nearly fell a victim to the epidemic fever.

He recovered upon his arrival at Alexandria, and conceived fresh hope of being able to add to our knowledge of the country of the Ptolemys. His escape from disease, made him think that he could confront danger with more impunity, and his heart beat with the desire of commencing his labours.

He successively pitched his tent at Guorchy in Nubia, Carnak in the Thebaid, at Medineh, Lavouara, Banquis, in Fayoum, Telebaste, Mouquedam, Charquieh, Comlarmar, and lastly, in the Delta.

Seventy-five statues, of which some now embellish the museum of Turin; the discovery of six monuments at Carnak and at Thebes, not mentioned in the great catalogue of the Institute; other precious ones at San; little sanctuaries, isolated peristyles, remains of different monuments; a collection of new inscriptions; hieroglyphics in Grecian, Saracen, and Latin figures, &c. &c. were the result of these long continued labours.

During this period a multitude of other objects occupied his attention,—mixed with the natives, whose language he had learnt, and whose costume he had adopted, few of their customs were allowed to escape unnoticed. He even occupied himself with the means they employed for the preservation of their health.

He became acquainted with the Pacha, who called him *Cravaji Francauvi, abou antique*, " French merchant, father of antiquities," and visited him, accompanied by part of his suite, on the very place of his discoveries, which he examined with some attention.

Familiar with the Bedouin Arabs, he often penetrated the deserts, making large collections of plants, and pursuing observations in meteorology, and the other branches of natural history.

Among these people vaccination, introduced by a sailor of Trieste in 1820, is now very prevalent.

Mr. Rifaud mentions the honourable notices he had received from Mr. Henry Salt, General Malcolm, the Hon. Mr. Banks, &c.

A careful examination of the labours of Mr. R. dissipated, however, a great many of the brilliant hopes which had been founded on these researches.

Part of the drawings represent Grecian inscriptions, copied near the second cataract, at Syene, &c.; but as the same spots have been visited either previous to, or after Mr. Rifaud, out of 114 Greek inscriptions, only 26 were found to be unpublished.

The Arabian inscriptions consist of 100 narrow bands of paper found in the tombs of Musselmen. They do not date farther back then the 13th century, and for the most part contain magic formulæ, and religious sentences or passages of the Koran.

The hieroglyphic subjects speak highly of Mr Rifaud's activity. There are 147 of them, and 53 sheets representing monuments of Nubia and of Egypt, and 30 drawings of architectural details; but these drawings require much correction before they can be published.

Mr. Rifaud has collected also 200 ancient medals in gold, silver, pewter, and brass, which he intends giving to different cabinets.

He has also constructed several maps and plans relative to the ancient topography of the country, at Medinet-el-Fars, the capital of Fayoum. He is said to have dug to a depth of more than 200 feet, and to have proved that this ancient town has been built on three successive soils, and that a considerable space of time elapsed between these different re-constructions; for the superior buildings have an entirely different form to the inferior ones. Our traveller found in the latter, mosaics, of which he made 213 drawings, besides bringing home some specimens whose high antiquity is very dubious. Some bricks, with singular characters marked on them, were also found by him in the greatest pyramid of Fayoum.

While occupied with researches for statues and monolithes in Thebes, he discovered some ancient monuments, little temples with coloured columns, peristyles, palaces, &c. on the eastern side, which were hidden under the ruins at the time of the French expedition.

Though Mr. Rifaud, during his long residence in the east, learnt to converse in the Arabian language, he did not study it by its principles. In consequence of which, when he has wished to take notes of the denominations of the plants and animals in use in the country, they are oftentimes quite incomprehensible.

During nearly four years he kept a regular meteorological register, consisting of observations made both by night and by day, as well upon temperature as upon different atmospheric phenomena. It is to be regretted that this observer has not had at his disposition a barometer to follow the comparative march of atmospheric variations.

The attention which Mr. Rifaud paid to natural history, is the more deserving of praise, as it shows a resolution seldom possessed by men devoted to other branches of knowledge, notwithstanding the advantage they could confer to that science and to society, of which Mr. Rifaud has given us a proof.

Constantly occupied with his subject, it is by thousands that he has collected drawings, quadrupeds, birds, fishes, insects, and vegetables. Every thing is to be found in his portfolio; even sketches of all the classes of vertebral animals are seen in great quantities; and though zoological characters have not been an object of the particular attention of the author, it is not impossible for experienced naturalists to trace them in his figures.

Mr. Rifaud has indeed brought home a sufficiently great number of the original pieces from which his copies were made; and they can be used to rectify or complete what may have escaped in his drawings.

Unfortunately every thing is not equally well preserved in his collections. The burning climate of Egypt accelerates too much the destruction of dry animal parts, to allow them to be long preserved; and the obligation under which he was placed, of opening his boxes at the lazaretto of Livournia, and of exposing their contents to rain and to the sun, has much added to the losses which the climate of Egypt had occasioned to him. Nevertheless he still possesses some very precious skeletons, particularly of the fish of the Nile.

Mr. Geoffroy St. Hilaire had already, in the great work on Egypt, excited the attention of naturalists towards the animals of that class, which this river, coming from the elevated parts of central Africa, bears with it in its regular increase, and which are unknown to the rest of the world.

Mr. Cuvier, in comparing with attention the drawings and skeletons of Mr. Rifaud with those of Mr. Geoffroy, ascertained the existence of several new and interesting species.

The whole number of fish amounts to seventy-eight, and the figures which Mr. Rifaud has executed of them, have the merit of offering the colours in a fresh state,—a part of their characters which painting alone has hitherto been able to preserve.

The shells of the Nile, to the number of twenty-five, may also offer many novelties; but as we have as yet on this subject only the drawings of Mr. Savigny, and as the state of that unfortunate naturalist's health does not permit the hope that he will soon publish the text, the commissioners who reported before the Academy of Sciences, had not the same means of comparison as for the fish.

The insects were so much broken, that it was impossible to distinguish the specific characters so as to ascertain whether there were many new.

In looking over the collection of plants, Mr. de Cassini found them much better preserved than the animals; and he found, that though offering a great number of known species, there were some perfectly new. The drawings are about 500 in number, coloured after living specimens; and, without being quite adapted to the present state of scienee, in the analysis of the more delicate parts of the fruit and flower, are far from being without interest, and give a satisfactory representation of the character of the plant, of its external parts, and of its natural colour.

Each separate commission, in terminating their reports, proposed that the bodies of which they formed a part, should testify their approbation of, and gratitude for, the labours of Mr. Rifaud; and the commission of the Academy of Sciences, more particularly testified its satisfaction to this traveller, for the rare example which he has given, of allying to his antiquarian researches labours of a more elevated nature, and from which all enlightened men can reap advantage.

Notice of Paraguay, and the Government of Dr. Francia.

THE rapid elevation of an individual from the most subordinate situation to the height of power, forms an epoch in the history of countries, upon which the mind always dwells with deep felt interest; and we love to seek, in his acts of government and first display of authority, the characteristics of that mind, by whose energies or superiority we suppose he has wrought his way to the regal purple.

Such contemplations will generally be found to be fruitful in results. The demeanour of the leader of the people, and the giver of laws may be different; but the bent of mind that characterized the one will still remain with the other, unless the sudden elevation dazzles the fair brightness of the intellect, and, like a second Masaniello, the hero becomes a madman.

So much originality of character and thought is displayed in the government of Dr. Francia,—there is so much consistency in his whole proceedings; and yet so much romance is attached to the first revolutions of a remote empire, originating under a fair sky, and planted on a rich and fertile soil; that we are sure our readers will thank us for having curtailed some other subjects of interest, to draw a sketch of this extraordinary man, for which we are principally indebted to the *Essai Historique sur la Revolution du Paraguay, et le Gouvernement Dictatorial du Dr. Francia. Par Messrs. de Reugger et Longchamp. Second Edition. Paris,* 1829.

Paraguay, a vast region in Southern America, threw off the yoke of the court of Spain, without experiencing any of those misfortunes which generally accompany revolutions. The republic of Buenos-Ayres sent, in 1810, a body of troops to subject this country; and though the expedition had not the desired effect, it gave birth, among the officers of the army of Paraguay, to the idea of making their country independent. The government of the king of Spain was replaced by a junto, whose administration was so bad that it fell by itself. Two consuls were then elected, Yegros and Francia. The latter was considered as the man most capable of conducting public affairs. He was the son of a Frenchman established at Paraguay. It was in the convent of monks that he received his first education,—that he studied theology, and obtained some knowledge of jurisprudence; and he had acquired, in the profession of a barrister, some reputation for his attainments, his disinterestedness, and for his singular character.

The day that he took possession of the consulship, his extreme love of power showed itself, by his sitting down on a chair on which was inscribed the name of Cæsar, and leaving to his colleague that which bore the name of Pompey.

He was not long, indeed, in making himself, by his intrigues, the master of the suffrages of the people, to gain the dictatorship, which was at first only temporary; but his ambition could only be satisfied by its becoming possession for life. To arrive at this supreme dignity, he was moderate in the administration of affairs; but when he saw himself charged with an unbounded power, he governed the state with a sceptre of iron. As his humour depended on atmospheric changes, his despotism became clouded and jealous. Every thing in the state was done by him, and for him. He had no more friends; and no one was the confidant of his thoughts. Fearful of allowing any of his designs to transpire, or of communicating the smallest part of his power, he never assisted himself by any counsel, following the dictates of his will alone, which he made to be executed with as much promptitude as severity.

His character, soured by a conspiracy against his person, became so harsh, that his presence inspired fear. When he appeared in public, or when he passed along the streets, every body avoided him like a ferocious beast. He ordered the houses to be knocked down which were in his way, wishing to have space about him to keep away those whom he feared might attempt to take away his life. He never walked without arms, or unaccompanied by a guard. The walls of his apartments were covered with swords. Those most familiar only approached him at a distance; their arms hanging down, and their hands open, as he was ever fearful of the presence of daggers. For more security, he never inhabited the same spot, nor the same house for two days, and he never retired without having shut the bolts himself. He never eat any thing which he had not previously examined or prepared with his own hand, for fear of perishing by poison, and his soul was constantly agitated by those fears which are the result of violence used in power.

But never was there a greater tyranny accompanied with such admirable virtue. Sober, active, economical, laborious, vigilant, he knows how to live upon little, and without luxury. He only keeps three or four servants, and his house resembles that of a simple citizen, rather than the residence of a prince, or a dictator. His manners possess an exemplary simplicity. He flies from all voluptuousness, which he considers pernicious to power. What is most remarkable in him is, that he has remained poor, without wife or children, with a power that must perish after him, and with riches which he only spends for the state. He loves those arts and sciences which are useful to the prosperity of his country; so that he passes no day without consecrating some hours to study, and he is acquainted with all that can be learnt in a country where ignorance still reigns.

It would appear that fortune gave birth to such a man, that he might lead by tyranny his people to liberty. His genius penetrated their character. He saw that, placed under a burning sun, shut up by rivers, surrounded by deserts and wild nations, they were ignorant, superstitious, and possessed of an extreme indolence, though they were not wanting either in intelligence or in natural sagacity; but that their minds and bodies remained without any impulse, and, as it were, weighed down by the weight of those vices which were derived as much from the climate as from the bad institutions brought over by the Spaniards. As nature distributed her luxuries without much labour, they remained in consequence immersed in a kind of apathy and indifference, inimical to all species of public felicity.

Francia has well judged that, with such vices, a nation which owed its liberty to the favour of circumstances, rather than to virtues culled from adversity, would soon fall again into slavery and brutality. He saw no other means of establishing and consolidating liberty, than by extirpating by violence vices which had gained so deep a root, and by imposing on them virtues which would one day make them prosperous. He undertook, then, to reform his nation like a father whips his children, to correct their bad inclination; and we shall notice the means which he put into practice to attain an end so worthy of an elevated mind which penetrates into the future.

As soon as he had attained the dictatorship, he occupied himself with giving strength to his power, and by rendering it more and more absolute. He did not allow the least contradiction, nor the least resistance to his will, exacting from all a passive obedience, without the least murmur. As such a power could not be supported but by a force, equally to be feared on all sides, he devoted all his attention to the formation of a well disciplined army, blindly devoted to the defence of the state, and to preserve his authority. He dispensed with the services of many officers, whose fidelity appeared suspicious, because they belonged to powerful families, who inspired him with dread. He replaced them by men chosen from the lowest plebeian ranks, and who attached themselves to him by interest, if not by gratitude. The soldiers whom, when unemployed, he allowed to live according to their fancy, had no less attachment for his person; and all became the instruments of his caprices and of his will.

But however devoted an army may be, it does not offer a sufficient guarantee to a power which becomes terrible, and knows no restraint. Francia thought he might consolidate this power, by establishing a police of such a description, that nothing could be undertaken, neither against his government nor against his person, without his being informed of it; for he was well aware how much his tyranny rendered him odious. Every creature that received his wages, was not only charged with the guardianship of the citizens, but was obliged to serve him as a sure and faithful spy. Whoever gained any information of any one rebelling against his authority, whether in action or in words, was punished equally with the guilty, if he did not hasten to denounce him. Hence friendship, concord, and communion of sentiment, fled from the bosom of families: people met one another with fear, and scarcely dared to speak. But without a police of this kind, it would have been difficult to have stayed, or have anticipated those conspiracies to which tyranny always gives birth.

As Francia's designs could not be penetrated, he was looked upon as a horrible tyrant, from whom the country should be delivered, and it was not long before a vast conspiracy was formed against him. Though in the very beginning he had arrested one of the chiefs of the enterprise, he only discovered the whole plot by the revelation of a conspirator, made to a monk at the tribunal of repentance. The moment of execution had been fixed for the Good Friday of 1820, when the conspirators were to have stabbed the dictator and the principal chiefs of the government. Francia was so much irritated, that he punished the conspirators like a tyrant. In the midst of their tortures, brothers might be seen denouncing brothers—fathers accusing their children. The executions were numerous, and lasted more than a year. The blood which he caused to be shed, created a great panic in Paraguay, which he kept up by throwing a multitude of citizens into irons, and directing his persecution more particularly against a great number of Spaniards, whom he detained in prison in a most barbarous manner, and to whom he only gave liberty after depriving them of their riches.

Tyranny is so odious in its nature, that no one can justify it, even should it be turned to public advantage; for staining itself with crimes and with blood, it violates the rights of humanity, of nature, and of society. Nevertheless Francia, who was not a stupid tyrant, promised to himself to draw great advantages from a power which he maintained by terror. He undertook, with the assistance of tyranny, to reform his nation ; and it is in that enterprise that appears the finest part of his genius. As long as Paraguay could have had communication with other people, he could not have introduced a salutary reform ; for, besides a spirit of anxiety and of rebellion, more vices would have been gained from without than he could ever have corrected in the interior. Francia did a thing quite new, and worthy only of the legislation of antiquity, when he forbade all kind of relationship, of correspondence, and of commerce, with foreign nations. He permitted no one to go out of the country under any pretext whatsoever.

No stranger could come into Paraguay, reside there, and go out without a permission, which he only granted with great circumspection. He put so much rigour in this measure, that he was not at all scrupulous in retaining Englishmen, Italians, Portuguese, and natives of other countries, prisoners in his state. Mr. Bonpland, travelling companion of the Baron de Humboldt, having been borne away by some soldiers from a village of Cavages, has not been able, after many years of captivity, to obtain permission to revisit France, his native country.

The situation of Paraguay was singularly favourable to the design of Francia, being in the interior of America, at a great distance from the sea, with which it has no communication but by its rivers, whose course surround it, and nearly make it a peninsula ; and it was the more difficult to enter, or go out of it without permission, as beyond these rivers deserts and forests are met with, where the traveller is exposed to destruction.

As soon as the people of Paraguay were, in this manner, isolated and separated from the other nations, they were obliged to give up all journies, a thing they were particularly fond of ; and not only were they forced to remain at home, but also to seek, in their own resources, the means of satisfying their wants. From that moment they devoted themselves to the cultivation of the fields, to the rearing of flocks, and to the different mechanical arts : they could no longer ask any thing from other nations, nor receive any thing.

Paraguay soon began to change in its appearance ; for industry is the daughter of want. Countries, previously barren and desolate, became covered with crops. Sheep-folds were established in all directions, and fine races of animals multiplied on the bosom of the vast and fertile pastures. The number of horses, which previously were all obtained by importation, now increased beyond the immediate wants. And nothing, contributed so much towards increasing agricultural riches, as flocks of sheep, which furnish clothes and food, and the keeping of which constitutes the sweetest occupation of a country life.

Agriculture, without which man would have remained in a savage state, never makes any progress without bringing arts into perfection. Besides the instruments of culture, machines were required for the preparation of wool and cotton, which could no longer be sold to foreigners. It was then that the mechanical arts left the state of infancy and imperfection in which the inactivity of workmen had left them. Manufactures were first established for the generality of necessary articles, and for which they had hitherto been dependent on other nations, thereby keeping the country in a state of poverty, notwithstanding the fertility of its soil.

This state of prosperity could not have taken place without the genius of Francia, and without many acts of tyranny. There were no men more given to idleness than the inhabitants of Paraguay. To them it was a delight to be doing nothing. They passed a great part of the day on horseback, at church, gambling, or with women. It was on this account that Francia, endowed by nature with an extraordinary activity, used every means in his power to uproot this apathy of the mind and body. He made every body work, by punishing idleness as a crime. He condemned to imprisonment those who neglected their fields and their flocks. If by neglect the shepherd allowed any of his flock to go astray, they were confiscated to the state, to render him more vigilant. He did not always trust to the reports of others. He traversed the country on horseback; visited the manufacturers' work-shops, markets, and magazines; saw every thing himself, and communicated his thoughts to every one, so much had he at heart the prosperity of his country.

Francia was singularly favoured in his enterprises by a disastrous event which he knew how to turn to the advantage of agriculture. The fields of Paraguay had been overrun by swarms of locusts. The inhabitants, seeing themselves on the eve of being desolated by famine, were thrown into the greatest consternation. They murmured against the dictator for having interdicted and destroyed commerce, which was the only thing that could prevent them from dying of hunger. Without being at all troubled by these murmurs, he ordered them, under severe penalties, to sow the lands again; and it was a kind of prodigy to see them bear a second crop, showing that Paraguay was of an incomparable fertility. From that time, taking care that a part of the cultivated lands were twice sown over in the year, he induced the reign of constant abundance.

As there was in the country a multitude of dogs, who, having abandoned their masters, went about in a wild state, associating themselves like wolves to commit depredations on the sheep-folds, from time to time he ordered their destruction: then the generality of dogs were destroyed, whether wild or not, as it was not always easy to distinguish. When he gave orders of this kind, which rather vexed the inhabitants, it used to be said that a dog had barked at the dictator's horse. It was an indirect way of blaming his tyranny, which they did not dare to do openly.

Francia did not allow agriculture to flourish without ameliorating the other arts, by always employing, with similar success, fear, threat, and punishment, as if to force human nature to produce what it creates naturally in a well organized society. He not only showed himself the enemy of laziness, but he exacted that every workman should perfect his art according to his intelligence; and with this intention he reprimanded him, threatened him, and even punished him with an unexampled and arbitrary rigour; so that visiting one day a work-shop, he had a workman put into irons for having ill constructed some superficial parts of a cannon. His mind, naturally inventive, sought to bring every thing into perfection. He got into so great a passion with a shoemaker for not having some belts of leather as he had imagined them, that he had a gibbet erected for him if he did not do better in future. He finished by inspiring so much terror in the workmen, that he made architects of the masons, and improved every art in the country. It is thus that he tore laziness from the heart of the people, that the love of labour, and emulation in the arts, might gain an ascendancy.

As the inhabitants of the capital did not continue to live in less inactivity, he determined to knock down a great portion of the houses in the town, which represented rather a great village, irregularly built upon an amphitheatre, and filled with narrow tortuous streets and impure cloacas. It was at once a means of breaking their habits of idleness,—of giving new life to the arts,—and of embellishing the town by constructions, whose regularity might charm the sight. Every one demolished his house with regret. Many were in want of money to construct a new one. All of which would have excited many complaints, had he not been careful to stifle them. He allowed no remarks, and demanded that his will should be immediately complied with. He knew that if he had amused himself by listening to the arguments of each, he would never have succeeded in reforming the manners of his nation, and in accomplishing his work. Thus, without giving himself the least anxiety in violating the right of property, only destroying that he might create, and overthrowing society even to its very foundations, he was constantly warring with the idleness of a nation, which he wished to render worthy of liberty,—a liberty which tyranny, at the fall of his dictatorship, would render still dearer,—well knowing that an idle nation is destined to remain always a slave.

Nevertheless he employed part of the state treasure in re-constructing the capital. He assisted the inhabitants, by paying the master workmen, and making people condemned to prison join in the work. He also opened new roads with the arms of the countrymen. Every body was obliged to assist in the great work. Some built, others laboured, others opened roads. The noise of work-shops was heard on every side. There was enough to do at home, without having any thing to do with foreign parts. The new capital, which was now only reached by fine and excellent roads, became by constant labour a finer, healthier, more regular town than the ancient one, and worthy of being one day the seat of that republic whose foundation was thus laid by the hand of tyranny.

One of the greatest evils under which Paraguay laboured, was its being surrounded by wild people, who came to ravage the country, to carry away cattle, to pilfer crops, to commit all kinds of depredations, without the inhabitants being able to find any means of preventing them, or of punishing them; for they ran afterwards into the deserts, where it was scarcely possible to overtake them. The spoils were more particularly committed along the river Paraguay. The savages took advantage of the time when the water was low, to traverse it, and spread themselves over the country, which caused a great desolation, and did much harm to agriculture. People cared very little to cultivate fields, that the crops might be robbed, or to bring up flocks, to see them carried away by savages.

The dictator, who had nothing so much at heart as the fertility of the lands, ordered little forts to be built in palisades, at a short distance from one another, of which the largest were guided by troops of the line, and the smaller ones by the inhabitants of villages. At the time when the waters of the river were low, it was guarded by boats; and, as the different forts communicated together at the signal of the enemy's approach, the infantry united with the inhabitants, who then had officers capable of directing them, and by these means an end was put to these fearful devastations.

Without order and economy a state inclines to ruin. The dictator administered the affairs of the state like a good father of a family. The revenue consisted of the duties on sales and stamps; of taxes on fields and houses; of custom-house duties; of the confiscation of the goods of condemned persons, or of strangers who died without any family; and more especially of the produce of the state lands, where were kept numerous flocks of sheep. He superintended every thing with an extreme attention. He taxed the price of articles of sale, to suppress the avidity of merchants; and he frequently conversed with shepherds and ploughmen upon the possibility of bringing improvements into agriculture, and on the rearing of sheep. He so seldom suffered himself to be deceived, that, having by drawing some chalk lines on a piece of cloth, detected in a tailor a wish to cheat him, he had him put in prison.

It was thus through order, care, and activity, that public riches increased, and in the midst of which Francia lived like a simple citizen, having for all his property only the half of a town-house, and a little country-seat left to him by his parents. He cared so little for riches, that, before coming into a public situation, finding that he had 800 piastres, he considered this sum as too much for a single man. He gambled with it, and rejoiced at its loss. His mind was so entirely deprived of avarice, that he was always in arrear in receiving the appointments attached to the dictatorship.

It was principally to the morals of the people that the dictator directed his reforms, and, as they were infected with a spirit of superstition, he gave himself much trouble to bring about a change. He forbade nocturnal processions and ceremonies in the church, as being a rendezvous for intrigue and corruption. He destroyed the monkish establishments, as they were too much given to incontinence and disorder. He overthrew the tribunal of the Inquisition, as the most dangerous enemy of a religion of love and charity. He thought it his duty to reform the calendar, by abolishing a great number of feasts, which cherished that idleness of which he was the declared enemy.

It was by these innovations that he threw off the yoke of the Pope, whose authority he contemned so much, as to say he would make him his first priest if ever he landed in Paraguay. The toleration which he professed for all religions, did not prevent him casting sarcasms and jokes on puerile belief; so much so, that a captain having one day asked him for the image of a saint to place in his fort, he told him that balls and not saints should watch over the frontiers of the state.

Notwithstanding the hatred which was felt towards the tyranny of the dictator, every body perceived that he made use of it for the common good, as he himself obtained no advantages from it. It was quite unexampled to see a man arrived at supreme power live without a wife,—without the show and pomp of power,—and remain poor while he held in his hand all the riches of the state. Though he was advancing in years, he never thought of transmitting by inheritance a power which was not to survive him. If by acts of authority he had isolated his nation, was it not to reform its manners,—to habituate it to labour,—make it love arts,—unburden it from all superstition,—give it the virtues of order, of economy, and of constancy,—and to concentrate the happiness of each family around its own hearth ? His tyranny, however culpable it might be, did not induce the aspect of desolation and of misery. If he had destroyed commerce in the exterior, had he not created an army, opened new roads, rebuilt the capital, enriched agriculture, brought tranquillity at home and abroad, without civil or foreign wars, an event rare in a young state ? His despotism could not then be blamed, without, at the same time, praising the generality of his actions and of his virtues.

When Francia had succeeded in introducing into the state the reform which he had contemplated, and when he remarked that the hatred borne towards him began to diminish, he no longer appeared so harsh in his government. He opened the state prisons. He no longer listened with the same good will to denunciations. He even punished the denunciators. He entrusted civil and military places to people more worthy of filling them. His manners became more mild. His temper less fierce, and more tractable. Thus the terror by which he was surrounded, disappearing by degrees, allowed that day to be first distantly seen, when liberty, without civil discord, was about to reign in Paraguay. He had prepared his people to receive the adoption of good laws ; and we can scarcely say of Francia, whether he was worse tyrant or better citizen.

Report of the Commission charged with the Examination of the Labours of the Expedition sent to Greece.

M. Geoffroy St. Hilaire reported, in the name of the commission charged with this object, respecting the operations of the scientific commission sent to the Morea, the members of which were specified in our last Number.

" The voyage was long and difficult. It was nearly the end of the month of March before the expedition saw the shores of Navarino. After some days of necessary repose, our learned travellers commenced the examination of the interior and exterior of the road of Navarino. The commission made a report to the Ministry, giving a description of the various kinds of shell and other fish which are to be found in this road and the surrounding shores.

The expedition afterwards was divided into two parties. MM. Pector and Delaunay were appointed to explore the coast of Messenia, running from Modon. M. Despreaux, who remained ill at Navarino, was replaced by M. Panaget, a young surgeon, to whom Marshal Maison gave permission to join the expedition. M. Bory St. Vincent, accompanied by MM. Virlet, Brusle, and Baccuet, explored the interior of the country, traversing mountains and valleys hitherto little frequented by strangers. All the travellers were instructed to take three barometric elevations each day.

Throughout the journey our travellers found the Greeks kind, hospitable, humane, and intelligent. They every where saw the French received with respect and kindness.

The Greeks regularly precede their public worship by a prayer for the royal family of France.

The expedition took notice of ruins of several monuments of the highest antiquity. A report of the 10th May contains the details of the observations which we notice.

In a second *exposé*, M. Bory de St. Vincent gives an account of several new excursions, and describes abundant collections, the produce of the soil, which he is to forward to the Museum of Natural History. The expedition, augmented by a new member, M. Goguet de Bourlay, sent out by the Minister of the Interior, was again divided into two sections,—the first embarked to explore the coast, the second visited the interior of Etolia. The report points out a vast number of errors in the charts which we possess of that coast. The expedition goes on to speak in terms of self-gratulation on the favourable reception they continued to receive from the Greeks. It speaks in the highest terms of their moral character and intelligence.

'In Laconia, as well as in Messenia,' says M. Bory, 'the French are the objects of the most friendly dispositions on the part of the inhabitants; even in the small villages they do not begin public worship without a general prayer for the royal family of France.' 'The manners of the Mainotes,' adds M. Bory, 'have interested us extremely. Their history will certainly form the most interesting part of our narrative. We claim the honour of having been the first among Europeans who penetrated amongst the descendants of the Spartans, amongst whom we found the manners of ancient times, modified by feudal customs, which are in the spirit of those of the 13th century.

'Laconia is susceptible of the greatest improvements; the land there is extremely productive, though from being badly managed, every kind of agriculture and gardening are in a state of infancy, and the fruits and herbage of all kinds are of a very inferior quality. When it is considered that this defect may be remedied, and that the unwholesomeness of the marshy lands may be removed by bringing thither a considerable number of exotic plants, of which they do not know even the name, it may be imagined that even the least political commotion and the smallest change in the usages of the country, have been of service to this part of Greece, and will become beneficial to humanity.'

The excess of labour, under an ardent sun, was at length nearly fatal to some of the travellers. M. Baccuet became dangerously ill, as did M. Virlet, whose zeal carried him too far. 'On our arrival at Monembasia,' contiuues the director of the expedition, MM. Brusle and Delaunay, both zealous for the objects of the expedition, became also ill. Dr. Pector, who was left behind from the maritime expedition, was unable to give any assistance to his colleagues. M. Saccharini, a young Bavarian doctor, who was attached to the Greek regular troops, was sent expressly by the President of Greece to give his aid to the expedition. The invalids, who were convalescent at the departure of the courier, were conducted by the director, M. Bory, on board a steam-boat to Tisio, an island of the Archipelago, and about 15 hours sail from the coast.'

Very rich collections were made during the journey in Arcadia and Laconia, but as yet nothing has been sent to France.

The reporter concludes by an enumeration of the scientific riches for which we are indebted to the commission. They are as numerous as could be expected from a country known for so long a period, but still imperfectly, so close to our territory, and in a latitude so little different.

The committee of the Institute gives the highest credit to the zeal, activity, and profound skill of the director of the expedition, as well as to those of all its members. It mentions that it was the authorities who conceived the happy idea of an expedition which brings so much credit to France. The Academy of Sciences, consulted on the choice of subjects, must applaud those to which the attention of the expedition was directed.

M. Brongniart has, on his part, made a report on two memoirs of M. Virlet, relative to the geology of Messenia, and particularly of that of the environs of Modon and Navarino."

Colony on the Coast of New Guinea.

THE inhabitants of Tidor Ceram, and other parts of the archipelago of the Molluccas, have from remote times been in the habit of visiting the coasts of the vast islands of New Guinea; but their commerce has remained very confined, on account of the state of barbarism of the natives, and the want of institutions for the protection of persons and property.

In order to provide against these inconveniences, the king of the Low Countries ordered an examination of the western coast of New Guinea, that an establishment might be formed there, and that afterwards the entire coast should be taken possession of in the name of his majesty.

In execution of this order, the colonial administration sent the Triton, ship of the royal marine, to New Guinea, under the command of the late Captain Steenboom, accompanied by the brig Isis.

On board these vessels was Mr. Von Delden, the superintendent of the projected establishment, Mr. Maclat, and some other members of the commission of natural history in the East Indies. Mr. Boers, lieutenant in the navy, charged with the nautical observations, and Mr. Schreifer, lieutenant of infantry, destined to the command of the garrison.

After having examined the river Dourga, discovered by Lieutenant Kolff, and after having sought in vain for the requisite facilities for the projected establishment, the expedition coasted to the north, and discovered a bay in about 3° 42′ south latitude, and 133° 57′ east of Greenwich, which they called Triton Bay, and which was considered adapted for the projected establishment.

With the assistance of the natives, who were found mild, tractable, and more or less civilized, the navigators constructed a fort, which they called Fort du Bus, on which the flag of the Low Countries was hoisted the 24th of August 1828, which ceremony was accompanied by a proclamation.

The expedition, on its voyage, collected many interesting facts in geography, and in natural and nautical science.

The permanent establishment of an European colony in New Guinea, will give rise, we have no doubt, to many important discoveries; and, amongst others, to a further examination of the river Dourga, which may perhaps be found to be a strait, making an island of the southern part of New Guinea.

Mr. David Douglas.—We had mentioned in our last, that this enterprising traveller was receiving instructions in physical observations previous to his again leaving this country. We learn in a letter from Captain Edward Sabine, to Professor Renwick of New York, published in the Quarterly Journal of Science, (No. XI. New Ser.) that he was to return in September to the north-west coast of America, on an undertaking which will occupy him there many months. He will be well provided with instruments, and is practised in the mode of observation. He hopes to determine the magnetic phenomena, from California in the south, to the furthest extent towards the north in which circumstances may enable him to prosecute his researches, and from the ocean on the west, occasionally to the rocky mountains on the east.

Hansteen's Journey.—We find that the route pursued by this traveller, and his companions, is also entirely regulated by the wish of following, as much as possible, the direction of the magnetic curves. It was Professor Hansteen's intention to commence, this last summer, by descending the Jenesei to Tourou-kansk under the polar circle, in order to extend the tracing of the curve of greatest intensity, found by him to be similar in figure to that of North America, but of smaller dimensions, curving round a maximum intensity, in longitude 102° east of Greenwich, and in latitude apparently somewhat to the north of 60°, but which will be more particularly determined in the present summer. Mr. Hansteen has already traced the southern bend of this curve below the 60th parallel from the Jenisei river on the west, to the longitude of 115° east, (25° east of the Jenesei, and latitude of 61°, where it pursues a direction nearly north and south.) After proceeding to Touroukansk, Mr. Hansteen returns to Krasnogarsh,—to cross, in a route from thence to the Caspian Sea, the curves 278, 287, and 297, in their further prolongation to the south-east; whilst Dr. Erman, who quits him at Irkutsk, and is furnished with the necessary instruments, will proceed by Jakutsk and Ochotsk to Kamtschatka, in which route he expects again to cross the same curves, after they have passed their southern Asiatic limit, and resumed for a second time a north-easterly direction.

Scientific Expedition.—Letters dated off the Cape of Good Hope have been received from Captain Foster, of his Majesty's ship Chanticleer, who, our readers will no doubt remember, sailed from England more than a year since on a scientific voyage to the southern hemisphere. As might have been expected, the Chanticleer has encountered much severe weather, and was forced by it into Mossel Bay. Captain Foster, we are happy to learn, has procured satisfactory observations at Cape Horn and South Shetland; and from his operations, consisting chiefly of pendulum experiments, important results may naturally be expected.

Major Laing's Papers.—Dispatches have been received at the Colonial Office, of the 13th August 1829, from Mr. Warrington, English consul at Tripoli. They state that Hassouna Dghies, suspected of having in his possession the papers of the late Major Laing, had run away. It was believed that Dghies had absconded, for fear that the improper means by which he had possessed himself of these interesting documents should be discovered. An account of this transaction, from the Semaphore of Marseilles, has appeared in the Literary Gazette.

M. Rousseau, the French ex-consul at Tripoli, has arrived at Marseilles, where he was performing quarantine: it is to be hoped that he will be commanded publicly to clear away the heavy imputations under which he labours with respect to the murder of Major Laing, and the possession of his papers.

Captain Ross.—Accounts from Orkney state that Captain Ross, in the Victory steamer, had touched at Icelanburgh on his northward course; and that, with "all well," he had found the season unusually open.

Russian Discovery Ships.—St. Petersburg, Sept. 14.—The Moller and Simavin corvettes, commanded by Captains Stanikowitsch and Lutke, have just arrived at Cronstadt, after an absence of three years, in which they have performed the voyage round the world. The results of the expedition will not be without advantage to science. Captain Stanikowitsch explored the coasts of the peninsula of Alashka, while Captain Lutke made a most accurate survey of the space between Kamtschatka and Behring's Straits. The latter also examined the great archipelago of the Carolines, and discovered several groups which have escaped the researches of preceding navigators. Dr. Mertins and M. Kastalsky, the naturalists, have brought home valuable collections of natural history; and the painters, Messrs. Portels and Mikhailoff, portfolios full of interesting drawings. The crews of both ships enjoyed excellent health during the whole voyage.

Baron Humboldt.—Intelligence has been received at Berlin, of Baron de Humboldt's expedition in the Ouralic mountains. This *savant* has carried his researches farther than had been expected. The Ouralic mountains are already in his rear, and he was on the road which leads to the frontiers of China. It is expected he will return again to Berlin.

Extract of a Letter written on board the Indemnity, arrived in the Downs from Demerara.—" Ship Indemnity at sea, at 3 P. M. discovered a rock on the starboard beam, distant about three ships' lengths; we were then going at the rate of about two and a half miles per hour, with a heavy swell from the N. W. With each succeeding swell it was entirely covered, but at intervals it showed several feet above water, and perfectly perpendicular. From the mast-head it was seen to a great depth below the water, and appeared to be in the shape of a cone. At the preceding noon our latitude by observation was 43° 20′ N. and longitude by chronometer 25° 10′ W.

NATURAL-HISTORICAL COLLECTIONS.

Extract from the Analysis of the Labours of the Academy of Sciences during the year 1828. By Baron Cuvier.

Mineralogy.—Since chemistry, by means of definite proportions, has determined the number and relative weight of atoms of different kinds of which every chemical body is composed; since the earths, which were supposed to be simple, have been found to be metallic oxides, and silica has to perform in those stones where it prevails, the part of a true acid; in fine, since it has been found possible to distribute all bodies according to the manner in which they are affected by the galvanic pile, the chemical analysis of minerals has received a new direction, and an exactness which chemists thirty years ago would scarcely have dared to expect; and yet there still remain minerals, and especially silicious stones, which, to the present time, we could scarcely believe it were possible to submit to the laws, except by supposing that certain of their parts, particularly the silex, exist in superabundant quantity over the proportion according to these laws, and rather as an accidental mixture than a true combination; and the opponents of the theory of definite proportions, not thinking themselves obliged to admit such a supposition, draw from these facts very weighty objections against this theory.

M. Beudant has devoted himself to extended researches, for the purpose of unfolding this kind of phenomena; and, with this view, he at first applied himself to the study of the salts properly so called, which it was more easy to compose and decompose in his experiments. He constantly observed in whatever proportion he approximated the elements to each other, that the acid or the base was in superabundance; but when once crystallized, the proportions of acid and base were the same, provided that the precaution was taken to deprive them as much as possible of the liquid particles, which are often found lodged between the laminæ of crystals. In operating upon salts, whose acids themselves are crystallizable, the excess of acid crystallizes separately from the neutral salt, and it is more easy to mix two different acids in the same crystallization, than to mingle a determinate acid with the salt of which it forms a constituent part: results evidently very much opposed to the supposition of which we have spoken above.

However, M. Beudant was desirous to see whether it would not turn out otherwise in the dry way, in as much as, from the beautiful experiment of M. Mitcherlich, it is probable that more silicates are formed thus than in the wet way. He therefore exposed to a convenient heat, mixtures in definite proportions, and others in which the substance which occupied the place of the acid, or that of the base, was superabundant. With the former he had perfect success; the others, on the contrary, and especially those in which the silex exceeded, did not produce one atom of the body which he expected to form; but in its place there were two products, distinctly separated in the crucible, between which the elements had divided themselves, so that in each of them there were definite proportions. But that which did not take place with an acid and its salt, occurred with two salts; and M. Beudant has assured himself, that those of the same acid, and especially those with the same atomic formula, mingle in all quantities, and that the more they are complicated, the more easily they unite, so that the double salts, for example, even of an entirely different nature, cannot be obtained pure when they crystallize with others in the same solution. Lastly, the facility is still greater when the salts are formed in a solution, than when they are put in entirely formed, so that, by double decompositions, we may obtain mixtures extremely varied, and even a great number which we could not otherwise procure. The crystals thus mixed, assume, however, the form of that of the composing salt whose character predominates; and, according to other experiments by the same author, of which we gave an account in 1820, this predominating salt is not always the most abundant.

These facts have appeared to M. Beudant to throw a strong light upon the subject with which he occupied himself. Indeed, when a salt is mixed in small quantities with another salt of the same acid, but of a higher order, that is to say, which contains an additional proportion of the acid, (if this circumstance be not doubtful,) we must try, at the time of analysis, to detect a superabundance of acid. The same thing may take place in relation to the base, when this mixed salt is of an inferior order, or when it contains more of the base.

Some experiments performed after this idea plainly confirm the fact. In disposing the solutions, so that, by double decomposition or otherwise, soluble salts of different orders may be formed of the same acid, M. Beudant obtained, for example, carbonates and sulphates of soda, which, with the crystallization and the other external characters proper to the bicarbonate and to the trisulphate, produce in the analysis excess of acid and diminution of water; which is explained very well by comparing the composition of the constituent salts, and by calculating the sum of their elements. The author has thus calculated all the analysis of mixed salts in his experiments, so as to determine positively the relative qualities of the different salts united under the same crystallization, and without any excess of acid or of base, or, what is the same thing, any electro-negative or electro-positive residue.

From this time, M. Beudant was no longer astonished at the apparent variations observed in minerals. He saw even why they occur more frequently in silicious stones, or silicates; on the one hand, because these are the most numerous natural salts; on the other, because they are of the greatest diversity in the degrees of saturation by the different bases; and lastly, because, as geology teaches, these are the mineral salts which are most frequently necessitated to crystallize together, and consequently most frequently placed in the circumstances best adapted to determine extremely varied mixtures. But to apply his method with certainty, we must have some idea of what may exist in the solution where the substance has been crystallized, and consequently of the sort of mixture which might be found there. In the absence of this knowledge, and to approach it as nearly as may be, it occurred to M. Beudant to make new analyses, not only of one mineral substance taken separately, but of all the substances which he could find united in the same group. He announced that he had obtained from this labour very positive results to assure him that all known analysis may easily be reduced to established laws, if we had for them data similar to those which he has employed for his; and the numerous examples of the latter which he has given, seem indeed to establish that it is with mineral substances precisely as with salts, and that all those which are found in the same solution, are mixed with each other at the moment of crystallization, and more or less according to the circumstances which have accompanied it. We know however that, in the complicated cases, the object is to resolve equations to several terms more unknown, that is to say, that we have indeterminate problems, capable of many solutions, according to the hypothesis which we are obliged to make.

M. Beudant has presented another memoir, wherein he remarks that the most pure minerals have not always a specific gravity as uniform as we should be disposed to expect, from the importance of this character. Carbonate of lime, for example, varies between 2.7 and 2.5, arragonite between 2.9 and 2.7, &c. Their state of crystallization influences them in a sensible manner. The specific gravity is always greatest in little crystals; in large crystals it diminishes, probably, because they have in their interior cavities more or less considerable, even when the mass appears to be most homogeneous. The varieties with lamellar structure, or the fibrous, are lighter, and that in proportion to the size of their laminæ; finally, it is in the varieties which result from decomposition that the specific gravity is not diminished. But it is very remarkable that in each substance, the difference between the two extremes is sensibly of the same value; and all the varieties of the same substance return to the same specific gravity, when they are reduced to powder, proving that the variations are only connected with cavities in their substance. It is thus alone that we can make specific gravity a comparative character, and consequently of certain importance in mineralogy.

The Animal of the Siliquaria.—M. Audouin has announced to the Philomathic Society of Paris, the discovery of the animal of the Siliquaria, whose tube alone was before known. This genus, confounded by Linnæus with the serpulæ, was established by Bruguières, upon characters derived from the shell. The Siliquaria has hitherto been generally referred, by supposition, to the *sedentary* division of the class Annelida, but M. Audouin places it amongst the *Mollusca*, in which class it approximates to the Vermetus of Adanson. It is furnished with a very thick, horny, operculum. Its mantle is cleft from one extremity to the other, and, contrary to the assertion of M. de Blainville, the branchiæ exist only on the *left* side. The body curls upon itself at its anal termination. The head, which is distinct, is provided with two eyes situated at the base of a pair of cylindrical tentacula, slightly enlarged at their summit.

Xanthus Desmaresti; a new species of Fossil Crustacea.—To the thirty-four species of fossil crustacea described by M. Desmarest, M. Polydore Roux adds, from his collection, one which he attributes to the same formations in the East Indies as are characterized by the Grapsus Dubius, many Gonoplaces, and other species so numerous in the cabinets.

The genus Xanthus, established by Leach, does not differ essentially from the crabs, except in the position of the external antennæ, which, instead of being placed between the internal canthus of the eyes and the forehead, are inserted in the depth of the internal canthus. It belongs to the order Decapoda, family Brachyura, and tribe Arcuata of Latreille.

The characters of this new species (the male of which is described) are: "Shell gibbous, having its regions highly embossed, and its lateral margins granulated and festooned; orbits little separated. The sternal parts granular; feet smooth; length, 0.030; breadth, 0.042."

The colour is brown, and M. Roux' specimen is crusted with an argillaceous paste. The general form presents some analogy with the Cancer floridus of Herbot, pl. 21. fig. 120, which is itself a Xanthus.—*Ann. des Sciences Nat. May* 1829.

Nidification of the Tortuga.—The Tortuga or large fresh water turtle travels far at times. It deposits its eggs in the sand with surprising address. The land turtles, it is said, are most stupid in this particular, dropping their eggs, one by one, as they hobble over the ground, neither covering nor taking any care of them whatever, nor paying any regard to their offspring. The tortuga, on the contrary, covers its eggs so accurately as to leave no signs perceptible of its nest; and, however strange it may seem, she so arranges it as to make her track appear unbroken over the sands, and, after laying her eggs, she proceeds on again in the same direction to complete the deception.—*Edin. Journ. of Science, New Ser. I.* 244.

Bisons in Lithuania.—The Bison, called in Polish Zuby, has disappeared from Europe, with the exception of the forest of Bialowiez, in Lithuania, wherein, as appears from an official return which has just been published, there were, in 1824, 543 large and small. The Russian government has taken measures for the preservation of this valuable race of animals.

Structure of the Ammonite.—M. Léopold de Buch draws the attention of naturalists to a new method of distinguishing and arranging the ammonites. Justly appreciating the fact that the structure of an animal is more constant and more connected with its general habits, i. e. with its natural history, than the external form or colour of its habitation, he seeks in the configurations which lie immediately under the thin exterior layer, or *shell* of these fossil animals, for characters by which the species may be advantageously determined. And the law which he has laid down is the more valuable, as it affords an easy and precise distinction between the ammonites and Nautili, which closely approximate.

The great difference between these two genera of Cephalopodous Mollusca, consists in the siphon of the former being always *dorsal*, whilst that of the latter is never so situated ; and from this primary distinction all the minor differences result, as M. de Buch thus ingeniously explains them.

The Nautilus protrudes a large siphon through the middle of its partitions, by which alone the animal is securely attached to the surface, on which the siphon rests ; and the partitions are in general smooth and concave, without any flexures on the borders. But the delicate dorsal siphon of the ammonite, is not sufficient to prevent concussion of the animal within its partitions. Other means of attachment are accordingly necessary, and the following provision is found. Below each partition there lie six lobès, symmetrically arranged around the circumference of the shell. The first or *ventral* lobe, which is usually the most considerable, rests upon the back of the convolution which precedes it. On the opposite side, the *dorsal* lobe advances itself towards the bottom to embrace the siphon ; and it is thereby divided into two cones, which are more or less separated from one another. At one-third of the height of the aperture from the back, the *superior lateral lobes* are placed on each side, and lower down, the *inferior lateral lobes* are similarly arranged ; the latter being a little more elevated than the ventral lobe. The separation of these lobes form the *Sellæ*, or seats, so termed because the animal rests upon them ; and their distinctive names, are derived from those of the lobes.

If the spire increases rapidly in size, so that the last whorl envelopes all the others, the animal would require points of support for the additional part. The cardinal lobes are then almost lost in a number of little auxiliary lobes, which increase in number as the ammonite enlarges, and of which there are sometimes found as many as three, four, or five. These auxiliary lobes are very apparent in the family which has been named Serpentinæ after Reinieke, and, whenever they occur, are subject to determinate laws in the flexures of their margins.

M. de Buch conceives that the animal finds additional attachment to its shell, by inserting its sac within the sellæ formed by the lobes ; and from the varieties which occur in the conformation, he proposes that specific characters shall be deduced.—*Ann. des Sciences Nat. July* 1829.

Thorite, a new Mineral Species, and Thorina, a New Earth.—The Rev. Mr. Esmark of Brevig in Norway has discovered a new mineral substance in small quantities in the syenite, which composes the island near Brevig. It is massive, black, brittle, and semi-hard. The vitreous lustre of its fracture resembles that of gadolinite. The surface is sometimes covered with a red coating. Its powder is dark brown ; its specific gravity 4.8. Before the blowpipe it gives out water and becomes yellow. M. Berzelius has appropriated to this mineral the name thorite.

Some time since this celebrated chemist gave the name thorina to an earthy oxide, which he then supposed to be new, but which is only a phosphate of yttria.

And now he applies the same appellation to an earth, which he has discovered in thorite, and which possesses many properties resembling the old thorina, though the two earths are not identical.

The new earth, thorina, possesses the following properties: It is colourless, infusible, after being strongly ignited it is insoluble in the acids, except the sulphuric acid; nor does it become soluble on being heated with alkaline substances. It is insoluble in caustic alkalies, but is dissolved by their carbonates. The solution heated gives a precipitate of thorina, which is redissolved on the temperature being lowered. The salts of thorina have a pure astringent taste. A concentrated solution of the sulphate of thorina, when boiled, coagulates into a thick pulp, but is re-dissolved in cold water. This property forms the most prominent character of the new earth. Like the salts of cerium, it is precipitated by sulphate of potash, with which a solution of it is saturated. The precipitate is a double salt and soluble in pure water. Like yttria it is precipitated by the cyanuret of iron and potassium.

On the Change in the Colours of the Flowers of the Hibiscus mutabilis.—The *changing Hibiscus* has received this name, on account of the remarkable and periodical variations which the colour of the flowers present. White in the morning, they become more or less red or carnation-coloured towards the middle of the day, and terminate in a rose colour when the sun is set. This fact has been long known, but we were totally ignorant of the cause. The following observation may assist to discover it, and give some useful ideas on the coloration of flowers.

Mr. Ramond de la Sagra remarked, in the Botanic Garden of Havanna, of which he is the director, that, on the 19th October 1828, this flower remained white all day, and did not commence to redden till the next day, towards noon. On consulting the meteorological tables, which he kept with care, he found that on this very day, the 19th October, the temperature did not rise above 19° C. whilst ordinarily it was at least 30°, at the period of inflorescence of this plant. It would appear then that the temperature holds a place of some importance in the coloration of certain flowers. The experiments of Mr. Macaire have taught, that it seems to be connected with different degrees of oxigenation of the chromule, or colouring matter, contained in the parenchyma. Is this oxigenation altogether, or in part, determined by the temperature? Can the colour of certain petals be modified by variations of heat? These questions require experiments.—*Ann. de Sciences, &c. No. XV.*

*** We have been requested to insert the following correction respecting the original discoverer of the Crassina ovata, one of the new shells, described by Captain Brown, in our last Number, p. 12.

"The Crassina ovata was discovered by W. Nicol, Esq. Lecturer on Natural Philosophy, Edinburgh, among gravel on the shores of the Gair Loch, about two miles from its entrance. Dead specimens were also found by him on the beaches of the Clyde, near the mouth of the Gair Loch."

NATURAL-PHILOSOPHICAL COLLECTIONS.

[In establishing this additional Section, it may be requisite to state, that, for the purpose of facilitating reference, the Editors have considered it advisable to distinguish, as far as may be, the sciences of observation from the sciences of experiment. Accordingly, the former will be contained under the title Natural-Historical Collections, and all discoveries and inventions connected with the latter will be referred to this new division.

The history of geographical discovery, mathematical geography and statistics, will constitute the department termed Geographical Collections.]

M. Longchamp's Theory of Nitrification.—Glauber was the first chemist who wrote on the formation of saltpetre in nature, (Prospérité de la Germanie.) He supposed that it is the *subjectum universale ;* he observed it in vegetables ; he recognized its production in considerable quantities by the putrefaction of animals and vegetables ; he found it also in the animal kingdom ; and the town of Fitzingen, where he lived, presented before him a mountain whose rocks, exposed to the air, produced this salt. In different parts of his work, Glauber explains the method of obtaining saltpetre by means of animal matter ; and he first laid down principles for the formation of artificial nitre-beds, to be constructed under sheds, in ditches or vaults.

In 1698, Stahl published a dissertation on nitre ; and many articles in his Treatises on sulphur and on salts are occupied with this subject. And he supposed that nitre is formed by the agency of animal matters.

And in the Memoirs of the Academy of Sciences for 1717, Lemery published two papers upon nitre, with the view of establishing that this salt is a product of vegetation. But it has since been proved that nitre is not formed in vegetables,—that which is formed in them being absorbed from the soil.

The great national importance of an easy, constant and economical supply of saltpetre, whilst empires are lost and won by its destructive powers, then began to occupy the attention of the governments of Europe. In 1747, 1757, and 1771, Sweden published "Instructions for the establishment of artificial nitre-beds." In 1749, the Prussian government offered a prize upon the same subject ; and about the same period the canton of Berne published the works of Bertrand and Grunner on the production of saltpetre. In 1765 the province of Franche-Comté, oppressed by 500 nitre beds, proposed through the academy of Besançon, a prize for the determination of the most economical, and, at the same time, the least burdensome mode of manufacturing saltpetre on the large scale. And in 1775, through the instigation of Turgot, who was anxious to eradicate the nitre beds, which were a scourge to France, the Academy of Sciences offered a prize "in favour of the individual who, in the judgment of the Academy, should most nearly ascertain the secret of nature in the formation and generation of saltpetre, and who should point out the most ready method of making it in abundance." Many memoirs were received ; and they are to be found collected in a 4to. volume of 900 pages.

Dissatisfied with the conclusion in which all these Memoirs agreed, that animal matter is the cause of nitrification, and discovering in the data therein contained the elements of a different opinion, M. Longchamp, on the 24th November 1823, presented a new theory to the Academy ; and in 1826, the Academy having delayed the consideration of his views, made it known to the world in the Annales de Chimie. The publication gave rise to an animated discussion between the author and M. Gay-Lussac ; and in August 1828, an unfavourable report was passed upon the Memoir by the Academy of Sciences.

Apparently out of a degree of spleen and of opposition to the dicta of the Academy, M. Longchamp's theory has again been laid before the public, and the history of its fate animadverted upon in Saigey and Raspail's Annales of January and February last ; and though we pay a little more respect to the decisions of the Academy than M. Raspail is able from circumstances to afford, we do not hesitate in our desire to facilitate the dispersion of M. Longchamp's views, that the question may obtain a candid consideration from the scientific world, The theory of nitrification is advanced in these terms.

"The oxygen and the nitrogen of the atmosphere, led into combination by means of the porosity of bodies, and by the presence of water and of a base, unite to form nitric acid.

"Animal or vegetable matters do not contribute in any degree to the production of nitric acid in nature."

And these principles are established upon the following evidence:

Sect. 1. Nitrates are found formed in materials or places which do not contain either animal or vegetable bodies, and which have never been under the influence of the effluvia of animals.

Those who have been occupied in the manufacture of saltpetre, are well aware that the earth dug out of caves furnishes nitrates by lixiviation, and that this earth, after being replaced, will afford, in eight or ten years, additional quantities of saltpetre, equal to that which had been before obtained from it. And further, after having been again deposited in its former bed, it will again give out saltpetre, and that indefinitely, provided that the earth has not been too much robbed of the base which favours the formation of nitric acid, and which in nitrifiable materials is ordinarily chalk or carbonate of lime; but if there remain nothing but clay, nitric acid, not finding a base to saturate itself, will not form.

Lavoisier has collected, in open quarries, in different places, 40 specimens, which for the most part have afforded by lixiviation, a small quantity of saltpetre, mixed with much nitrate of lime.

Thouvenel put two ounces of well washed chalk into a vessel hermetically sealed, and containing only atmospheric air. The chalk had been moistened with distilled water. In about eight months, he washed it with a lixivium, and there subsided six grains of nitrate of lime. And Thovenel adds, (p. 76.) "Chalk afforded nitrous acid in more than fifty different experiments, whether it was renewed in each operation, or whether *the same chalk. after being well washed, was made to serve many times.*"

Hence M. Longchamp draws the conclusion that nitric acid is formed out of the elements of the atmosphere, independently of the presence of animal matter.

Sect. 2. Nitric acid may be formed in the open air, by materials which do not contain any vestiges of animal or vegetable matters.

One of the competitors for the prize of the Academy (page 114 of the collected Memoirs) took soil from the fields, and lixiviated it so as to remove all the saline particles. He then placed it in a heap, and constantly sprinkled it with pure water as it became dry. This soil, on being again lixiviated, in about six months furnished saltpetre.

Another candidate (p. 160) made a still more exact experiment. He took soil from the fields, lixiviated it very completely, and exposed it to the sun. He then divided it into two portions, one of which he placed in a cavern upon slabs of stone, supported by an iron frame, at a distance of two feet from the walls, and as far removed from the floor—the other part was placed upon slabs similarly arranged in a coach-house. Both portions were stirred from time to time, and continually moistened with pure water. At the end of a year, the gas produced by that portion in the cave, after lixivation, was indicated by one degree of the aerometer; the gas from that portion deposited in the coach-house only rose to half a degree. This difference was probably occasioned by the humidity being more constantly sustained in the cave than in the coach-house; but whatever may have been its cause, the experiment proves that earth may be nitrified in the air, without connection with animal matter.

Moreover, saltpetre is found in the midst of plains, in all parts of India, in Egypt, in Spain, and in many other countries where no animal matter exists.

On his return from the continent of India, Mr. J. Davy stayed at Ceylon, and visited the caverns of that island, which produce saltpetre in abundance. In the 25th volume of the Annales de Chimie, p. 209, the observations will be found, from which he arrived at the following conclusions: "After the examination of the caverns which I have visited," says Mr. Davy, "as well as of the specimens which have been sent to me from other caves, I believe that they are all similar, and that the rocks out of which they are hollowed always contain at least carbonate of lime and feldspar. The decomposition of the latter furnishes the base of the salt, and the carbonate, *exercising a particular action upon the oxygen and nitrogen of the atmosphere*, the nature of which we cannot yet comprehend, gives rise to the acid.

Sect. 3. Nitric acid is formed exclusively by the elements of the atmosphere.

Having shown, in the preceding sections, that saltpetre is found in places far removed from any habitation, and in materials which can contain no animal matter, M. Longchamp now attempts to prove the impossibility of nitrogen being disengaged from this matter to assist in nitrification.

"It is admitted that the animal matters need not be in contact with the earth, but that their effluvia suffice for the production of saltpetre. Let us, then, try all possible suppositions to find out how nitric acid can be formed under these circumstances.

"Is it formed by nitrogen disengaged from animal matter during putrefaction? All chemists know that the products of this putrefaction are ammonia, carbonic acid, carburetted hydrogen gas, and perhaps of the gaseous oxide of carbon and water, but no nitrogen. But if this gas were produced, how could it combine with the chalk? We have examples of extraordinary combinations of gas in its *nascent* state; but this was not the case of the nitrogen given off from blood putrefying at a distance of two feet from the chalk, and produced from 4 to 5 oz. of saltpetre for each cwt. of chalk, as the commissioners of the Academy pretend.

"Or is it formed by some compound of nitrogen which the effluvia carry along with them? We know that in the putrefaction of blood, urine, &c. all the nitrogen goes to form ammonia; but even admitting that a portion of nitrogen should escape from the hydrogen, and form a compound unknown to this day, how does it happen that this matter is nitrogen only when it comes in contact with the chalk? for, if it meets with lime, magnesia, alumina, &c. nitric acid is not formed, or at least only in an insensible degree, and after a long lapse of time.

"Or is it the produce of a re-action of the putrid effluvia upon the atmospheric air? Besides the difficulty of conceiving this re-action, and besides the fact, that in this case it would be the nitrogen of the air which would form the acid, and not that of the animal matter, this unanswerable objection occurs, Why is chalk the only body which conduces to this re-action?

"It is, then, impossible that there can be disengaged, by putrefying animal matter, any substance which by itself, or by its influence, can produce nitric acid; but is it so when this matter is mixed with earth? There is no chemical fact which would support the idea, that the products would differ when it is mixed with earth, and when it is left to putrefy without such admixture." *

Resting upon these proofs of the incapability of animal matter to the production of nitric acid, it only remained for M. Longchamp to explain the mode by which he supposed the atmospheric air alone could form this acid; and he states his views in the following terms:

"It is universally accorded that nitric acid can only be formed where there is a certain degree of humidity, and where the air circulates freely; for in places where it cannot be renewed, there is no formation of the acid. It was thus that Lavoisier observed, at Roche Guyon, that in the caverns or holes which were deep, and had only one entrance, nitric acid was not discoverable in the depths, but near the opening alone. The same observations were made by this celebrated chemist in the tufa quarries of Touraine.

* "Though urine and other similar animal matters, which may be employed in moistening nitre beds, cannot serve directly to the formation of nitric acid, it is possible that they may conduce to it indirectly, by preserving their humidity longer than pure water."—LONGCHAMP.

" Since nitric acid is formed in places where nothing is found but porous stones and light earths, containing chalk, moisture, and constantly renewed air, let us inquire by what process this acid can be produced in circumstances so simple.

" Tufa, moveable soil, and chalk, act principally as absorbents : Chevrand, indeed, observed, that compact chalks would not nitrify, and no nitric acid was ever observed in any marble, either when exposed to the open air, or in the interior of our houses. Thus we must chiefly attribute the easy nitrification of tufa and chalk to their porosity, since marble, which is also a carbonate of lime, cannot nitrify. However, we know that the base must also perform a part in nitrification.

" Upon what bodies is it that chalk and tufa exercise their absorbing power ? Undoubtedly upon air and water, the latter of which will conduce to the ascribed effect in two ways. 1. By bringing air in a higher state of oxygenation, if I may use the expression, than that of the atmosphere, as all chemists agree ; and 2. By being indispensable to the production of the acid, which could not exist without water.

" Since the times of Morozzo, Roupe, and de Saussure, we know the influence of the porosity of bodies in facilitating the combination of gases, which will only unite when in contact. If, then, to the action of the porosity of bodies, and to that of the water, the presence of a base be joined, we shall obtain the union of the oxygen and nitrogen of the air, in the proportions which constitute nitric acid, and this acid will be absorbed by the base, as it is produced by the porous body and the water.

" Every instance of nitrification, whether in quarries or in vaults, in caves or in cellars, under sheds or in artificial nitre beds, in sheep-folds or in stables, are simply and satisfactorily explained by the theory I propose. It is only necessary further to examine whether it affords an equally admissible explanation of the formation of saltpetre in India, Spain, and other similar places. We know that all the formations which afford saltpetre are very mobile. We know also, that in all warm countries, and particularly in India, the rains are extremely abundant, though rare. Here, then, are all the conditions requisite by my theory,—porosity of the soil, and deep humidity. When the heat has evaporated the moisture, and rain does not soon fall, the saltpetre which has been conveyed to the surface by the water remains there, and may be collected, whilst in our climates the constant rains do not permit the saltpetre to show itself; but an incontestible proof that it exists in the soil is, that we find this salt in a great number of vegetables, and we have seen above that it is not a product of vegetation.

But besides the nitrification which takes place in the soil of India and Spain, the saltpetre collected in these countries may have another source, as I have remarked many years since, (Journ. de Phys. lxix. p. 107.) In these countries the rains are often accompanied by thunder, which arises from the disengagement of electricity from the clouds ; and we have known since the days of Cavendish, that when an electric spark is made to cross a mixture of oxygen and nitrogen, nitric acid is formed ; indeed Marggraf has observed, that the water of rain which falls in a storm contains nitric acid. This acid combining with the base which the soil contains, forms saltpetre, which unites itself with that produced by nitrification."

Such is the theory of M. Longchamp, which certainly merits experimental examination, although the commission of the Academy pronounced, in characteristic irony, the definitive conclusion, that " it is only in a theoretical point of view that it might be useful to make the experiment proposed by M. Longchamp. It would, however, be very curious for science to know whether nitric acid could be formed in the circumstances which he describes."

On the Magnetic Influence of the Violet Ray.—When in 1812 Professor Morichini published his observations upon the magnetising influence of the violet ray, there was not an experimentalist in Europe who did not desire to repeat and vary them ; but unfortunately the attempts of the most expert men were not crowned with that success which they had a right to expect. Thus, it is not astonishing that many philosophers doubted the results of the Italian professor; and it was not till 1826, that Mrs. Somerville confirmed, by the most decisive experiments,* the fact advanced by him, that the violet ray was endowed with a magnetising property. Nevertheless experimentalists were not yet satisfied: they could neither verify at will the results obtained, nor discover the causes which opposed the success of their labours. This state of things induced M. F. Zantedeschi, professor at Pavia, to undertake a series of experiments upon this subject, in the same town where, in 1813, Professor Configliacchi had already made remarkable observations.

The method pursued by M. Zantedeschi was as follows:—He introduced into a dark room a solar ray by means of a heliostat, and dispersed it so that the spectrum was formed horizontally. He then placed under the violet ray, in a direction perpendicular to that of the magnetic meridian, the extremity only of the needles which he desired to magnetise. In this manner he obtained the following results:—

1. Having placed, in the position described, a steel wire, well polished, four inches long, and a quarter of a line in diameter, in five minutes he found that the extremity exposed to the violet ray had acquired a north pole. In eight minutes, this wire being presented to a magnetic needle, showed well marked poles.

2. He exposed, in the same manner, two wires of steel, similar to the preceding, to the action of white light; in five minutes, the two extremities exposed had acquired a north pole; but it was feeble, and at the end of a few minutes it disappeared.

In both these cases he ascertained, with much care, that the wires employed did not previously possess any sensible magnetism.

3. The violent ray reversed the well-marked poles of a wire of steel; it developed very distinctly, in six or seven minutes, those of another wire, which manifested at its two extremities a very feeble repulsion for the pole of a magnet.

4. Having placed one extremity of a magnetic needle in the red, yellow, orange, and green rays, and having observed the nature of its poles, and their energy at the end of six or seven minutes, he did not find any alteration whatever; nor did he remark any effect produced by this operation upon a needle which had no sensible magnetism.

5. A wire of iron covered with a film of oxide, and strongly magnetised, having been exposed to the violet ray, in three minutes the south pole was transformed to a north pole.

6. A steel wire, well polished and magnetised, having been exposed by its two extremities to the violet ray, in ten minutes a north pole was formed at each of its extremities.

7. If the wire be oxidated, the same effect is produced in five minutes.

The dimensions of all the wires employed were the same as those first mentioned.

These experiments, which gave the same results in every repetition, place beyond doubt the magnetising property of the violet ray.

The causes which have prevented previous observers from arriving at the same facts are traced by M. Zantedeschi, to be owing to the metal coming from a sulphurous mine, and consequently being incapable of receiving the magnetic influence;—to its being too highly tempered;—to the temperature being too high or too low;—to the diameter of the needle being too great;—or to the violet ray not being made to impinge on the extremity of the needle.

He considers that the action of the violet ray is chemical; and he is convinced that, if the above causes of imperfection are attended to, its magnetising power may be brought into action independently of climate. The magnetism thus obtained is permanent, as he has ascertained by the examination of his wires eight months after the experiments, when he found them still magnetic.—*Bib. Univ. May*, 1829, p. 64.

* Ann. de Chimie, xxxi. 393.

CATALOGUE RAISONNÉ.

On the Tertiary Fresh water Formations of Aix, in Provence, including the Coal-field of Fuveau. By Roderick Impey Murchison, Esq. and Charles Lyell, Esq. Jun. Secretaries to the Geological Society; with a Description of Fossil Insects, Shells, and Plants, contained therein; by John Curtis, F.L.S. J. de C. Sowerby, F.L.S. and J. Lindley, Professor of Botany in the London University.—*Ed. New Phil. Journ. No. XIV. p.* 287.

This interesting paper points out the geological position of some fossil insects and shells of great value, and the whole communication shows the necessity which the present state of geognosy demands, of a very deep and universal knowledge of the natural sciences. On the red marl of the river Arc, we have reposing the conglomerate and breccia, on which is built the town of Aix; upon these again, red sandstone, (which represents the molasse,) breccias of limestone and pink limestone; and above them, the gypsum beds, alternating with marls, containing beds of gypsum, and fishes, plants, &c. These again are succeeded by an argillaceous stone-band, gypsum with insect bed and fish bed, and marls with plants, fishes, and shells; the whole is capped by calcareo-silicious millstone, with Cypris, Cyclas gibbosus, Potamides Lamarckii and Bulimus terebra, and white limestone and marlstone. Insects had first been noticed in this locality by Marcel de Serres, and Mr. Curtis's remarks on them are very interesting. Among the shells there are four new species of Cyclas, a new and large species of Unio, also new species of Cypris, of Planorbis, of Lymnæus, and Melania, principally from the roof of the coal of Fuveau. The plants bear more characteristic marks of a difference of climate than the insects, being nearly allied to the plants of India, the Mediterranean, and the coast of Barbary; but the specimens were in too mutilated a condition, to admit of very satisfactory investigations.

Of the Red Pigment called Carucru or Chica. By John Hancock, M. D. —*Ibid, p.* 283.

This is a fecula procured in the manner of indigo, from a species of Bignonia. The plant producing it is chiefly found towards the head of Essequibo, Parima, and Rio Negro, where it is known by the name of chica. The chief manufactory of the carucru is amongst the Tarumas, a numerous and industrious tribe of Indians, who inhabit the eastern branch of the Essequibo near its source. The leaves are pounded and infused in water, till a fermentation ensues. The liquor is next poured off, and left to deposit a sediment. This sediment is collected, and forms the carucru paint. This ornamental paint, in great demand amongst the interior Indians, is confined to chiefs and higher orders: the rest decorate their persons with arnotta, or pincer, mixed with the oil of Carapa, a portion of which, with the balsam of Aracousiri, (from a species of Amyris,) mixed with these paints, imparts to them a very fragrant and agreeable odour.

Report on the Impression made on the Ground by the Foot of the Sow. By Messrs. Robert Spittal and Robert Stevenson Jun.—*Ibid, p.* 285.

The authors think that the general conclusion to be drawn from their observations is, that the impressions made by the feet of the sow on the ground, vary according to the softness, depth, and position of the soil over which the animal may have passed; and though it seems to be true, that in general there are four impressions, viz. of the two anterior and two posterior toes, still it seems equally true, that the same animal may, in certain circumstances, leave a bisulcated impression, or that of the two anterior toes only.

Observations connected with the Migration of the Herring and Mackerel, as noticed in the British Channel. By Major W. M. Morrison.—*Ibid, p.* 317.

The author supports that view of the migration of gregarious fish, which leads to the supposition, that they do not actually travel from north to south, but that in accordance with climate, successive shoals approach the coasts for the purpose of spawning; and this view he supports by some interesting facts. The nets of Hastings are always cast north and south, in order that they may drift with the ebbing and flowing of the tide, which takes the direction of east and west in that part of the British Channel; and it is curious, that while those fish which are encumbered with roes, are caught in great numbers on the east side of the nets, they are not met with in a greater proportion than one in about one hundred without roes on the west side.

The mackerel which are met with off Hastings, appear to be of a different species from those caught off Mount's Bay in Cornwall.

The fishermen of Cornwall, under the impression that the mackerel moved eastward along the coast, have endeavoured repeatedly, on their return, to meet them off the Praul Point, Portland Race, and off the Isle of Wight, without success. With respect to the mackerel, his ideas do not appear to be very definite, and he questions whether they may not move north.

On the Reflection and Decomposition of Light at the separating surfaces of media, of the same, and of different Refractive Powers. By DAVID BREWSTER, LL.D. F.R.S. L. & E.—*Edin. Journ. of Science, No. II. N. S. p.* 209.

A detail of the important discoveries laid before the Royal Society of Edinburgh in 1816, and announced in the Quarterly Journal for July—October of that year.

The experiments are divisible into two classes.

I. Those which (in opposition to the opinion of Herschel) establish the existence of reflecting forces at the confines of media of the same refractive power; and,

II. Those in which periodical colours are produced at the confines of particular kinds of glass, and various fluids, and soft solids, of the same, and of different refractive powers.

From the first of these classes of facts, the following conclusions are drawn:

1. The reflective and refractive forces, in media of the same refractive power, do not follow the same law,—which is directly opposed to the assertion of Herschel.
2. The force which produces reflection, varies according to a different law in different bodies.

The reflective forces in the solid and fluid, may be conceived to decrease in various ways.

a. They may extend to different distances from the reflecting surface, and decrease according to the same law.

b. They may extend to different distances, and vary according to a different law; or,

c. They may extend to the same distance, and vary according to different laws.

It seems highly probable that the law of the refractive force also varies in different bodies; and if we take for granted the mutual dependence of the refracting and reflecting forces, (which there seems to be no method of determining,) these experiments will establish a variation in the law of the refracting forces of different media.

In the undulatory system, these new facts may be explained, by supposing that the density or elasticity of the ether varies near the surface of different bodies,—an opinion which has been already adopted, to explain the loss of part of an undulation in several of the phenomena of interference.

Speaking of the second class of phenomena, Dr. Brewster remarks, "Although there can be little doubt that periodical tints are more or less developed in every combination of solids and fluids of the same refractive power, yet their production in combinations where there is much uncompensated refraction, is influenced by certain changes on the surface of the solid, the nature and origin of which I have in vain attempted to discover......That some unrecognized physical principal is the cause of all these phenomena, will appear still more probable when I submit to the Society a paper on the very same periods of colour produced at similar angles of incidence, by the surfaces of metals and transparent solids when acting singly upon light."

Notice of some of the Birds of Madeira. By C. HEINEKEN, M. D.—*Ibid*, *p*. 229.

1. *Columba trocaz*

Dr. Heineken proposes the trivial name of " Trocaz," for a pigeon which he considers to be an undescribed species, belonging to the Columbæ antarctopodiæ of Wagler. Its characters are, " Brownish ash; head, neck, breast, vent and rump, ash; neck imbricated, and together with shoulders and breast iridescent; belly vinous; wing and tail feathers brown black, the latter with a broad blue ash bar one-third from the tips, which are black; the outer web of the 2d, 3d, and 4th primary of the former, edged with white; bill red, tipped with black; nails black; legs red, feathered a little below the knee; iris pale straw colour; length 19 inches; tarsus one and a half inch. (Adult male in the spring.)

Ash; head, neck, belly, and rump blue ash; *neck only* iridescent and imbricated: breast and shoulders vinous; length 18 inches; tarsus one and a half inch. (Adult female in the spring.)"

2. *Procellaria Anjinho.*

Sir W. Jarbiue is of opinion that this species is new. The characters given by Dr. H. are :—" Bill shorter than the head, and compressed towards the tip; nostrils united in a single tube at the surface of the bill, but the septum distinctly seen a little within the orifice; tail slightly forked, extremity of wings not surpassing it; plumage *entirely* brown black or soot colour; bill black; legs smoky; length 11 inches; tarsus 1 inch. (Adults taken in spring and summer.)"

Some remarks on its habits are subjoined.

Dr. H. notices a Cypselus, whose plumage was entirely black, and desires information as to the winter plumage of the C. murarius, which differs from this specimen in having a *white chin.* Sir W. Jardine possesses both the C. murarius, and this black-chinned individual, which he thinks is a distinct species, and probably undescribed.

Dissertation sur l'emploi du Vinaigre a la guerre, comme agent de destruction et comme moyen de defense. Par M. Rey. 8vo. Paris 1829.

Under a title certainly foreign to Geography, Mr. Rey examines a geographical question which has occasioned long controversies,—the place of the passage of the Alps by Hannibal. He has had the ingenious idea of collecting, in a synoptical table, all the opinions which have been given, down to the present time, upon this interesting subject; and, according to him, with the exception of errors or omissions, out of 90 opinions, 33 are for the little St. Bernard, 24 for Mont Geneve, 19 for the great St. Bernard, 10 for Mont Cenis, 3 for Mont Viso, and 1 for Rocke Melon, and probably the question is not yet decided. It may be observed, however, that Livy, and Polybius, whose texts still remain to be explained, ought not to have been found on the columns of this table.

Scandinavien und die Alpen, (Scandinavia and the Alps; with an Appendix upon Iceland. By Victor de Bonstetten.) 8vo. Kiel 1828.

This work offers a comparison of the Swiss Alps, and those of the north, in their geognostic relations. Along the whole length of the coast of Norway, for a distance of 1200 miles, granite rocks may be seen split to their very base, so that the eye can penetrate into precipices of more than 1000 feet in depth.

Tables for converting the Weights and Measures, hitherto in use in Great Britain, into those of the Imperial Standards. By GEO. BUCHANAN, Civil Engineer, Edinburgh. Lizars. Edinburgh, 1829.

This volume, though more than half of it is directed to the conversion of the Scottish weights and measures, is calculated to become of the greatest use generally throughout Britain.

The tables are preceded by a " view of the new system of weights and measures," highly valuable in itself; and the accuracy of the calculations is sufficiently vouched for, (at least to ourselves,) by the authority of the name of Mr. Buchanan.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

Acts of the Geographical Society of Paris.

Meeting of the 5*th June* 1829.—His Excellency the Minister of the Interior announced that the Commission of Arts and Sciences had given in a favourable report on the publications of the Society, and that he will have much pleasure in accomplishing the desires which have been expressed to him.

The Royal Academy of Sciences of Berlin wrote to the Society, offering it a copy of its Memoirs for the year 1825.

M. de Navarette wrote from Madrid, to announce the transmission of the third volume of the Collection of ancient Spanish Navigators, published under his direction.

Mr. Warden communicated a letter of Mr. Baradère, who had just arrived at Paris, with a precious collection of monuments relating to the ruins of Palenqua and Mitla, with other antiquities from Mexico, which he has collected during a residence of two years in the different states of the Mexican Republic. It is this traveller's intention to submit his collection to the Society at its next meeting.

Mr. John Jump, teacher of the English language, laid before the Society a model and description of an improvement in the construction of globes. Colonel Bonne was ordered to report upon it.

Mr. Jomard announced to the Assembly the arrival of six young Ethiopians, purchased by Mr. Drovetti, and sent into France to receive their education. They have been placed in two boarding-houses in the environs of Paris, and have already given proofs of their aptitude for learning.

Mr. Barbié du Bocage read a notice of the Baloutches, written in 1811 by Mr. Raymond, French consul at Bagdad.

Mr. Eyrie's presented several notices on this subject, which were ordered to be given over to the committee of the Bulletin.

Meeting of the 19*th June* 1829.—His Excellency the Minister of the Marine transmitted from Captain Sir John Franklin, a copy of his Narrative of a Second Expedition to the Polar Seas. His Excellency also transmitted a volume of the Memoirs of the Royal Society of London.

The Society formed at London for the encouragement of translations of Oriental Literature, addressed to the Society a copy of its first publication, containing the Voyages of Ybn Batouta.

Mr. de Larenaudiere offered to the Society his notice on the life and works of Mr. Pacho.

Mr. Barbié du Bocage presented, in the name of Mr. Rey, a map of ancient Arabia and of the Red Sea, published in 1829 by Mr. Frederick Campe. Mr. Rey also laid before the Assembly Reichardt's map of Gaul, in which the author has traced the road followed by Annibal, and the Roman roads from the itineraries of Antonine and the tables of Peutinger.

Mr. Cadet of Metz reported on Mr. Delcros' notice on the secondary formations of the chain of Sainte-Victoire, and the environs of Aix.

Mr. Brué read a note upon the tables of geographical positions, addressed to the Society, in one of its last meetings, by Mr. Thomas.

Mr. Baradère exhibited a collection of drawings, representing the antiquities of old Palenqua and of Mitla, amounting to 145, collected during several expeditions made in 1807 and in 1808, by order of the King of Spain.

Mr. Jomard mentioned that Dr. Fr. Corroy, director of the hospital of Tabasco, was about to depart for the ruins of Palenqua.

Mr. Barbié du Bocage read a notice by Mr. Rifaud on his discoveries made at Koum-Medinet-el-Farès, the ancient capital of Fayoum.

Academy of Sciences.

Meeting of the 19th October 1829.—M. Geoffroy Saint-Hilaire made his report on a communication from Dr. Warren, of Boston, relative to the two young Siamese, aged eighteen years, who are united at the belly. These individuals, said the reporter, experience simultaneously the same wants and affections. They eat, drink, and sleep together, and scarcely can speak to each other, although they like to talk with those who visit them. They have the same impulses,—the motion of the pulse is the same in both; and the respiration is also the same. When one is touched during the time they are asleep, they both awake; and they generally agree to do things quickly or instaneously,—for instance, during the voyage, they ran and played on the deck of the ship. Their course is always in a diagonal line, towards their supposed direction. They suddenly found themselves near the hatchway, and were in great danger of falling into the hold of the vessel, where they must have bruised, perhaps killed each other; but with a spontaneous, and really admirable movement, considering their danger, they leaped together, and cleared the hatchway without accident.

Though the most perfect intelligence reigns between the united individuals, who appear to have constantly the same wants, yet M. Collin witnessed a quarrel which arose between them during the voyage. The cause was a cold bath, which one wished to take, and the other refused, alleging the coldness of the season. M. Collin, however, succeeded in restoring harmony between them, by remarking that, in either case, one ought not to desire what would be prejudicial to the other. These two young men, it is thought, will come to Paris.

At this sitting a work was presented by Dr. Chervin, in which he contends that the late fever at Gibraltar was not contagious. Dr. Cherwin formed part of the French commission at that place.

A report was read from M. Robineau Desvoidy, who states that, from a female viper of the red species, he extracted 3000 young.

A report by M. Boyer was read, stating that he had invented a new instrument for crushing the head of the fœtus in the womb, when that operation is requisite. It was announced that he had made several successful experiments with this instrument.

M. Dupetit Thouars read a memoir relative to Botany, by M. Gautherot, who proposes, by a new process, to reproduce the shape of plants with great exactness.

Edinburgh.—The Royal Medical Society held its first meeting on Friday the 23d instant.

The Royal Physical Society commences its meetings on Tuesday the 3d November; from the great improvements which have been made during the recess, and from the spirit which actuated its members last winter, the scientific world has a right to expect some important results from the labours of the associates during the ensuing session.

The Plinian Society will also meet at their hall in the College early in the next month.

Newcastle.—In the lecture-room of the Literary and Philosophical Society, Newcastle, on the 20th instant, the second monthly meeting of the Durham, Northumberland, and Newcastle Natural History Society was held, and presents announced from Mr. Taylor of Boldon, comprising 116 specimens of plants from New South Wales; the head of a New Zealand chief, completely tattooed; and a box of insects from Rio Janeiro. The Rev. R. H. Brandling, of Gosforth, presented a portion of a fossil tree, found in Wideopen quarry, Northumberland.

An interesting paper was read from Mr. Richard Wingate of Newcastle, explaining the probability of a wild swan, shot in February last, near Haydon Bridge, being an entirely distinct species from the Anas cygnus, or common wild swan of Linnæus. It is much smaller, and differs considerably in anatomical structure.

The Hon. H. T. Liddell, M. P., and the Rev. R. H. Brandling, were elected Vice-Presidents of the Institution. Twenty-two gentlemen have joined the Society since last month, making in all 126 members.

MISCELLANEOUS INTELLIGENCE.

Zoological Gardens of London.—A fair correspondent, who takes much interest in the gardens of the Zoological Society, favours us with the following communication:

"Great improvements are daily being made in the Zoological Gardens. Seven acres of land have been added to them on the other side of the road, where winter accommodation for the animals is being prepared on a very large scale. The labourers are also engaged in making a tunnel under the road, for the purpose of connecting the two gardens. Three more leopards have just been presented, which make seven now in the collection. Several of the birds have died lately from the cold, particularly the swans and spoonbills. A great many visitors have been to admire the Gardens this summer: in one day the receipts at the gate amounted to L. 108, 12s."——M. A. H.

University of Edinburgh.—The winter-class of botany, opened last year, will be repeated by Dr. Graham this session, commencing on Tuesday, November 3, at five o'clock, P. M.

Large Polyzonal Burning Lens.—Through the scientific zeal of George Swinton, Esq., James Calder, Esq., and several other ardent friends of science at Calcutta, Dr. Brewster has received nearly L. 150 towards defraying the expense of constructing a large burning lens built up of zones and segments. The arrangements are to be affected by a scientific committee.

We shall shortly lay before the public an important general statement connected with this project.

Practical Chemistry.—It is with the greatest pleasure that we have received an announcement of a course of lectures on practical chemistry, by our correspondent Mr. K. T. Kemp. At the same time that this gentleman will demonstrate the principles of chemical science, and familiarize the student in manipulation and the use of the blow-pipe, it is his purpose to give particular instructions on electricity and galvanism. We most sincerely wish Mr. Kemp every success, in introducing others to that science in which he himself excels so much.

Paris.—Mr. De Lancy has just been appointed administrator of one of the public libraries of Paris.—*Gazette de France, Sept.* 20.

Paisley.—A meeting was lately held in Paisley, in the house of Mr. Duncan Henderson, to consider the possible introduction of the maize, or Turkey corn, into the west of Scotland, Mr. James Lee of Stanley in the chair. This gentleman stated, that from experiments made on his own farm, he had no doubt of its successful cultivation. Mr. D. Henderson was appointed to communicate with agriculturists on the subject.

Portsmouth.—Notice has been given by the admiralty that a BALL will be be dropped daily (Sundays excepted) from the High Tower of Portsmouth Dock Yard, at *the moment of one o'clock, mean time at Greenwich*; by observing the first movement of which Ball, all Vessels at Spithead and in Portsmouth Harbour may have an opportunity of regulating their Chronometers.—22*d October* 1829.

Sheffield.—Dr. Holland, author of the "Experimental Inquiry into the Laws of Life," has been elected to the chair of physiology in the Medical Institution of Sheffield. The lectures commence in January.

LITERARY NOTICES.

Works in the Press.

Preparing for publication, Azara's Natural History of Paraguay, translated into English from the original Spanish; with a Life of the Author, and Explanatory Notes, by Percival Huuter, Esq.—Messrs. Raspail and Talrich intend publishing a Collection of Wax Models of the French Fungi: two livraisons will appear every month from the 1st of October, and each livraison will be composed of four distinct species, each represented by five individuals, intended to display the different ages and aspects, and the anatomy of the organs in the species; the price of each livraison will be 40 francs.—The Travels of M. Caille to Timbuctoo, are preparing for publication in London.—Professor Sibbern is about to publish the first number of a Philosophical Journal, which will be completed in a given number of volumes.—Messrs. Olsen and Bredsdarff are about to publish a geographic map of all Europe. These gentlemen were honoured with a prize by the Geographical Society of Paris, and their map was subsequently approved by the learned society at Copenhagen.—Mr. Cowper Rose, Civil Engineer, is about to publish Travels in South Africa.—W. Curry & Co. Dublin, announce the Northern Tourist, or Stranger's Guide to the north and north-west of Ireland.—An Historical Account of Discoveries and Travels in North America, &c. including the shores of the Polar Sea, with Observations on Emigration, is announced by Hugh Murray, Esq.—Mr. Rhind has preparing for publication, Popular Studies in Natural History.—On the 1st of November will be published, a New Aunual for Youth, under the title of the Zoological Keepsake, Price 6s. 6d.

The great botanical work begun in 1802 by Venus, Palmstruch, and Quensel, and continued by Svartz and Billberg, under the title of *Svensk Botanik*, is to be published under the superintendence of the Royal Academy cf Sciences. The 108th number, published at Upsal in 1825, completed the ninth volume. In this work 648 excellent engravings and about 700 etchings have already appeared.

List of New Books.

Mignan's Travels in Chaldee, 1 vol. 8vo. 14s.—Hardy's Travels in the Interior of Mexico, 1 vol. 8vo. 16s.—Ward's Mexico, 2 vols. 8vo. L. 2, 2s.—Granville's St. Petersburgh, 2 vols. 8vo. L. 2, 2s.—Humboldt's Travels, vol. vii. 8vo. 14s.—Macfarlane's Constantinople in 1828, 2d edit. 2 vols. 8vo. 31s. 6d. and App. 4to. 6s. 6d.—The Horse, in all his varieties and uses; by John Lawrence, 1 vol. 12mo. 12s.

ERRATA.

In the last Number,

Page 14. Line 25. *for* square *read* broad.
—— 50. —— 2. *for* sanguinalis *read* sanguinaria.
—— 75. —— 6. *for* Hisinger read Haidinger.
—— 75. —— 8. *after* F *insert* 3.

for molluscæ and crustaceæ, *read* mollusca and crustacea, *passim*.

Letters and Communications (post paid,) Advertisements, and Books for Review, to be addressed to the Editors, at Mr. Lizars', 5. St. David Street, Edinburgh, or to the Agents in London and Dublin, where Contributions will be thankfully received and acknowledged.

W. Cartwright, Printer, Edinburgh.

THE

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OF

NATURAL AND GEOGRAPHICAL SCIENCE.

DECEMBER, 1829.

ORIGINAL COMMUNICATIONS.

ART. I. *On the Natural History of the Dugong,* (Halicore Indicus, DESM.)—*the Mermaid of Early Writers; and particularly on the differences which occur in its Dental Characters.* By HENRY H. CHEEK, ESQ.*

A POPULAR scientific periodical addresses itself to two classes of readers so entirely distinct, that it becomes necessary to assume therein a style and language appropriate to each. Thus, whilst we are desirous of adapting the papers we purpose to publish in this Journal, to the actual state of knowledge possessed by the most advanced student, it is a duty which we owe to the uninformed, to associate with the abstruse doctrines of science, those rudimentary principles, by means of which alone the former can be understood. And we hope that these considerations will, on all occasions, be taken into account in the perusal of the essays which may appear from our pen.

This globe, viewed as the residence of those myriads of animals which wander on its surface, or which sport in the bosom of its waters, presents itself to our observation under two important aspects, —as land, surrounded by an etherial atmosphere,—and as sea, a medium of suffocating density. Oxygen, that vital air, by means of which, through the renovation of the deteriorated venous blood, the life of animals is sustained, must, however, be extracted from both the atmosphere and the water; and nature has accordingly endowed her creatures with respiratory organs peculiarly adapted

* The substance of a paper read before the Royal Physical Society of Edinburgh, Nov. 3. 1829.

to each. The fishes, destined to live exclusively in the ocean, are provided with a comparatively external mechanism, (the branchiæ or gills,) over which the surrounding fluid flows, to impart its oxygen to the blood. The terrestrial vertebrata breathe by means of lungs, inspiring and expiring the circumambient air. And some remarkable reptiles, as the *proteus* and *siren,* created with a capacity for living in either of these media, are possessed of both those organs by which the terrestrial and aquatic tribes respire.

It would be impossible for any animated being to contain, in the ordinary bulk of a respiratory organ, that surface which would be requisite to extract from water a quantity of oxygen sufficient to maintain the temperature possessed by warm-blooded animals: lungs, in which, over a large surface, and at intervals, the oxygeniferous medium can be diffused, are indispensable to these classes. But the function of respiration by lungs is impracticable to animals which are constantly submersed; whence fishes respire by gills, and are cold blooded.

It cannot, then, fail to strike the observer with surprise, when he discovers in the ocean a large tribe of warm-blooded, mammiferous animals, analogous to fishes in their external form, with the fin and the hairless coat, and pursuing a similar mode of life. And wonder will increase, when examination proves, that they are nothing else than terrestrial mammalia, whose internal organs are concealed under the figure of the fish. Speculation immediately suggests the geological fact, that fishes existed prior to the creation of mammalia; and that the Omnipotent has passed by slow gradations from one series of organization to another; that the type or model on which all vertebrated animals are formed, is essentially the same; and the train of ideas may be easily extended to the conception, that those internal differences which were necessary to the terrestrial mammalia, were first attempted in the inhabitants of the ocean. The Cetacea, of which the whale (Cete) serves as an example, respire by means of lungs, incessantly rising to the surface for atmospheric air: they are viviparous, and suckle their young, and the sexes associate in the manner of terrestrial animals. The bones which represent those of the anterior limbs of quadrupeds, are concealed under thick tendinous envelopes in the form of pectoral fins; the posterior members are displaced by the cartilages of a horizontal caudal fin;* and the pelvis is in a rudimentary state.

Some striking peculiarities present themselves in the general organization of the cetacea. Constantly immersed in the water, with the exception of a small portion of the body,† it became necessary to the act of respiration, that the nostrils should have a direction differing from terrestrial mammalia; and we find in the cetacea,

* The cetacea differ from fishes in the direction of the caudal fin: in the latter it is always vertical.

† "——His delights
Were dolphin like; they shew'd his back above
The element they liv'd in."—SHAKESPEARE.

apertures which have been named *spiracles*, placed on the summit of the head, in a perpendicular direction, by which are performed the functions of respiration, and of the ejection of the water which passes into the mouth during the act of feeding. As an article of commerce, every one is acquainted with that peculiar production which supplies the place of teeth in the whale; but it does not claim consideration amongst these generalities.

The enormous size of the cetacea is perhaps one of the most amazing facts in their history. Varying in developement from the most colossal proportions to the ordinary size of other beings, they are in their extreme bulk the largest of known animals. Indeed it is natural, says Lesson,* that these giants of the animal kingdom, occupying the immense deserts of the sea, should bear relation to the vast surface which they have to animate. Thus the extensive wastes of Africa are the habitations of the largest quadrupeds, such as the African elephant, the rhinoceros, the giraffe, &c. And thus the uplands of Asia nourish the Asiatic elephant and the tiger; and in Borneo live the great orangs.

The habits of the cetacea vary in the different groupes. The whales are stupid and unwieldy, but move with great power; the cachalots are fierce and courageous; the dolphins warlike and voracious. The developement of the brain bears an interesting relation to the manners of the animal; of little magnitude in any of the cetacea, in proportion to the bulk of the body, it assumes its maximum in the dolphins, and their possession of superior intelligence is by all attested.

The period is but little distant to which we can look back with any degree of complacency on the nature and amount of our knowledge of these animals. Associated with the fishes anteriorly to the time of Bloch, they continued for many years the objects of vague though frequent descriptions; their history was but imperfectly related even in the classical works of Bonnaterre† and Lacepede;‡ and we hasten to the "Regne Animal" for the true arrangement of the cetacea, and to the labours of Lesson|| for an encyclopædia of the facts known in their natural history.

The order of cetacea was first divided by Cuvier into two families, the *herbivorous cetacea*, (Sirenia,) and the *cetacea proper*, which last are piscivorous. As the dugong, towards whose history these preliminary remarks are directed, forms one of the genera which compose the first division, we shall now confine ourselves exclusively to that branch.

The whole of the cetacea are formed on a type of great similarity: the striking differences observed amongst other orders of animals, are in vain sought for amongst them. The law of variety is principally developed in the dental system; thus the sirenia are distinguished from the common cetacea by the flat crowns of their

* Complément à Buffon, tom. 1.

† Cétologie, 4to. 1789.

‡ Hist. Nat. des Cétacés, 1804.

|| Loc. Cit.

molares, which result from the nature of their food. The neck, which can scarcely be said to exist in the other cetacea, owing to the diminutive size of the bodies of the cervical vertebræ, is more apparent in this family, which thus becomes approximated in general appearance to the amphibious Feræ, the walrus and the seal, with which it was long confounded in the systems. And as by the naturalists they are confused in the scientific works, so were they indiscriminately the subjects of the strange superstitions of the ignorant vulgar. Observing in early times the mammæ and the bearded chin of these animals, the people, fain for miracles and supernatural events, fancied that they saw the united forms of men and fish. The authenticity which was attached to the narratives, which at different times were published, would once have authorized their repetition in our pages; but if we now permit ourselves to relate some of the absurdities which were retailed from author to author with implacable mendacity, it is rather to illustrate the eccentric path in which the mind of man may wander, than for the purpose of showing that all these tales of mermaids and sea-nymphs are to be referred to the occasional appearance of a morse, a seal, a manatee, or a dugong.

In 1187, as we are told by Larrey in his *Hist. d'Angleterre*, a mermaid was fished up in the county of Suffolk, and kept by the governor for six months. It bore so near a conformity with man, that nothing seemed wanting to it besides speech.

In 1560, seven mermen and mermaids were caught by some fishermen near the island of Maner, on the western coast of Ceylon, and seen by several Jesuits, whose attestations may be found in the history of their society, (Part II. Vol. IV. No. 276.)

But amongst the numerous instances which have been thought worthy of preservation, the following is perhaps the most singular in its details:—

"The history of the Netherlands relates, that in the year 1430, after a great inundation, some women of the town of Edam, situated on the sea of Zealand, at the extremity of the little river Tye, going from their town in a boat to Prumeraude, where their cows were feeding, found in their way a sea-girl half buried in the mud; that they took her up, washed her, cleaned her, and took her to Edam, where they clothed her. The history adds, that they taught this girl to spin, and to make the sign of the cross, but that they could never teach her to pronounce one word, though they had taken her to Haerlem, where some literati attempted to make her speak. She was entirely like to our women, except in a very few particulars. She retained a great love for the sea, and even for the waters of rivers and canals, so that they were obliged to watch her lest she should throw herself into them, as she had several times attempted."*

The sirens of the ancient poets have by many been confounded

* Maillet's Telliamed.

with the mermaids of more modern times; and much ingenuity has been lent to the discovery of the mode by which those enchanting songs, which lured to destruction the unhappy mariner, could be articulated by the cetacea, whose language is a groan. But the sirens were most probably abandoned women, inhabiting an island on the coast of Sicily, and leading to perdition all those strangers whom they could draw within their toils. It is otherwise, however, with the naiads and tritons of antiquity, which seem to have taken their origin from our cetaceous tribes: the former were represented as young and handsome virgins, riding on dolphins' backs, and the latter like a man above the waist, and a dolphin in his inferior parts.

Of all the cetacea, that which approaches the nearest in form to man is undoubtedly the dugong, which, when its head and breast are raised above the water, and its pectoral fins, resembling hands, are visible, might easily be taken by superstitious seamen for a semi-human being.

The dugong, named Halicore, (sea nymph,) in allusion to these popular tales, was till very lately confounded with the manatus and stelleria, and placed in the same genus with the walrus or morse. Camper first distinguished it from this carnivorous quadruped. Leguat, Dampier, and others, described the dugong under the name "manatee of the Indies;" but Lacepede separated the walrus, the dugong, and the manatus, into three genera, and Cuvier has added as a fourth the stelleria, an animal from the sea of Kamtschatka, supposed by Steller to be a mere variety of the manatee. The walrus is now associated with the seal, amongst the Feræ, and the manatee, dugong, and stelleria, compose the natural family of herbivorous cetacea.

Only one species of the dugong has been described, (Halicore Indicus,) confined to the seas of the Indian archipelago. The characters of its organization bear a great resemblance to those of the manatee, the principal difference being in the number and kind of teeth.* Browsing on sea-weed near the shores of the ocean, the whole of this family of cetacea are intimately related to each other; so great is the directing influence of similarity of food. The flattened molar teeth, the multiplied stomach, the mild disposition produced by vegetable diet, are all links which closely unite this family of pisciform mammalia. And in its external appearance, the dugong differs only from the manatee in the crescented form of its caudal fin, in the absence of nails from its pectoral fins, and in its superior lip being a little longer and more pendant.†

* The geographical distribution of these two genera, however, differs exceedingly: the manatee is only found in the Atlantic, while the dugong is confined to the Eastern Seas.

† This great external similarity might have formed an excuse for Sir Everard Home's mistake, in calling the manatee "a species of dugong" since the publication of the *Regne Animal*, had not the state of his knowledge led him rashly to pen the following passage:—"In these two species of this extraordinary tribe of animals, between which there is so great a resemblance, the teeth

But in the dental characters of these animals, and the developement of bones connected with the teeth, we observe the most striking differences. Suffice it to say, that the dugong possesses large tusks in the intermaxillary bones, which are of enormous size, whilst, except in its early youth, the manatee has none. Indeed, Cuvier remarks "that the manatee may be said to be a dugong whose tusks are not developed."*

From the consideration of the teeth of the dugong brought from the East Indies, and from a belief which obtains amongst the Malays, countenanced by a comparison of the cranium figured by Daubenton, with the specimens brought home from the East Indies by MM. Diard and Duvaucel, it has been conjectured that there may probably be two species or varieties of this animal. And in No. I. of the New Series of Brewster's Journal, Dr. Knox published the results of some inquiries, which led him to suppose it "not unlikely that the differences in the form of the tusks, may originate not in a difference of age, but in their belonging to distinct varieties or species of the dugong," (p. 158.)

Since the publication of this notice, Dr. Knox, whose experience and zeal as a comparative anatomist are more generally known than his disinterested participation of the knowledge he possesses, has paid me the compliment of calling my attention to this question; and I have collated the evidence afforded by the writings of others, and compared it with the two specimens deposited in the collection of the Royal Society, and in the museum of the College, in this city, with the view of determining the nature of those differences which we have observed.

As it is not in my power to enter upon a minute examination of the skeleton of the dugong, and as the principal distinctive characters are derived from the teeth, I have confined myself to an investigation into the peculiarities of these organs, as observed in different specimens, the comparative size of whose crania is given.

The data (consisting of descriptions and engravings of crania, and of osteological preparations in the museums of this city) are perhaps sufficiently numerous for accurate deductions; but it would have been highly valuable had the history of the specimens been more complete.

They are, 1*st*, The figure and description of a mutilated cranium, engraved by Daubenton, (Tom. xxvii. P. 289, Pl. 56. Paris 1766;) and, after him, by Cuvier, (Oss. Foss. Tom. v. Pl. 19.)
2*d*, The description, by Camper, of a cranium so very similar to

are totally different, which shows the mode of classing animals from the appearance of the teeth, to be very erroneous," (Phil. Trans. 1821, p. 391.) In the first edition of his great work, published in 1816, Cuvier adopted the generic separation between the manatee and the dugong, which had been established by Lacepede. But the knowledge of species was of secondary importance whilst every fresh arrival crowded the museums with *ad captandum* novelties.

* Ossemens Fossiles, V. 260.

Daubenton's, that he has given no figure of it, (Œuvres, Tom. ii. P. 479.)

3d, The descriptions by Sir E. Home, (Phil. Trans. 1820, P. 144,) with figures, of two specimens sent to England by Sir Stamford Raffles from Sumatra; and of a cranium in Mr. Brookes's collection.

4th, Description by Sir S. Raffles of a male dugong 8½ feet long, (Phil. Trans. 1820, P. 174,)

5th, The descriptions and engravings by Cuvier (Oss. Fossiles, Tom. v. P. 262, Pl. 20,) of another skeleton, brought from Sumatra by MM. Diard and Duvaucel.

6th, Cranium in the Royal Society of Edinburgh.

7th, Skeleton in the Edinburgh College Museum.

1. The specimen which supplied to Daubenton the description he has given, was deprived of the whole of the occipital and parietal bones; but the remaining parts, and especially the teeth, appear to have been entire. They are thus described by the author: "The molar teeth of the dugong are placed at the bottom of the mouth, at a great distance from the tusks; there are four on each side of the superior jaw, and three on each side below; their crown is formed of a concave surface; their root is hollow like that of the tusks, which are the largest of the teeth; they have a longitudinal fluting upon their sides. All the teeth are of ivory, with a thin rind of the same nature, but without any envelope of enamel.

"The tusks are about half a foot long, and two inches in circumference; the cavity of their roots is more than three inches deep; they are composed of ivory like the molares; they do not pass above an inch out of the alveoli; this extra-alveolar portion is shaped by friction to a cutting edge, whose oblique face is on the external side, where alone it is not covered with enamel. As it is not possible that this face can have been formed by friction against other teeth, I presume that the animal rubs them on the external side against surrounding bodies."* The age and sex of this specimen were unknown. As no mention is made of the inferior incisores, it may be presumed that they were wanting. It is remarkable that the dimensions are not stated.

2. From an impression that the morse and the dugong had been unnaturally associated by Buffon and Daubenton, Camper was induced to publish a paper on this subject, wherein is contained an account of a cranium sent to him from Batavia by M. Vandersteege. "The figure and description," says Camper, "which Daubenton has given in the 13th vol. of the *Hist. Nat.* of Buffon, are so exact and perfect, that it would be useless for me to add any

* Hist. Nat. gen. et partic. 12mo. Paris 1766. Tom. xxvii. P. 293. Pl. 56. If it were probable that the most anterior pair of the inferior incisores (of which mention will be made in the sequel) ever attained sufficient developement, they would be the most likely agents in the attrition of the tusks. The direction they would necessarily take, renders the idea plausible.

thing to them." It is unfortunate, however, that neither the age nor sex of this specimen is recorded.

3. At the period when no other perfect specimen had been described, Sir E. Home received two skulls from Sir S. Raffles, governor of Sumatra. In one of these crania, (*Vide* Phil. Trans. 1820, Pl. 12,) the superior incisores or tusks protrude in a very slight degree from their sockets. On making a longitudinal section of one of them, the whole of its substance was found to be solid; at the posterior extremity there was a small shallow cup, composed of the same materials, which appeared to be no part of the tusk itself, but, as it were, fixed to the end of it.*

In the other skull, which belonged to an animal 8 feet long, the tusks project from the sockets, diverging outwards, and have their external faces worn to a flat surface. They are considerably broader than the former, and hollow from the extremity of the root to nearly half their whole length. In the lower jaw two rudimentary incisores were entangled in their sockets.

4. With the above skulls, Sir S. Raffles sent to this country an account of the general external appearance and anatomy of a male dugong, 8½ feet long, founded on personal observation.

The teeth are thus described:—" Two short tusks project straight forward from the extremity of the upper jaw, and are nearly covered by the upper lip......There are no incisors in either jaw (the tusks above mentioned being more properly defences,) their place being supplied by the rough bristly surfaces of the palate and jaws, which serve as rasps, to enable the animal to browse upon the algæ and other submarine vegetables......The molares are twelve in number, six in each jaw, placed far back on the horizontal part. They are cylindrical, with flat crowns; the first are somewhat oblique, and worn to a kind of point; the second are perfectly flat; but the last are composed of two parallel and adjoining cylinders. They are short, and scarcely project from the gums."

5. The last specimens sent home by Sir Stamford Raffles, were accompanied by a memoir from MM. Diard and Duvaucel, so similar to the accounts already published in the Phil. Trans. that it was considered unnecessary to have it printed. M. Fred. Cuvier, however, in his *Hist. des Mammif.* made use of the notes of these two French naturalists. It was from them, also, that the Baron Cuvier received a skeleton, imperfect from the absence of the sternum, but which served as the basis of his description and plate, in "Ossemens Fossiles," wherefrom corroborative information alone can be reaped.†

* This idea of disunion is connected with a theory of Sir Everard's. In the cranium in the Royal Society of Edinburgh, exactly similar in other respects to the figure given by this author, there is not the slightest appearance of disconnection between the tooth and the shallow cup.

† M. Cuvier, however, lately told Mr. Robison, secretary to the Royal Society, when the notice of Dr. Knox was shown to him, that "he now possesses a perfect specimen."

6. In the Royal Society of Edinburgh there is deposited a cranium of a dugong, whose resemblance to that engraved in the Phil. Trans. 1820, Pl. 12, is so exact as to appear to be identical with it.

The description given by Sir S. Raffles, (*vide* p. 168, *supra,*) agrees minutely with the characters of the molar teeth in this specimen. They are to the number of 12, three on each side of each jaw; their surfaces are flat, approaching to a slight concavity: empty sockets indicate the previous existence of a greater number, which have been shed.

The superior incisives, or tusks, are not advanced above half an inch out of the socket, having the points uneven and not at all worn. The extremity of the root has a cup-like concavity, as described by Sir E. Home, but there is no evidence of its ever having been separate from the rest of the tooth.

In the lower jaw there are four incisive sockets on each side, two of which contain rudimentary teeth, (as in Phil. Trans. 1820, Pl. 14, Fig. 2,) directed into the substance of the bone; the others are devoid of teeth, and grown up with cancellations of bone.*

7. In the Edinburgh College Museum, there is a handsome adult skeleton, nearly 8 feet long, which seems to be perfect except in the absence of the tympanic bone, whose loss Dr. Knox ingeniously observed. Through the kindness of Mr. Frederick Knox, I am able to give the following description of the dentition of this animal: †—

On each side of each jaw there are three molar teeth, and other empty imperfect sockets, indicating the former presence of teeth which are gone. Their surfaces are quite smooth from use.

Two incisores, or tusks, are deeply seated in the intermaxillary bones of the upper jaw, and diverge outwards when they project from the socket. The external surfaces of their extremities are worn flat by friction. Like the tooth figured in Phil. Trans. 1820, Pl. 13, Fig. 3, they are hollow to a considerable depth from the base. There are no incisives in the lower jaw, but there are five grown up sockets on each side.

* It is the opinion of Dr. Knox, that "the incisive teeth in the lower maxillary bone remain imbedded in their sockets throughout life; they are neither shed nor replaced. They seem to be eight in number." (Brewster's Journ. N. S. Vol. I. P. 157.) It must, however, be remarked, that in the adult specimen in the College Museum, the inferior incisive alveoli are all grown up, and though they present evidences of being formerly occupied, no teeth remain in them now.

† At the time that this paper was already in the press, and it only remained for me to corroborate by minute examination the notes which had passed through the hands of Mr. Knox, who articulated this skeleton, I requested the Professor of Natural History, who is also Keeper of the Museum in this University, to permit me to have access to the collection for this express purpose; and, indeed, as I was aware that a degree of jealousy was attached to the admission of those who might employ the valuable materials which lie on those shelves "unnoticed and unknown," I provided myself with a ticket to the ensuing winter's course of Natural History, for the sole purpose of securing that *favour*, which had been promised to me before the delivery of the fee. But I have since been prevented from performing the duty to the public which I imposed upon myself when I undertook to write upon this subject,

Such is the amount of evidence that I am at present able to obtain.

It is very apparent that the whole of the specimens may be reduced to two classes, according to the differences in their tusks, the molares, *cæt. par.* being the same in all the individuals. Thus we have 1*st*, Those whose tusks (as in No. 1, 2, 3*b*, 5, and 7,) project 1 inch or 1½ inch beyond the bony sockets, diverging outwards, and whose external margin is worn to a flat surface: these teeth are hollow to a great extent from the extremity of the root. And 2*dly*, Those (as No. 3*a*, 4, and 6,) whose tusks do not protrude from the sockets in any degree sufficient to fit them for use: they are not hollow, but are terminated at the root by a crested cup. Moreover they are much straighter, rounder, and less compact in their general structure than the former.

Hence the question has arisen, are these diversities owing to difference of age? or do they constitute the characters of distinct varieties or species?

by two obstacles which are at present insuperable. 1*st*, Because, as the Professor on one occasion stated, "*the Royal Commissioners have not yet authorized*" him to throw open the osteological museum; and 2*dly*, Because it is the Professor's "*private property*," and I might as well "*go into his drawing-room*," as he recently remarked, with a degree of the *fortiter in modo*, when, in consideration of the absorbing engagements which he placed in the way of my admission, I inquired of him "Whether there were no *other* means of obtaining access to that museum, without giving him the trouble to attend me?"

I am concerned that the same cause should have prevented me from obtaining accurate notes on the osteology and general developement of a young specimen of the dugong, (not much above half the size of the adult,) which is also deposited in the College Museum. There is a confused story of its having been sent home by the Duke of Manchester when governor of Jamaica; but it must not on that account be supposed that the animal is a manatee; for it has been also said, that the specimen came from the East, and the distinctive characters of the dugong are sufficiently evident. The skeleton is in an imperfect condition, being without the sternum, and having its mouth adorned with a most heterogeneous collection of teeth of horses, &c. and fragments of ivory. There are, however, most of the molar teeth remaining, five on each side of both the jaws being the original number. In the upper jaw, the posterior molar has its crown tuberculated, and very little advanced from the socket; and in the lower maxilla, the corresponding tooth has not yet passed out from its bed; the other molars have smooth crowns from use: the anterior are the smallest.

In the Phil. Trans. (1820, P. 315. and 1821, Pl. 20.) there is a description, with figures, of the skeleton and general anatomy of a young dugong, 4 feet 6 inches long, which was also sent to Sir E. Home by Sir S. Raffles, who, it is but justice to say, has done every thing in his power to increase our knowledge of this animal. It had two incisores in the upper jaw immediately before the tusks, and more advanced in the gum than these teeth. The gum covering the alveoli was very thick, and a ligamentous substance passed down from it into each separate opening, and attached itself to the teeth they contain. There were twenty (temporary) molars, five on each side of each jaw.

"In the anterior scabrous projection of the lower jaw, were four regular sockets on each side, filled with a ligamentous substance passing into them from the gum, forming gubernacula for the incisores not yet completely formed," (p. 316.)

The mangled condition of the bones in the College Museum, prevent the detection of these two superior incisores; but it seems to be the fact, that, as Dr. Knox has remarked, "they are shed at an early period, and not replaced by others."

The first paper published by Sir Everard Home on the dugong, had the express object of stating the discovery, (upon which, by the way, much overweening stress was laid,) that the first class of tusks we have described were the *milk tusks,* and the second class the permanent tusks of the same animal. And it did not appear necessary to the author to account for the cranium of the young animal being larger than that of the adult, according to his speculation, which, as shown by Dr. Knox, would be actually the case. The main argument supplied by Sir Everard, in support of his supposition, is, that "the whole of its (the tooth's) substance, was found to be solid, showing that it had arrived at its full growth, and was *therefore only a milk tusk,*" (Phil. Trans. 1820, p. 146.) The true conclusion to be deduced, was, as I presume, that as this tooth, at its full growth, was not so much developed as the tusk in other heads, it was therefore not the same as the latter; but the fact might as well be the indication of a variety in the species, or of a sexual difference, as of the presence of a milk tusk. A forcible argument used by Dr. Knox against this hypothesis, is obtained from the observation, that no appearance of any germ which might afterwards be perfected in the form of a permanent tooth, can be discovered behind this supposed milk tusk, nor is there any indication of an approaching change in the shape of the tooth. And additional proof might be drawn from the fact, that the bone of the skull which immediately incloses the root of the tusk, is absorbed, from the long-continued pressure of that rough crest which surrounds the extremity of the tooth.

There seems, however, to have been a general impression in favour of the existence of two species or varieties of the dugong. The Malays believe that two varieties frequent their shores, and have given them the names of *busban* and *buntal,* "the latter much shorter and thicker in proportion."* M. F. Cuvier and Lesson are both inclined to the conjecture that there are two species; and Dr. Knox employs this method of accounting for the discrepant statements of naturalists.

But after carefully comparing the different specimens which have lain before me, and after considering the analogies which might be derived from other animals, (though I am sufficiently convinced that the opinion of Sir E. Home must be erroneous,†) I cannot induce myself to accord with this latter supposition. It has occurred to me, from the recollection that a corresponding difference is observable between the male and female elephants of Asia, (the tusks in some females being so small as not to appear beyond the

* Sir Stamford Raffles, in Phil. Trans. 1820, p. 180.

† If the specimen in the Royal Society, and that similar one figured in Phil. Trans. 1820, Pl. 12, be the young, in comparison with the adult skeleton in the College Museum, and with the other specimen described in Phil. Trans. 1820, p. 153, (which from their relative size is inadmissible;) the young skeleton in the College Museum, like the specimen engraved in Phil. Trans. 1821, Pl. 20, cannot also be the young of the same species.

lip,*) that this may not improbably be a *mere sexual distinction.* Amongst the mammalia it is undoubtedly a general law, that the females are less developed in numerous portions of the body than the males,—a principle which, in many instances, extends itself to the teeth. Thus, the canine teeth in the musk-deer are much shorter, thinner, and straighter in the male than in the female, in which, indeed, they are sometimes altogether wanting. Thus also in the horse genus, the canines are almost always wanting in the female; and thus (to return to our own cetacea) the female narwhal often has a very inferior developement of the horn which at other times renders her undistinguishable from the male.†

Do not the foregoing statements, then, authorize the following results?

1. The specimens which have been described in the text, are of the full grown animal,—the ordinary length of the adult dugong being between 8 and 9 feet.‡
2. The number of molar teeth varies from five in youth, to three, and, according to Cuvier, even to two, in maturity, on each side of each jaw.
3. The inferior incisives have not been observed to attain a developement fitting them for use.
4. The superior rudimentary incisives are cast in youth and never replaced.
5. The peculiarities observed in the structure, size, and form of the tusks, are indicative of sexual differences,—the tusks of the female probably never projecting sufficiently for use. They certainly are not the characters of age; and there seems to be no reason to believe that they point out distinctions of species, or varieties.

It was my purpose to have subjoined to this memoir a tabular view of the comparative dimensions of the different crania, with a plate containing figures of each; but superior power has prevented my design. I trust, however, that when science is freed from monopoly,—when the gates of knowledge are no longer infested by a preternatural Cerberus, (whatever may be the sop that shall stupify his vigilance,) I shall be able to effect the completion of this subject with that degree of success which my means will permit.

* See Mr. Corse's Obs. on the different species of Asiatic Elephants, Phil. Trans. 1799, p. 208. In the Barclayan Museum, belonging to the Royal College of Surgeons of Edinburgh, (from the use of which the public are fortunately not debarred,) there is a noble specimen of an old *female* elephant, brought by Dr. Ballingall from Asia. The imperfect state of dentition in the tusks of this specimen, forms an interesting corroboration of the above views.

† Lesson Cétacés, p. 108.

‡ Sir Stamford Raffles observes, "they are seldom caught above 8 or 9 feet in length, but how much larger they grow is not ascertained, as when they exceed this size, their superior strength enables them to make their escape when attacked," Phil. Trans. 1820, p. 180.

ART. II. *TABLE of a Series of Observations of Solar Radiation.* By WILLIAM BAIRD, ESQ. Surgeon H. E. I. C. S. Member of the Plinian Society, &c.

[WHILE we are waiting for the results of the experiments on solar radiation, which are stated to have been made during the voyage of the late French expedition, we publish the following observations, transmitted to us by our valued correspondent, Mr. William Baird, which, it will be perceived, are slightly discordant with the opinion to which so much credit has been given of late,—that the intensity of radiation increases as we approach the poles, and diminishes towards the equator. To those who have experimented on the subject, it is well known that the amount of this intensity will vary locally with the methods employed, whether of blackening the bulb of one of the thermometers, or covering it with black silk or cloth; or, in other words, with the degree of perfection with which the experiment is performed. But while the intensity of a latitude may vary with two observers, if the experiments are all carried on according to the same plan, they will always be equally comparable with one another. And it is upon these considerations that we offer the following Table with every confidence to the public.—ED.]

The registrations are all made at different periods between the hours of 12 and 1, indicated by the number of minutes past 12. Thus in the first observations, on Dec. 17. at 12 minutes past 12 o'clock, the thermometer stood at 111 degrees,—at 15 minutes past 12, it had risen to 115 degrees, and so on.

1826. *Dec.*	Latitude, *South.*	Longitude.	Declination of Sun.	Therm. in shade at noon.	Thermometer exposed to the Sun at noon.	REMARKS.
17.	16° 05′ S.	92° 54′ E.	23° 21′ 09″ N.	79½°	12′ 111°, 15′ 115°, *on black hen-coop.*	Bulb covered with black silk. White cumuli occasionally passing over sun. *Fresh trade.*
18.	17 34	89 25	23 23 25	78¼	12′ 111°, *do. do.*	Zenith at time covered with light cirrus; bulb covered with blue woollen cloth. *Fresh trade.*
20.	19 58	83 18	23 26 26	77½	12′ 114½°, *exposed on China earth.*	Large cumuli occasionally obscuring sun. *Moderate trade.*
21.	20 49	80 18	23 17 15	78	12′ 119½°, 30′ 124½°, *do. do.*	Large fleecy cumuli occasionally shading sun. *Light trade.*
22.	21 41	77 38	23 27 35	77½	12′ 112°, 20′ 120°, 30′ 121½°, *do. do.*	Cumulo-stratus, gradually rising and passing into nimbus, began to cover sun. *Light trade.*
23.	22 20	74 45	23 27 25	77½	12′ 110°, 30′ 119°, *do. do.*	Sun occasionally obscured by large cumuli for a minute or two at a time. *Light trade.*
24.	22 47	72 14	23 26 47	78	*Thermometer placed on black hen-coop.* 12′ 103°, 20′ 108°, 30′ 106°, 45′ 105°.	A thin coat of cirrus, gradually condensing, with occasionally a cumulus passing across the sun. *Moderate trade.*

1826. *Dec.*	Latitude, *South.*	Longitude.	Declination of Sun.	Therm. in shade at noon.	Thermometer exposed to the Sun at noon.	REMARKS.
25.	23° 40′ S.	69° 18′E.	23° 25′ 40″ N.	79°	12′ 109°, 20′ 112°, 30′ 113½°.	Light cirri and cirro-cumuli prevailed on sky, shading the sun considerably. *Pleasant breeze.*
26.	24 40	65 58	23 24 06	78½	12′ 112°, 20′ 115°, 30′ 114°, 45′ 116°.	Cumuli occasionally passing across sun. *Fresh trade.*
28.	26 19	58 40	23 19 27	78½	12′ 103°, 20′ 102°, 30′ 105°, 44′ 106½°.	Cumuli occasionally passing across sky. *Fresh trade.*
29.	26 59	55 59	23 16 25	78½	12′ 99°, 20′ 100°, 30′ 111°.	Sun very much obscured by a thick cirro-strative cirrus. *Light trade.*
30.	27 17	54 00	23 12 55	78½	12′ 114°. 20′ 124°, 30′ 127°, 45′ 125°.	Fleecy cumulated clouds occasionally passed over sky. *Light trade.*
31.	28 02	51 00	23 08 55	78½	12′ 125°, 20′ 126½°, 30′ 126½°, 45′ 130°.	Light cirri. *Light breeze.*
Jan. 1.	28 40	48 29	23 03 15	78½	12′ 120°, 20′ 122½°, 30′ 122°, 45′ 126½°.	Sun at times partially obscured by a light covering of cirrus. *Light breeze.*
2.	29 11	45 53	22 59 37	77	12′ 95°, 20′ 100°, 30′ 105°.	Large masses of cumulus and cumulo-stratus, in fleecy masses at times obscured the sun. *Fresh breeze.*
3.	30 14	41 21	22 54 13	74½	12′ 104½°, 20′ 111°, 30′ 104°.	Large fleecy cumulated masses passing across sun occasionally. *Fresh breeze.*
4.	31 09	38 07	22 48 16	76½	12′ 119°, 20′ 121°, 30′ 122°, 45′ 122°.	Sometimes a little light cirrus passed across the sky. *Light breeze.*
5.	31 36	36 47	22 41 59	75	12′ 104°, 20′ 103°, 30′ 97°, 45′ 96°.	Light cirro-cumulus occasionally passed over the sky. *Light breeze.*
15.	33 53	16 37	21 14 27	71	12′ 91°, 20′ 91½°, 30′ 101½°, 35′ 102°.	Sky covered with light cirro-stratus. Bulb of thermometer covered with black woollen cloth. *Light airs and N. wind.*
17.	30 09	11 10	20 52 19	68½	12′ 114°, 15′ 118°, 20′ 119°.	Sky clear and unclouded. *Light breeze.*
18.	28 54	9 44	20 40 12	70	12′ 127°, 20′ 132°, 25′ 135°.	Sky clear. *Almost calm.*
19.	27 47	9 02	20 28 02	71½	12′ 99°, 18′ 100½°, 30′ 97°.	Large cumuli spreading over sky and obscuring sun, except at times for a minute or two. *Light airs.*
20.	26 24	7 26	20 15 18	71½	10′ 114°, 20′ 117°, 30′ 114°, 40′ 114°.	Cumuli occasionally passed over sun. *Light breeze.*
21.	25 08	5 39	20 02 04	71	12′ 118°, 20′ 120°, 30′ 122°, 35′ 117°.	Sky clear. *Light breeze.*

1827. *Jan.*	Latitude, *South.*	Longitude.	Declination of Sun.	Therm. in shade at noon.	Thermometer exposed to the Sun at noon.	REMARKS.
22.	23° 38′ S.	3° 30′E.	19° 48′ 53″ N.	73°	12′ 106½°, 18′ 114°, 23′ 116°, 33′ 118½°.	Cirro-cumulative clouds prevailed over sky. *Moderate breeze.*
23.	22 03	1 25	19 34 58	73½	12′ 114°, 20′ 116½°, 30′ 121°, 40′ 119°.	Sky clear and unclouded. *Moderate breeze.*
24.	20 21	0 40W.	19 50 22	73½	12′ 107°, 20′ 112°, 30′ 117°, 45′ 118½°.	Cirro-cumulative nebulæ at times rode over sky. *Moderate breeze.*
25.	18 40	2 33	19 06 23	74	12′ 120°, 20′ 119°, 28′ 123°, 40′ 128°, 45′ 126½°.	A few light cirro-cumulative clouds occasionally passing over sky. *Light trade.*
26.	17 31	3 43		73	12′ 116½°, 20′ 122°, 30′ 121°, 40′ 118°.	Sky clear. *Light trade.*
Feb. 2.	13 21	8 41		75	10′ 121°, 20′ 114°, 30′ 113°, 40′ 112°.	Sky first 10 minutes unclouded, then cirro-cumulative clouds collected and passed over sun. *Moderate trade.*
3.	11 26	10 20		76	10′ 129°, 20′ 130½°, 30′ 126°, 40′ 130°, 43′ 132°, 52′ 134°.	Sky clear. *Moderate trade.*
4.	9 23	12 03		76½	12′ 120°, 20′ 129°, 28′ 134°, 36′ 137°, 44′ 134°.	Sky clear and unclouded. *Moderate breeze.*
5.	7 20	13 54		78½	12′ 133°, 15′ 136°, 25′ 140°, 35′ 144°, 40′ 146°, 45′ 145°.	Sky clear and cloudless. *Moderate breeze.*
6.	5 23	15 35		79	10′ 122½°, 20′ 118°, 30′ 122°, 40′ 125½°.	Cirro-strati, cirro-cumuli high up. Cumuli low down in atmosphere, and a dense fog enveloping all, prevailed over the sky. *Light trade.*
7.	3 23	17 22		79½	10′ 122½°, 18′ 129°, 30′ 129°, 32′ 129½°, 40′ 126½°.	Cirro-strati, cirro-cumuli, with some light cumuli, occasionally passed across sky; a dense haze over all. *Moderate breeze.*
8.	1 34	18 48		79½	10′ 127°, 20′ 141°, 30′ 143°, 34′ 129°, 44′ 140°.	Cumuli occasionally passing across sun. Deep haze over all. *Light trade.*
9.	00 18	19 59		80	10′ 125°, 20′ 130°, 25′ 134°, 30′ 137°, 40′ 136½°.	Some light cirri and a few cumuli occasionally passing over sun. A deep haze over all. *Light breeze.*
10.	1 07 N.	20 52		80½	10′ 135°, 20′ 145°, 30′ 142°, 35′ 142°, 40′ 142½°, 45′ 142½°.	A few cumuli prevailed on sky, with a haze lighter than yesterday. *Light breeze.*

The following Observations of Solar Radiation were made in the Indian Seas by Mr. Baird in the year 1828.

NEW ANCHORAGE, BENGAL.

May 24*th* 1828. At 12 noon, the temperature in the shade being 86°, exposed a thermometer to the sun's rays upon a black painted board, the bulb being covered with a piece of black woollen cloth; at 12 30′, it stood 117°; at 12 45′, 120°. At 2½ P. M. temperature of shade being 86½°, exposed the thermometer again in same manner as before; at 3 P. M. it was 120°; at 3 30′, 128½°; at 3 45′, 129½°. During the day a few cumuli occasionally passed over sky, obscuring sun for a few minutes at a time.

Shade 86½°, Sun 129½°, Power of Sun 43°.

May 25*th*. At 11 A. M. temperature in shade 86½°, exposed a thermometer to sun's rays in same manner as yesterday; at 11 30′, 120°; at 12 noon, 128½°; at 12 45′, 130°; at 1 P. M. 130°. A few cumuli occasionally obscured sun for a few minutes.——Shade 86½°, Sun 130°, Power of Sun 43½°.

WHAMPOA, CHINA.

August 31*st* 1828. At 12 5′ noon, temperature of shade 85°, exposed thermometer as before; at 12 15′, 108°; at 12 15′, 118°; at 12 35′, 125°; at 12 45′, 131°; at 1 15′, P. M. 137½°. A few clouds occasionally for 2 or 3 minutes obscuring sun.

Therm. in Shade 85°, Maximum of Sun 137½°, Power of Sun 52½°.

Sept. 21*st*. At 12 10′ noon, temperature in shade 86°, exposed thermometer to sun as before; at 12 20′, 119°; at 22 25′, 130°; at 12 30′, 137°; at 12 35′, 140°. Sky during this time clear.—Shade 86°, Sun's maximum 140°, Power of Sun 54°.

Oct. 10*th*. At 12 20′, temperature in shade 70°, exposed a thermometer as before; at 12 30′, 102°; at 12 40′, 114°; at 12 50′, 120°; at 1 P. M. 123°. A fine haze extended all over sky during the whole of the day.

Therm. Shade 70°, Sun's maximum 123°, Power of Sun 53°.

Nov. 9*th*. At 9 30′ A. M. temperature in shade 74°, exposed thermometer as before; at 10 A. M. 98°; at 10 30′, 109°; at 11 A. M. 111°; at 11 30′, 116°; at 12 noon 122°. Sky clear.—Therm. Shade 74°, Sun's maxim. 122°, Power of Sun 48°.

Nov. 18*th*. At 10 25′ A. M. temperature in shade 74½°, exposed thermometer as before; at 10 35′, 96°; at 10 45′, 106°; at 11 A. M. 107°; at 11 30′, 109°; at 11 40′, 113°; at 11 50′, 114°; at 12 noon 117½°; at 12 10′, 121°; 12 20′ 123½°. Sky clear.

Therm. Shade 74½°, Max. of Sun 123½°, Power of Sun 49°.

If we compare these seven observations, made in about 23° N. Lat. with seven of those made in a former voyage, as registered in the preceding table, we shall find the mean of the above seven to be 49°, (Power of Sun;) while those made nearer the equator, (from 9° 23′ S. Lat. to the equator, or rather to 1° 07′ N. Lat.) give as the mean 58° 6′, being an excess in favour of those made near the line, of 9° 6′.

ART. III.—*Remarks on the Voyage and Periplus of Scylax.* By JAMES BELL, ESQ.

RESPECTING the former of these, the voyage of Scylax down the Indus from Caspatyrus and Pactya, and his subsequent voyage from thence to the head of the Red Sea, and his return by land to Susa, agreeably to the orders of his master Darius, we have but a short and meagre account, and that solely from Herodotus, who never saw the account which Scylax gave of his voyage to Darius, agreeably to his instructions, but gave it as he heard it from the Persians; or, in other words, has given merely an oral report of this important voyage. Such a wonderful voyage, in the infant state of nautical science amongst the Greeks,—a voyage far surpassing that of Nearchus in a still more advanced state of maritime knowledge,—is difficult of belief, and has induced many of the learned moderns, and amongst others the learned Dr. Vincent, that luminous annotator on the voyage of Nearchus and the Periplus of the Erythræan Sea, to call its authenticity in question; and, after all, this wonderful voyage contributed nothing to the advancement of geographical knowledge, or the extension of hydrographical science amongst the Greeks. There are difficulties on both sides of the question, and at this distance of time it is impossible fully to decide it. The voyage was made 508 years before Christ, and 70 years before the date of Herodotus' History; and as Herodotus proposes to give it merely from the report of the Persians, it is possible that he may either have given it incorrectly, from his own ignorance of oriental geography and hydrography, or have misconceived his information, or that he may have received an incorrect report from a people who have been always noted for their ignorance of maritime science. If these suppositions be allowed, there may have been some truth in the story; but it is impossible to believe it in all the extent which the information of Herodotus has assigned it. But it is necessary to give the account of the voyage itself from Herodotus, in order to discuss the subject a little, and state the difficulties attending the subject, which have induced me to pursue this investigation.

Darius having the conquest of India in view, but ignorant of its geography, first resolved, in order to facilitate his conquest of that extensive tract, to obtain a proper knowledge of it. For this end he employed Scylax, a celebrated Greek navigator, and native of Caryanda, a city in Cara. This personage was accordingly dispatched to the Indus, where, by the orders of Darius, he caused a fleet to be equipped at Pactya and Caspatyrus, cities on that river, and did the same at several other cities on the same stream, as far as the borders of Scythia. His orders were to sail down that river, explore all the tracts he possibly could, on both sides, quite down to its mouth,—to pass thence into the Southern Ocean, and then to steer his course westwards, and so return to Persia. In pursuance of his instructions, Scylax sailed with his fleet from the district of Pactya and city of Caspaytrus, down the river eastward to the sea, and then altering his course to the west, sailed from the mouth of the Indus to the Straits of Bab-al-mandab, and then entered the Red Sea, and landed, after a voyage of 30 months, at the same place whence Necho, about a century previous, had dispatched the Phœnicians to circumnavigate Africa. We are then informed that Scylax returned from Egypt to Susa, where he gave his master, Darius, an account of his voyage and discoveries, and how he had explored the country on both sides of the Indus. We are then finally told, that Darius, in consequence of the report of Scylax, crossed the Indus with a large army, and conquered all that vast country.

If this voyage be authentic, it is the most extraordinary one on record, after that of the Phœnicians who by Necho's orders circumnavigated Africa, that was ever performed by the ancients, and compared with which, that of Nearchus sinks into nothing. It is clear, from this account of Herodotus, that the Indus was then the eastern boundary of the Persian empire, and that Darius was master of the country on its western bank, as otherwise, Scylax could never have equipped a fleet at Pactya and Caspaytrus, if these places were not at that time within the limits of Persian domination.

If Pactya be the Peucelaotis of Alexander's historians, and be to the north of Attock, then Scylax must have sailed from its highest navigable point all the way to the sea, an inland voyage of 1000 British miles, exclusive of the sinuosities of the stream, whereas the fleet of Alexander sailed down the Hydaspes, and did not enter the Indus till after its confluence with the Punjnud, or the five rivers, a much shorter course. It is also clear from Herodotus, that Darius first sent Scylax to explore India, and then conquered it; whereas Alexander did the reverse, first conquering it, and then exploring it with a fleet and army, fighting all the way as he went down the Hydaspes, the Acesines, and the main stream. If Darius was not master of the Punjnub till after the voyage of Scylax, the wonder is how the natives permitted him to sail down the stream without opposition, when it required the combined strength of a fleet, and a numerous, well-appointed army, to enable Alexander to accomplish his purpose, in spite of the hostile tribes who opposed him at every step. The account implies also that Darius was then master only of a small portion of India on the western bank; for Scylax was ordered to explore both sides of the river, and there was no necessity for this, if Darius possessed all the country on the western side, for that would have been already known to Darius as a part of his empire. If Darius was master of the eastern shore of the Indus previous to that voyage, what need was there of accomplishing what had been done already? There was no need, at any rate, of sending a fleet down the Indus, in order to know the route to India, as every conqueror has followed nearly the same route from Cabul to Attock, and from the latter to Delhi. It would be strange, indeed, if Darius knew not the route from his own dominions to the Indus; and it is difficult to see how the voyage of Scylax could facilitate his conquest of India.

It is said further, that he sailed down the Indus eastward to the sea, which is impossible, as the river runs S. W. the whole way, and the mouth is at least 5 degrees W. of Attock. We are further told, that he altered his course to the westward, after leaving the embouchure of the river, agreeably to his orders, and thus returned to Persia. One would imagine from this, that his orders were to steer to the W. along the shore of the Indian Ocean, and then enter the Persian Gulf, instead of sailing S. E. along the gulfs of Cutch and Cambay. But instead of this, we find him sailing boldly across the Indian Ocean, in a S. W. course from the mouth of the Indus, to Cape Ras-al-Ghat in Arabia, and then coasting the whole S. E. coast of the Arabian peninsula, till he entered the Red Sea at the Straits of Bab-al-mandab, and then coasted the whole S. W. side of the same peninsula, till he arrived at Suez. After this, says Herodotus, Darius subdued the Indians, and became master of all that sea. What sea? Not that which washes the shore of India either to the W. or to the E. of the mouth of the Indus, for that coast Scylax it seems never visited; but that which washes the S. E. coast of Arabia and the Red Sea.

Now, what visible connection has this voyage with the conquest of India? I would think that Darius, by his conquest of India, became master of the whole sea-coast, from the Gulf of Cutch to the mouth of the Persian Gulf. I am inclined to suspect that Herodotus, from a misconception of his Persian informants, confounded the Red Sea with the Erythræan Sea, or Sea of Omman, which extends W. from the Indus to Cape Mussendom, at the entrance of the Persian Gulf; or rather that he confounded the Erythræan Sea and Persian Gulf with the Erythræan Sea and Arabian Gulf, and that instead of conducting him, as he ought to have done, to the head of the Persian gulf, landed him at that of the Arabian Gulf. It is further said, that Scylax published a full and circumstantial account of his wonderful voyage, and dedicated the same to Darius. That performance, however, if really published, seems to have perished before the time of Herodotus, as he never saw it, and his information respecting such a voyage was merely oral; and as the Persians themselves were never a maritime people, their information, as conveyed to Herodotus, was not likely to be very correct, It might be that Scylax was first sent as a traveller by Darius to India, to bring some account of its political state, in order that Darius might ascertain the practicability of its conquest, or it might be that, after Darius had conquered the country on both sides of the Indus, a fact indisputably certain, that Scylax, under Persian orders and Persian protection, sailed down the Indus in order to ascertain where it entered the sea, and then returned, by way of the Erythræan Sea and Persian Gulf, to Susa; but otherwise I strongly suspect the whole story, as it is told by Herodotus, for the reasons stated above.

Aristotle affirms that Scylax published a work on India, and that it was extant in his time. But it seems inexplicable to me, how Alexander, the pupil of Aristotle, could be so ignorant, as we are told, of the source and course of the Indus, when his master was possessed of, or at least could have procured the work for the perusal and information of his curious and conquering pupil. What mariners were employed in this voyage we are not told, which is somewhat surprising, as it was a circumstance of great importance. We are sure that they were not Persians, as maritime navigation was interdicted by the system of Zoroaster. It is probable that they would be Asiatic Greeks and Phœnicians, with perhaps Cypriots. But the most surprising thing in the whole story is, that he should have sailed directly across the Erythræan Sea, from the mouth of the Indus to Cape Ras-al-Had, a circumstance wholly without precedent or parallel in the existing state of nautical science. The method of sailing directly across the Erythræan Sea by means of the monsoon, instead of slowly creeping along the coast, was not known till the time of Hippalus, several centuries posterior to this voyage. It is equally surprising that no knowledge of these monsoons was communicated by Scylax, and that there is a total silence respecting the very high tides at the mouth of the Indus, which struch such terror into the minds of the mariners under the command of Nearchus. Not a word is communicated respecting what rivers fell into the Indus. Not a word of the Cophenes nor of the Punjnud, the mouths of which Scylax must have passed in his voyage down the river, nor of the Delta towards the mouth of the stream, nor of its various branches and mouths, as given by Nearchus, the admiral of Alexander, in his voyage down the Delta of the same river. It may be said that all the knowledge which Herodotus derived respecting India, was from this reported voyage. To use the words of Dr. Vincent respecting it, I may say, I cannot believe, from the state of navigation in that age, that Scylax could perform a voyage round India, from which the bravest of Alexander's followers shrunk, or that men who had explored the distant coast of Gedrosia, should be less daring than an experienced native of Caryanda. They returned with amazement from the sight of Mussendom and Ras-al-Had, while Scylax succeeded without difficulty of any kind on record.

The same Scylax is also said to be the author of a Periplus bearing that name, containing an account of the circumnavigation of the interior coasts of Europe, Asia, and Africa. This work is mutilated in some places, and imperfect in others, and has been pronounced by the learned Dr. Bentley, a very competent judge, to be one of the most corrupted books in the world. In his Periplus Scylax takes his departure from Gades, (Cadiz,) and proceeds eastward along the coasts of Spain, Gaul, Italy, Illyricum, Greece, Macedonia, Thrace, Scythia, the Euxine Sea, and the Palus Mæotis ; thence returning, he surveys the coasts of Asia Minor or Syria, Phœnicia, Egypt, Africa, and then finishes his course at Mount

Abyle, one of the Pillars of Hercules. He mentions the nations and tribes who occupied these coasts and the adjacent territories, enumerates the rivers and some of the cities in those parts, and ascertains the course of each day's sailing, computing it at 800 stadia. Dodwell, in a learned and ingenious dissertation, has endeavoured to shew that this Scylax is not the Scylax of Herodotus, who performed the wonderful voyage above discussed, but one who must have been contemporaneous with Polybius, (See *Hudson's Minor Geographers*, Vol. I.)

The Baron de Saint Croix, in a dissertation read before the Academy of Inscriptions, defends the Periplus which bears the name of Scylax, as the genuine work of Scylax of Caryanda. Gronovius is of the same opinion as Saint Croix, as also Rennel. Dr. Vincent, on the contrary, denies its authenticity, and maintains it to be a spurious production. One strong objection urged by Vincent is, that mention is made in the Periplus, of Dardanus, Rhetium, and Ilium, whereas there is great doubt whether Rhetium existed in the time of the real Scylax. It is very strange that if the Periplus be the real work of Scylax of Caryanda, that no mention either of his own wonderful voyage down the Indus, or of India itself, is made in it. One would have thought that these would have made part of the Periplus. It is besides still more wonderful, that in addition to his voyage from the highest navigable point of the Indus to the Indian Ocean, and across that very ocean to Ras-al-Had, and thence to Bab-al-Mandab, coasting the S. E. coast of Arabia in his way to that strait, and then sailing up the whole of the Red Sea, till he arrived at Suez, he should also have circumnavigated the whole of the Mediterranean and Euxine Seas, together with the Palus Mæotis, and even also have coasted the shores of the Atlantic from the Pillars of Hercules to the island of Cerne, (the modern Arguin,) near Cape Blanco, a point more than 10° W. and 15° S. of the Straits of Gibraltar.

If all these nautical facts were really done by the same individual, Scylax of Caryanda, he must have been the most extraordinary navigator of antiquity, and that at a time too when the Greeks did not know the line of coast from Delos to Ionia, and believed the distance to be as great from the Isle of Egina to that of Samos, as from the former to the Pillars of Hercules. I am therefore disposed to think that the Periplus of Scylax is not the production of Scylax of Caryanda, or indeed of any individual navigator, but a compilation made up from the various journals of different navigators, who had at different times coasted the shores of the seas therein mentioned, under his name, to gain credit to the work, and that it was published long posterior to the age of Herodotus. In that Periplus, as above stated, a day's sailing is estimated at 800 stadia, and in another part of the same work, the distance from Canopus, (Abukir,) to the Pillars of Hercules, is stated to be 75¼ day's sail. Now the space intercepted between these two points, does not exceed 2400 geographical miles, or 32 such miles daily: whereas, by the calculation in the Periplus, the intervening space would be upwards of 60,000 stadia, or 5145 geographical miles, at the rate of 700 stadia to a degree of a great circle. Now the whole distance, according to Eratosthenes and Strabo, measured along the coast between the points mentioned, is only 23,000 stadia. The rate of sailing is also prodigiously overrated by the above statement, being nearly 68 geographical miles a-day: whereas Rennel, by a comparison of the several distances recorded as sailed in a day by the ships of the ancients, has fixed the daily rate of sailing at from 36 to 37 geographical miles. Now, what confidence can be placed in a Periplus which allows 68 geographical miles for the average rate of daily sailing between Canopus and the Pillars of Hercules, and which consequently extends the length of the Mediterranean to upwards of 5400 geographical miles, or more than double the real length, Canopus or Abukir being more than 5 degrees to the W. of Scanderoon.

Posidonius rejected the whole history of Scylax as a fable and a forgery, as we are informed by Strabo. It has been contended by the advocates of Scylax, that, in his Periplus, Tyre is called an island and a royal city, neither of which designations could have been true at any time posterior to the time of Alexander the Great. The passage is thus given:—" This island is the royal city of the Tyrians, 3 stadia from the sea." It is clear that the passage is corrupted; for who would say that the island is 3 stadia from the sea? It ought to be read thus:—" 3 stadia from the continent." The whole passage is thus:—" Further on, another city called Tyre, having its port within the wall. This island is the royal city of the Tyrians, 3 stadia from the sea, the city Palætyrus, (Old Tyre,) through the middle of which flows a river." Reland supposes the passage to be interpolated, and wrong pointed, and that it should be read thus:—" Further on, another city Tyre, having its port within a wall. The royal city of the Tyrians is 3 stadia from the sea, the city Palætyrus, through the middle of which flows a river." Now he might mean the continental Tyre, built after the destruction of the insular Tyre, and joined to the island afterwards by a peninsula; and then what becomes of the objection? At any rate, the passage is corrupted.

It is again said that no notice is taken of the cities of Alexandria, Antiochia, Lysimachia, and others, built by this conqueror or his successors. It is also stated in the Periplus, that Carthage was then in a flourishing state, which could not have been the case had this production been contemporaneous with Polybius, Carthage being then sadly on the decline. The objection only proves that this part of the work was the production of some Greek philosopher, who lived before the time either of Alexander or Polybius, and that the work was a mere nautical guide, compiled from the journals of different navigators, to assist future sailors in their coasting voyages in the Mediterranean and Euxine Seas, and the Palus Mæotis.

ART. IV. *Experiments on exciting Galvanism, with compound and simple substances, at high temperatures.* By K. T. Kemp, Esq. Lecturer on Chemistry, &c. &c.

Galvanic electricity has been invariably produced by liquids of a compound nature, and its developement has accordingly been regarded by those who adopt the chemical theory, as the necessary consequence of the decomposition of the liquid which is interposed between the metallic plates. According to the theory of Volta, on the other hand, the chemical action has been regarded as entirely accidental, and quite unconnected with the developement of the electricity set in motion by the battery; and the supporters of this theory attribute it to the contact of the metals by which the electric equilibrium is disturbed, and that the liquid only acts the part of again restoring the equilibrium between the plates.

It is to be little wondered at, however, that these two theories so opposite should still continue to hold in the different countries in which they originated, when we consider that the modes adopted for exciting galvanism have been so similar; and that various substances have been altogether overlooked, which, had they been employed, might have thrown considerable light on this obscure subject.

In illustration, I performed the following experiments with substances which have not hitherto been employed for exciting galvanic electricity.

Having procured a small sized black lead crucible, and having perforated a hole in the bottom of it sufficient to allow of the passage of a copper wire, which I inserted so as to project within the inside of the crucible, and rendered the whole tight by cement.

A circular plate of copper was then cut, so as to enter easily into the mouth of the crucible, having also a copper wire soldered to its centre.

The crucible having been thus prepared was placed in a furnace, and a quantity of lead put into it; as the metal became melted, additional portions of it were successively added, until the liquified mass filled the crucible till within an inch of the top. During this part of the operation the furnace was raised to a red heat, and the extremity of the wire coming from the bottom of the crucible, was connected with the one side of an apparatus containing a suspended magnetised needle, the other extremity of the wire being in contact with the melted lead within the crucible.

A quantity of nitrate of potass, likewise heated to redness, was now poured over the melted lead in the crucible. The extremity of the wire, which had been soldered to the centre of the circular copper plate, was connected with the other side of the needle apparatus, so as to form a continuous wire passing under the needle. The copper plate itself, by means of the wire attached to it, was carefully placed into the crucible, so as to be in contact with the liquid nitrate of potass; and at the instant of contact the needle was powerfully affected, which evidently showed that the simple galvanic circle had been completed, and that electricity was circulating along the wire.

In this experiment the whole of the substances used for generating the galvanic fluid were at a red heat.

The crucible was afterwards removed from the furnace, while the circuit remained completed. As the temperature of the substances decreased, the effect produced on the needle was likewise lessened, and almost no effect was perceptible after the temperature of the nitrate of potass fell below a red heat, although it retained the liquid state.

In this arrangement the current of electricity circulated from the copper to the lead.

This experiment was varied by using fused carbonate of potass, with the same metals, instead of the nitrate as formerly: the effect on the needle, as I had anticipated, was much less than that produced by the nitrate. This difference may be accounted for, from the difficulty with which the carbonate of potass parts with its oxygen, and the consequent decreased action on the surface of the metals. The effect produced by the carbonate of soda, when used in the same manner, was rather more powerful than the carbonate of potass.

I now used borate of soda in place of the salts used formerly, along with the same metals, viz. lead and copper, and I found the effect on the needle to be more powerful than that produced by any of the salts I had previously employed, although the quantity of oxide formed on the surface of the metals must have been less than that produced by the nitrate of potass. It may, therefore, have been owing to the borate of soda requiring a less degree of heat to bring it into a perfect state of fusion than the other salts, and thereby be rendered a better conductor of electricity than those in a less perfect state of liquidity.

With the same apparatus these experiments were farther varied, by using, instead of the lead, other metals, as tin, zinc, brass, copper, and iron; with the liquified tin, zinc, and brass, I used a plate of copper, and with liquified copper and iron a plate of wrought iron. As an exciting liquid between these metals, I employed the nitrate and carbonate of potass, and the carbonate of soda, and also the borate of soda.

The effect produced on the needle by the use of melted tin was less powerful than that produced by lead; and the same ratio of power appeared to hold with respect to the different salts, as in the first experiment, when the lead was used.

With liquid zinc and nitrate of potass the effect was also rather powerful, but not nearly so much so as would have been supposed, from the quantity of oxide formed on the surface of the metal, as the thickening of the nitrate apparently rendered it incapable of transmitting the electric state so easily. With the other salts the effect was nearly similar to that produced by the metals used formerly. When liquid brass was used, the effects were much similar to those of zinc.

When liquid copper was used, and an iron plate substituted for the copper plate used in the former experiments, the effect on the needle was also rather powerful.

On increasing the temperature to a much greater extent, and using liquid cast iron, and a wrought iron plate, with fused flint glass for a liquid to excite the metals, the needle was also affected, which showed that galvanic electricity was generated, and even conducted, at this high temperature, by substances which, in their solid state, were totally incapable of transmitting electricity, although of a very high intensity.

In the preceding experiments, the developement of electricity was evidently caused by a portion of the oxygen existing in the salts combining with the most oxidizable metal, and thereby producing a current of electricity in the same manner, and in the same direction, as that which takes place when liquids are used to excite metals at ordinary temperatures. But that solid substances, which are not conductors of electricity, such as glass, should be made to conduct it, merely by being liquified, seems to be totally unaccounted for.

According to the theory generally received in this country on the subject, galvanism can only be excited by a liquid compound substance, consisting of two ingredients, which, of course, must be in opposite electric states; and that, when this liquid is brought in contact with the metallic plates, the oxygen or negative ingredient combines with the positive plate, and the hydrogen or positive ingredient is attracted to the negative plate. In this manner it is supposed that the equilibrium is restored which had been destroyed by the contact of the metallic plates.

In consequence of the success of the preceding experiments, I was induced to employ substances still less likely to excite electricity, being both simple and non-conductors of electricity.

The same crucible that was used in the preceding experiments was filled with lead as formerly; and, when it had arrived at a red heat, the remainder was filled with liquid sulphur. The copper plate was heated to redness, and brought in contact with the sulphur; the wire coming from the bottom of the crucible, and that from the copper wire, were, as formerly, connected with a needle apparatus. When the circuit was completed, the needle was very powerfully affected; while the sulphur combined rapidly with the copper plate. From the heat of the metals, the sulphur, at the same time, underwent combustion, and consequently formed sulphurous acid gas.

The crucible and lead being prepared, as in the last experiment, the copper plate was also placed in the crucible. It was then covered over with fire-clay, through which two porcelain tubes passed to open into the cavity remaining in the crucible between the melted lead and copper plate. When the crucible had arrived at a red heat, the liquid sulphur was poured through one of the tubes; and as soon as it came in contact with the metals, so as to produce a chemical action, the needle was strongly affected, although no oxygen was present to combine with the sulphur.

In this experiment we have electricity generated apparently by the combination of a simple substance with the metals, which is somewhat at variance with the chemical theory that supposes a compound body to be necessary to produce this action.

I am inclined to suppose that all substances, conductors or non-conductors of electricity, whether they be simple or compound, provided they are brought to a liquid state, and are capable of combining with one of the metals used, will be also found to transmit that electricity which they may have generated by the chemical action on the plate.

These simple galvanic arrangements can be increased so as to form batteries, and their effects more decisively ascertained.

SCIENTIFIC REVIEWS.

Travels in the Interior of Mexico, in 1825, 26, 27, *and* 28. By Lieut. W. H. Hardy, R. N. Colburn. London, 1820.

We are indebted for these travels to "the General Pearl and Coral Fishery Association of London," which, in the year 1825, commissioned Mr. Hardy to establish a pearl fishery in the Gulf of California, and which, after numerous difficulties put in his way both by the general and local authorities, and only with the use of much diplomatic talent, he succeeded in accomplishing, though finally without any success. Many circumstances connected with the local character of the waters, appear to contribute towards a tendency to the formation of pearls in the shells of certain molluscous animals; but with respect to the animal itself, nothing appears more intimately connected with their formation, than its age and undisturbed possession, in oysters, of rocky and sheltered gulfs or bays; or in fresh water mussels, of mountain streams coursing into deep and tranquil lakes. Under these circumstances, they do not lie in beds heaped one upon another, as when art has fostered the breed, but adhere singly aud firmly to the rock, in chasms and sheltered cavities; and notwithstanding the failure of the means employed by Mr. Hardy, we are still inclined to think with Baron Humboldt, that the pearl fishery of these districts will one day become an object of very high importance.

The interest of Mr. Hardy's journey lies principally in his navigation of the Gulf of California and the Rio Colorado, and in his travels in unfrequented parts of Sonora. A good describer of character and of national manners, his work abounds in lively portraits and scenes, strongly characteristic of a nation surrounded by sources of wealth, yet living in the extreme of poverty,—occasionally bursting into the heart-stirring feeling of an unanswerable claim to independence, and yet possessed of all those remnants of fanaticism, superstition, and pride, which have so long been a cloak to the vices and ignorance of their ancestors. Mexico appears to be still what it ever was, a most beautiful city, with filthy environs,—apartments (originally intended to be occupied by coaches) filled with women more than half naked, and men sprawling on the floor from the effects of inebriation. Numbers of people are passed on the streets wearing neither shoes nor stockings, and many even without shirts, with a sort of dirty blanket carelessly thrown over their shoulders.

Our traveller, while in Mexico, fell in with a member of the "Junta de Californias," who had drawn up some most extensive schemes, and, among others, one for colonizing Upper California by native as well as foreign settlers, and for converting it into a general depot for China tea, India silks, &c. combining the united interests of Asia, America, and Europe, and embracing the greater part of the maritime commerce of these quarters of the globe, including in its mighty grasp the Californian pearl fishery, trade of cattle, hides and tallow, and spermaceti whale-fishery. This plan was approved of by the Junta at California, and recommended by its members to the government. Its reception by the minister was so favourable, that they ordered it to be printed, and a copy to be sent to each of the deputies of the General Congress, that they might be prepared to discuss its merits so soon as the ordinary sessions should open. Mr. Hardy makes some remarks upon this subject, which were undoubtedly suggested by the present condition of the Mexicans, and which are at the same time applicable to more civilized nations in the old world. "It is (he says) an inherent failing in an uneducated people, to give credence to the marvellous, and to cling to all those absurdities which they deem to be axioms in "Legislation," "Freedom," and "Political Economy," words which are ever in their mouths, but to which they affix no precise meaning, and which so peculiarly designate a morbid state of feeling, an imbecile mind, and a true picture of national poverty, parsimony, and low ambition."

On leaving Mexico and Guadalaxara for the interior, our traveller appears to have been struck with that great beauty of scenery with which De Humboldt, Bullock, and others, had already made us acquainted. Indeed, "this confusion (he says) of mountain precipice and valley, affords no indifferent idea of the appearance of the world when it was yet 'without form,'—a perfect chaos!"

On the side of the road were maize plantations, and near the populous town of Teguilla, the sugar-cane grew luxuriantly, "as there are both warmth and water, two very essential requisites for its maturation." The scenery in other parts is entirely composed of a succession of precipices, covered, except where they were absolutely perpendicular, with trees and shrubs: now and then a cottage romantically situated by the side of a stream of water, trickling with a gentle murmur over the stones which obstructed its course, imparting a delicious fragrance to the air, and shaded by the wide-spreading branches of enormous trees overhanging it, and orange trees whose fruit welcomes the thirsty traveller: animals, grazing in situations which it would be thought they could have reached only by the aid of wings, brushing away with their perpetually moving tails the feverish flies: the grasshopper sounding its monotonous trumpet, and the owner of this wild domain reposing under the shade of a species of viranda, while his more industrious wife is employed in knitting stockings, and their happy children in devouring oranges, give an air of enchantment to the scene, which it is not easy to forget. Even on entering the smaller towns, the alcalde may be seen, with his family, hearing the recitation of extempore verses before his door, music filling up the cadence when the poet retired to refresh his memory, or regale himself with a drop of his honour's bottle; but this is a picture pencilled by imagination, and to which climate and the imagery of external show give the glow of natural colouring; for there are other scenes in which Mexico and its inhabitants might be delineated, in which we would trace the outline of moral and intellectual improvement, the state of the arts and sciences, the prosperity and happiness of individuals, the dissemination of a humble and beneficent religion, and we fear the drawing would not be of so pleasant an aspect.

It has long been admitted among the political economists of western Europe, that the riches of a country do not depend upon the amount of its pecuniary resources, and the Mexicans are living examples of the truth of this induction. Sensible of the effect, yet unable to trace the cause, Lieutenant Hardy advises that neither gold nor silver be sought for in the bowels of the earth, but recommends the mining of copper, not with any reference to quality or quantity, but merely because it appears *"to debase the mind less than gold,"* (p. 413;) but equally certain it is, that there is a general wish for improvement, and why should not that inclination be encouraged? Captain Basil Hall has stated that the commercial capitalists of some parts of Mexico, were desirous of opening a direct communication with England; and in order to do this safely and effectually, they proposed to remit a considerable quantity of specie to London, in the Conway, (Captain B. Hall's ship,) for which returns were to be made in English goods, in the manner practised ever since the opening of the trade in Peru, Chili, and Buenos Ayres. If such an intercourse was established, we should at once confer great benefit on that country, and find in return a probably very extensive demand for the produce of our manufactures.

There are two things common to the generality of travellers, against which we have strong objections, and which both bear upon a common failing,—the assumption of knowledge on subjects of which we are entirely ignorant. The first of these is a pretension to medical science. There are cases, as, for example, to save our life with the Arab, or to assist the suffering native, that it is philanthropic to become a doctor; but there are also cases in which such a character may become extremely ridiculous. Though your patient has bad assistance, yet you may give her worse, and the traveller had always better hold a course by which, whatever may be the result, his conscience remains clear.

The other case is that in which we hear a man talking of mines which had been so much worked that there is still sufficient metal left to make *a copper saucepan or two!* or, as at another place, "Our host was an odd old fellow, and particularly curious about the object of our journey, which he concluded could be none other than a search after mines. He told us that he never *knew* of any 'mineral' in the neighbourhood, but he was certain there *must be* some, as a gentleman only a few days before, and who dined at his house, was most particular in his inquiries about *one!* We resolved not to undeceive him, but requested, if he should come to the knowledge of any that he would send us word, to No. 18. Calle de Valvaniero, in Mexico; a street which had only seventeen houses in it." After reading this attentively, which we have printed in its original types, we remain in the same doubt as to where the wit lays, but not so as to where the nonsense.

Leaving travellers who wish to be thought doctors and mineralogists, and while we contemn the folly of constantly endeavouring to be witty upon very insignificant subjects, a style which takes much from the value of our author's descriptions, we may mention that in several parts of the work there are some excellent portraits; and as we are in the land of gold and pearls, we shall extract a sketch of a miser:

"At four P. M., we came to the Hacienda of Don Pedro Negrete, a native of Biscay, to whom I brought a letter of introduction from one of the Deputies of Guadalaxara. He was so polite as to receive me with as much coolness as if I had come to ask payment of an old bill! We found him sitting at the door of his one-room-house, superintending the repairs of an old box, which, judging from its venerable appearance, might have served Noah for a sea-chest. He is of middling stature, with a red visage; wears spectacles, stuck on, as in olden time, at the extremity of his pointed nose. He had on no jacket, and the sleeves of his shirt were turned up to the elbow; nor did he disdain to confine his half-grey locks of hair in an old pocket-handkerchief. His age might be about forty-five, and from the nervous irritability which his small grey eyes expressed, combined with his odd figure and odd occupation, he showed that the love of gain was the most predominating passion in his breast.

He seemed not to *understand* the import of a letter of introduction, the study of which engrossed him so completely, that for a long time he did not even offer us a seat on a block of timber which was placed by the side of his house, to serve the purpose either of a bench or a bed. It evidently annoyed him very considerably, and he presently left us to our reflections, and began bellowing like a mad bull, to his labourers, by way of taking off the rough edge of his passion. He was tranquillized, however, when we assured him that every thing should be paid for. To obtain this assurance, probably, he had acted the madman, and now that the paroxysm was over, he suddenly became very attentive. He gave us a bad dinner; and afterwards showed us his sugar mills and boilers, which he said yielded a good profit. After supper he ordered my bed to be made up in the inside of the house, where he also slept, having already exacted the payment of our bill! Thus our letter of introduction turned out rather to his profit, in spite of his fearful anticipations on our arrival. I ought to have mentioned that he made me pay for a bowl of milk, although he himself drank half of it! The Hacienda is eight leagues from Tepic."—P. 66, 67.

Our author seems to have been a man of courage and determination, and we feel assured, after reading his work, that the business on which he travelled did not fail for want of exertions on his part. He pursued tigers to their dens,—exposed himself to the most dangerous travelling amidst warring Indians,—dived among marine monsters of portentous size, and that till the blood trickled from his mouth, ears, and nostrils. His navigation of the Rio Colorado is so full of novel details, that we have introduced it into another part of our Journal; and at a time when the royalist Spaniards think that the country is again ripe for change,—when the same false information that a short time ago led Iturbide on to his ruin, is now probably bringing another expedition to disturb the tranquillity of the country and to injure its commerce, or to fall beneath the avenging arm of independence, we would finish by recommending to our readers a perusal of Mr. Hardy's *Censure* on the Mexicans, who with all their vices, we still think, will prove themselves to be firm patriots.

Four Years in Southern Africa. By Cowper Rose, Royal Engineers. Colburn. London, 1829.

This volume is written in letters to a brother, and therefore sometimes assumes a tone of familiarity; but while it contains nought "unborrowed from the eye," the object of the author being, as he states in his preface, to give "all that caught its glance, and on which that glance lingered—all that is beautiful or stern in nature—the gleam of the river—the gloom of the forest—the shadow of the mountain—the swift mist of the troop of graceful antelopes—the towering strength of the elephant—and the bold bearing of the free-born savage." We remember that there is but one step from the sublime to the ridiculous, and are prepared for what we have to expect in a work which professes to delineate the indefinite outlines of "the shadow of the mountain," and vie with "the towering strength of the elephant," and are glad, on perusal, to find ourselves oftentimes misled by the preface, and to catch ourselves lingering with pleasure and some instruction on the descriptive parts of the work, a branch of inquiry in which the author excels.

It is a mistaken notion—and Mr Rose has fell into the same error—that poetry consists in undefined images, and in leaving field for the reader's imagination. From the great examples of imperishable genius, and the history of more humble efforts, we could bring many examples of the contrary. It has often been a pleasure to us to walk with one whose muse unfortunately never extended beyond the precincts of his own village, to see how well he knew every ruined oak, every flower, every rock, in that vicinity. Indeed that power, the result of organization, which enables man to seize and remember "facts," seems to be a peculiar attribute of the successful poet; and though we do not think that the severity of science can ever be made to agree with the licences of poetry, we yet think poetry is ever worthless unless in description it is correct, and in painting human manners and actions it is true.

The germs of that kind of poetical prose which our author has indulged in may be found equally in the desert or the rich plains of Europe; its features will, indeed, be more novel, and there is no tint of colour so deep that it cannot be thrown over the manners of races little known, and scenes little visited.

These gaudy pictures have, however, no intrinsic merits, and to use the author's own words: "How idle a thing is description, *and my description the most idle of all,* who know not the names of what I saw, and have not words to speak their beauty." (p. 72.) We are not aware of the exact state of public feeling with regard to what they consider the most agreeable travellers; but we think that there can but be one opinion as to which is the most useful, and if the useful can be added to the agreeable, why should we have the latter alone.

We are now arguing against the principle; for it is certain that our author had never prepared himself to write an useful work, and his labours are of no interest either to geography, history, or natural sciences; but with such spare materials he has accomplished his task with credit. It was something to visit countries already explored by such men as Barrow, Vaillant, Delalande, over which had been stretched the scientific eye of La Caille, Thunberg, Sparrman, Abel, and a host of others; and it was not to be expected that in this small volume much was to be added to our previous knowledge of these countries; but equally unnecessary was that redundance of language by which every solitude is "tremendous and mighty," the hollow of every ravine "shadowy," the step of every Caffre "proud and elastic," the form always "beautiful," and by which every river is made to flow "clear, and dark, and deep." Mr. Rose describes the situation of the missionaries to be every way comfortable. Their communication is carried on by a Caffre messenger, who each week visits the nearest frontier military post, and receives the letters, which are then forwarded to those more remote. "I have in my rides through the country" (says our author) "crossed the dusky figure, as he moved quickly forward in his return, and have looked upon him as the last link of the vast chain of social intercourse that binds the absent to their father-land." This is a pretty conception: but we have one further on, which is more curious. Their party was joined by a woman of another tribe, whose husband had been unable to pay her stipulated price. "Barrow, I think, says, that when he was in Cafferland, the price of a wife was one ox; if so, the commodity is raised. This woman, who was of the lower order, and by no means beautiful, was valued at eight. Conguar told us, that one of his, a daughter of St'lamby, had stood him in forty, while I was asked fifty. It is pleasant and gratifying to see the sex taking their true station and value in society," (p. 194.) We shall terminate the notice of Mr. Rose's work by two more extracts; the first relating to the new settlement of Graham's Town, and in the second we will accompany the author in an elephant hunt.

"Graham's Town, now a large, ugly, ill-built, straggling place, containing, I should think, nearly three thousand inhabitants and soldiers, was a few years back only a military post, and the mimosa tree stands in the principal street, beneath which, it is said, the first English officer, Colonel Graham, who led a military party there, pitched his tent. Colonel Graham is dead, and the second town in the colony bears his name,—a name that is often mentioned, and always with respect.

"Houses have sprung up quickly of every variety of form, and barracks, and a church for the established faith, and chapels for all sects—Dissenters, Wesleyans, Anabaptists, Independents, &c. and last, not least, the handsomest building, and the most necessary, is a gaol.

"The population is a strange mixture of lounging officers, idle tradesmen, (merchants, I beg their pardon,) drunken soldiers, and still more drunken settlers.

"We have a circulating-library, and a fashionable tailor, whose shopboard announces that he comes from the Quadrant. Piano-forte tuners, a seminary for young ladies, and an artist, who in England was employed to copy Varley's drawings, and who succeeded, by his own account, so well, as to have his copies always mistaken for the originals; but, alas! Africa affords no encouragement to art; he lives in a mud-hovel, hawks about his drawings in vain, and his pencil fails to keep him in Cape brandy."—P. 45, 46.

And now to penetrate the deserts.

"The country we were traversing was singularly wild,—savage nature unreclaimed,—no blue smoke amidst the dark-green hills and shadowy hollows told of an habitation; even the roads are the work of the elephant. Man has never appeared in those tremendous solitudes, save as a destroyer. All was still, yet at intervals there came upon the ear the distant sound of a passing bell, heavy and slow like the death-toll; all again was still, and again the bell-bird's note came born upon the wind: we never seemed to approach it, but that low, melancholy, distant dreamlike sound, still continued at times to haunt us like an omen of evil.

"We threaded the elephant paths with a swift silent pace, over hills and through ravines, until, from having been long unaccustomed to walking in this riding country, I began, greatly to the surprise of the hunter, to show symptoms of fatigue. "We shall soon be among the elephants," he said, "and then we can sit down and watch them." Forward we went—now in shadow, and now in light, as we wound through the high bush; the light now glancing on the strange head-gear of the leading Hottentot, now touching the yellow handkerchief that bound the hunter's head; now the blue one, that shadowed the fair brow of the boy, and now running in a line along the muzzles of the large guns; then, again, they were lost in the gloom of some dark descent, or rocky ravine.

"We had frequently traced the mighty foot-prints of the elephants; from which the Hottentots told us when the animals had been there. "This is three days old,"—"This is last night." It was curious to observe the marks stamped in the mud around the small ponds, of animals that left their haunts at night to drink. The misshapen *spoor* of the elephant; that of the rhinoceros, resembling three horses' hoofs; the buffalo, the wolf, the timid and various antelopes, and the baboon, were all clearly to be traced.

"The African sun of mid-day now poured all its fire upon us; and it was with difficulty I could carry my gun, and the far-searching eyes of the hunters in vain looked around.

"The only animals we had seen, were three buffaloes that rushed down the side of the hill close to us, and disappeared in the deep hollow below. We had passed in our search several bodies of elephants, their bones bleached by sun and shower, showing through the black shroud-like shrivelled skin, and at one place the skeleton of a rhinoceros lay close to that of its mighty enemy.

"The search was becoming hopeless, when the leader pointed to a distant hill; there was a consultation, in which it was decided that a troop of elephants was passing over it. I looked, and could see nothing. But now we went on with fresh vigour, and gained the hill opposite to that on which they were; we halted and watched; a few words passed between the hunter and Skipper, and we descended silently the ravine that divided us. Again they whispered—marked from what point the light breeze came; and we commenced the steep ascent in a direction that the wind might come from the animals to us; for we were now so near them, that their quick scent would have discovered us. Skipper led, while we followed in Indian file, threading a narrow rocky path, which skirted one bank of a small hollow, while the huge beasts were feeding on the opposite one. The leader halted, the hunter gave my companion and myself lighted sticks, and whispered directions to fire the bush and grass, and to retreat, in the event of the animals charging. It was a strange feeling to find myself within twenty yards of creatures whose forward movement would have been destruction; but they stood browsing on the bushes, and flapping their large ears, pictures of indolent security. We were taking our stations when we heard a shot, and then another, and of the eight elephants, seven fled. We went forward to see the effect of the shots. Skipper's had carried death with it; the elephant had fallen, but rose again. I never heard any thing like its groans; he again fell, and we went up to him; the ball had entered behind the shoulder and reached the heart." Pp. 216—220.

Review of the Discussion on the existence of Active Molecules in Organic and Inorganic Bodies.

It was not considered one of the least important divisions of this our critical department, when we announced our intention of occasionally giving an analysis of the principal scientific discussions which occupy the attention of learned men. Indeed, it has generally been found the shortest method of arriving at truth, to determine before setting off which track should be pursued, and half the difficulty of forming an opinion, on a given question, is to know what that question means. How many a dispute has concluded, by the discovery that the only difference lay in the arbitrary acceptation of a term! And how frequently does it happen with the most philosophic men, that science has been disgraced by their imperfect conception of the views they rancorously oppose! If Fleming, knowing the facts, had clearly understood what Cuvier asserts, he would not have been tortured by Conybeare's merciless lash; nor would the Royal Society of Edinburgh have tottered in the conflict, and become incurably dumb,* had the theories of Werner and Hutton been comprehended and calmly compared by the contending parties, who, in the enthusiasm of the man, often sacrificed to unappeasable dogmas the character of the philosopher within those walls.

We are led, then, to believe, that it will be serviceable to science, if we occupy our leisure by throwing off, from the different subjects of discussion which agitate the students of nature, the veil with which, by obstinate pride and avariciousness of superiority, they have but too frequently been enshrouded.

Disputes of this nature will obviously be of two kinds,—as they are under the cognizance of the reason or of the senses. Contradiction in observation or experiment, depending upon the comparative strength of the eyes or on manual expertness, are, however, much more easily settled than the contrarieties of mental conclusions, which are ever the results of inappreciable differences of organization. A Festus may charge a Paul with madness ;† but the people will always have their adage, that "seeing is believing."

We commence this division of our labours, then, under manifest advantages, when we select a question which is open to ocular proof; requiring only as much exertion of mind as will enable us to detect the obstacles which oppose our true perceptions by the sight. It must be recollected, however, that when the aid of instruments is employed, a certain degree of practised skill is requisite, which must vary with the individual. And we do not hesitate to say, that we must relinquish our opinion on the controverted views which we are about to compare, to more accustomed experimentalists than we profess to be.

Vegetable anatomy and physiology, and especially the history of the generative organs and functions, beyond the capability of examination by the naked eye, are almost entirely the subjects of microscopic investigation, and in proportion to the perfection of the use of this instrument has our knowledge of these matters increased. The difficulties attending this mode of observation are, however, great; and an authoritative standard is much wanting, whither we may look for decision when dispute arises. For each observer is at present his own oracle, and interprets nature according to the promptings of his fancy: whilst the public, the universal arbiter, is obliged to listen in blind admiration on the dicta which must be believed by faith. Hence, in presenting to our readers an outline of the discoveries of Robert Brown, Ad. Brongniart, and Raspail, on the structure and functions of the pollen of plants, and

* Since the violent discussions which took place when geologists were absorbed in the speculations of Werner and Hutton, debate has been discountenanced in the Royal Society of Edinburgh.

† "——Festus said with a loud voice. Paul, thou art beside thyself; much learning doth make thee mad.

"But he said, I am not mad, most noble Festus; but speak forth the words of truth and soberness."—*Acts of the Apostles.*

of the generalizations to which these researches led, we constrain ourselves to a simple statement of what they profess to have seen, and a comparison of the points upon which they differ.

As early as the year 1826, in the botanical appendix to Captain King's Voyage to Australia, (Vol. II. p. 534,) Mr. Robert Brown had shown that the apex of the nucleus of the ovulum, the point which is universally the seat of the future embryo, was very generally brought into contact with the terminations of the probable channels of fecundation,—these being either the surface of the placenta, the extremity of the descending processes of the style, or more rarely, a part of the umbilical cord. It also appeared, however, from some of the facts noticed in the same essay, that there were cases in which the particles contained in the grains of the pollen, could hardly be conveyed to that point of the ovulum, through the vessels or cellular tissue of the ovarium; and the knowledge of these cases, as well as of the structure and economy of the antheræ in Asclepiadeæ, led Mr. Brown to doubt the correctness of observations made by Stiles and Gleichen, as well as more recent statements respecting the mode of action of the pollen in the process of impregnation. These observations were confirmed by Mr. Raspail in the 14th volume of the *Memoires du Museum d'Histoire Naturelle,* in which essay the author also endeavoured to prove that the apparent perforation was owing to a transparency in the summit of the cylinder, towards which the radicle of the embryo probably directed itself.

In 1827, in the 4th volume of the *Memoires de la Societé d'Histoire Naturelle,* another essay of Mr. Raspail's is inserted, in which he states his opinion, that the epidermis of the pollen incloses another vesicle, which is driven out by ammoniacal gas, and that this vesicle contains two or more glutinous and elastic vesicles, which sometimes lengthen themselves like an intestinal canal, and that it is to the coats of this intestine that the particles which are driven out by the explosion attach themselves. Mr. Adolphe Brongniart's essay, *On the Generation and the Developement of the Embryo in Vegetables,* had been read by Mr. Alexandre Brongniart, in the last days of 1826, before the Academy of Sciences, and six months after, (June 11. 1827,) Mr. Mirbel reported on the labour. In this report, after stating that the subject was not new, Mr. Mirbel says that it appears at present indubitable that fecundation does not take place by the vascular part of the style and the umbilical cord, but by the cellular tissue and the micropyle,—an important fact, announced by Mr. Morland, and which Mr. Robert Brown, and, after him, Mr. Brongniart, have placed in the highest degree of probability. The membranous mass, of cylindrical form, which Mr. Amici had observed to pass out of a grain of the pollen of *Portulaca oleracea,* and, inclosing the fecundating granules, elongate itself on the stigma, Mr. Brongniart ascertained not only to exist in that plant, but in many other phanerogamous species; and probably that in most it penetrated into the interstices of the cellular tissue of certain spongy stigmæ, and to all appearances allows the fecundating granules which it contains to be poured out in that situation. This was the state of the question in its first days, and the subjects of discussion were the probability of certain stigmæ being deprived of epidermis, while the utriculæ were in other plants covered with that membrane,—the degree of adhesion which existed between these utriculæ, and the real importance of the intervening mucilaginous matter, to which may be added, the degree of credit which could be attached to Mr. Brongniart's statement of his having seen the grain of pollen introduce its membranous cylinder between the interstices of the utriculæ, and, bursting there, spread its granules among the inter-utricular cavities of the stigma down to the style, and which he had seen travel from thence to the ovulum itself. And it was asked with great plausibility, how was it possible to see globules, almost incommensurable, travelling through a tissue, which offers in itself so many of similar dimensions, and generally so opaque that it is difficult to distinguish its internal tissue? And how, after dividing the ovulum longitudinally, could one be certain that the globules presented to the eye are the same as those seen in the grain of pollen?

In his first essay read before the Academy of Sciences, Mr. Ad. Brongniart had assimilated these incommensurable granules to the spermatic animalculæ of animals; but as the reporter passed over this part of the subject in silence, he presented to the Academy, on the 5th November 1827, a supplementary labour, in which he definitely stated his agreement with Needham, Gleichen, Geoffroy, Spallanzani, and others, in considering the granules of the pollen as analogous to the spermatic animalculæ of animals, and in contradiction to the opinion of Kœlreuter, and the generality of his successors, who attribute fecundation to a very subtle and invisible fluid. Mr. Cassini, in the name of himself and Messrs. Mirbel and Desfontaines, reported on this essay, in which they considered certain general laws as very premature. Mr. Brongniart had asserted, for example, that the species of the same genus presented granules of an analogous form, and that differ a good deal in different genera, even in the same natural families; and he thought that he could explain, by these facts, how the production of hybrids is easily effected between plants of the same genus, and why it is impossible under other circumstances.

Not only did Mr. Brongniart see the granules of many plants change their position with respect to one another, by approximating and distancing; but what is more remarkable, he saw the oblong granules of the *Hibisci* and *Œnotheræ* curb themselves spontaneously in the form of an arc, or even the form of an *S*, but always very slowly. Considering that the cause of the motion can only reside in the granules themselves, Mr. Brongniart thought that it could be qualified as *spontaneous*, and as the molecules of all organic fluids are motionless from the moment that they leave the body of the animal, with the exception of those which constitute the sperm;

in the same manner as the reproductive corpuscles of some confervæ are capable of spontaneous movements, before they become fixed, to form as they grow up, a new plant. He considers that it is a character common to the reproductive corpuscles of all organized beings, to enjoy a peculiar existence which manifests itself in spontaneous motions.

The theories of Mr. Brongniart are founded, in the first place, upon the analogies of the spermatic granules of vegetables, with the spermatic animalcules of animals, analogies which are doubtful and imperfect; and, in the second place, upon the nature and the functions which, according to a certain system, have been attributed to spermatic animalculæ; but this system, according to the reporters, is far from being beyond the reach of contestation, and the introduction and transmission of the granules through the vegetable tissue, as far as the germs of the ovulum, present new difficulties in the theory of vegetation.

In addition to the observers already mentioned, Mr. Guillemen, in his *Recherches Microscopiques sur le Pollen,* read before the Academy in 1825, had stated that when the grains of pollen are burst in water, that a kind of stream is produced by the ejection of a denser liquid in which the granules move at first with great rapidity; but that motion ceases very soon. He thought that these granules have a life independent of the organ which encloses them, and that they are the rudiments of embryos which nature carries upon other parts necessary for their developement.

Mr. Brown's researches, entitled *a Brief Account of Microscopical Observations made in the Months of June, July, and August,* 1827, *on the Particles contained in the Pollen of Plants; and on the General Existence of Active Molecules in Organic and Inorganic Bodies,* was not put into circulation by the author till the month of July or August 1828, and was printed without the author's sanction in Professor Jameson's Journal for September in that year. These observations were not then publickly known until that period, before which, on the 10th March 1828, Mr. Raspail read to the Academy an essay, entitled *Experiences et Observations destinées à demontrer que les granules lancés dans l'explosion du Pollen, bien loin d'etre les analogues des animalcules spermatiques, comme l'avoit avancé Gleichen, ne sont pas meme des corps organisés.* The labour was divided into two parts. In the first part the author examined the accidental causes, which, without the observer's knowledge, may impress upon the stillest corpuscles the most deceitful motions. These causes he supposes to be, 1st The explosion which ejects the granules. 2d. The phenomena of capillarity. 3d. The evaporation of the water on which the granules are floating. 4th. The evaporation of the volatile substances with which the floating granules may be impregnated. 5th. The motions common to great cities. 6th. The motions impressed by the agitation of the air. 7th. The motion occasioned by the pressure of the observer's hands upon the table. 8th and lastly. The inclination of the supporting glass.

In the second part of his essay, Mr. Raspail having taken for the object of his observations the pollen of the Malvaceæ, which contained the largest and best determined animalculæ, thought that he could explain all their motions by these foresaid causes, and further stated that they could all be dissolved in alcohol.

Mr. Adolphe Brongniart answered Mr. Raspail's observations in a paper read before the Academy the 23d of June 1828; but in consequence of some observations of the latter naturalist, the former gentleman wrote another explanatory letter, which commenced a dispute entirely foreign to the original question.

The Academy had named four members, Messrs. De Blainville, Cassini, Desfontaines, and Mirbel, to report upon Mr. Adolphe Brongniart's paper, when a new incident came to retard the judgment of the commission. Mr. Robert Brown's observations were distributed at one of the meetings of the Academy, in the month of August, giving a still greater latitude to a discussion which had always been one of observation, but at first purely implying peculiarity of structure, becoming subsequently functional or physiological, and was now going to lay the basis of great laws, applicable to every particle of matter, and liable to govern the whole universe. Not only did Mr. Robert Brown find motion in the grains of pollen, but in the cylindrical antheræ, or pollen of mosses, and in the minute spherical particles on the surface of the four spathulate bodies surrounding the naked ovulum, as it may be considered, of Equisetum, "which had been dried upwards of one hundred years." Continuing these researches, he found the same particles, and the same motion in fossils, stalactites, leaves, minerals, wood, linen, paper, cotton, wool, silk, hair, and even in antiquities; for example a portion of the sphinx. Oil, sulphur, wax, rosin, and those metals which cannot be reduced into a proper state of division, and the bodies which are soluble in water alone excepted.

The question then at that moment lay between three experienced observers, who each resolved it in a different manner. While Mr. Brongniart admitted in the interior of the grains of pollen, the existance of regular organised corpuscles of a very particular nature, distinct from all other bodies analogous to spermatic animalculæ, and essentially destined to produce the embryo; Mr. Raspail only saw in those corpuscles little resinous masses without determinate form, variable, and entirely deprived of organization and of life; and Mr. R. Brown, attaching himself to the exclusive opinions of neither of these observers, admits the existence in all natural bodies, whether organic or inorganic, of active molecules of similar forms, similar sizes, similar nature, and manifesting a peculiar motion when immersed and plunged into a liquid.

The reporters on Mr. Brongniart's reply to Mr. Raspail observed that the celebrated English botanist is far from partaking the opinion of Mr. Raspail, and he is convinced with Mr. Brongniart, that the granules of the grains of pollen are endowed with a nature peculiar to themselves, and independent; but upon other points, relating to theoretical views, that is to say, to the particular nature and functions of these granules, or to their mode of action in nature, Mr. Brown does not appear to adopt the ideas of Mr. Brongniart. The commissioners, after having observed the facts with all the care in their power, and driving from their minds all systematic considerations, came to the unanimous conclusion with Mr. Brongniart and Mr. Brown, that the causes to which Mr. Raspail attributes the motion of the granules exert no influence.

The commissioners further stated, that the resemblance which certain active molecules of Mr. Brown present to the spermatic granules of Mr. Brongniart, furnish strong presumption against the hypothesis of the latter.

But Mr. R. Brown's remarks on Mr. Brongniart's essay do not coincide with the first statement made by the commission, and establish some important distinctions. For he particularly says:—

"He (Mr. Brongniart) was evidently unacquainted with the fact, that the active spherical molecules generally exist in the grain of pollen along with its proper particles; nor does it appear from any part of his memoir that he was aware of the existence of molecules having spontaneous or inherent motion, and distinct from the peculiar particles of the pollen, though he has doubtless seen them, and in some cases, as it seems to me, described them as those particles.

"*Secondly*, He has been satisfied with the external appearance of the parts in coming to his conclusion, that no particles capable of motion exist in the style or stigma before impregnation.

"That both simple molecules and larger particles of different form, and equally capable of motion, do exist in these parts, before the application of the pollen to the stigma can possibly take place, in many of the plants submitted by him to examination, may easily be ascertained, particularly in *Antirrhinum majus*, of which he has given a figure in a more advanced state, representing these molecules or particles, which he supposes to have been derived from the grains of pollen, adhering to the stigma."

Mr. Raspail, in the mean time, asserts that Mr. Robert Brown has only developed his opinions, with this difference, that Mr. Brown thinks that in observing the motions of inorganic substances, he has established a new law; while Mr. Raspail only sees in these phenomena, the most simple and most ordinary effects of a number of causes sufficiently well known.

In No. II. of the New Series of the Edinburgh Journal of Science, there are some "*additional remarks on active molecules*," by Robert Brown, F.R.S. &c. &c. in which, after correcting the notion that he had stated the active particles to be animated, he states the results of the enquiry as follows:—

"That extremely minute particles of solid matter, whether obtained from organic or inorganic substances, when suspended in pure water, or in some other aqueous fluids, exhibit motions for which I am unable to account, and which from their irregularity and seeming independence resemble in a remarkable degree the less rapid motions of some of the simplest animalcules of infusions. That the smallest moving particles observed, and which I have termed Active Molecules, appear to be spherical, or nearly so, and to be between 1-20,000dth and 1-30,000dth of an inch in diameter; and that other particles of considerably greater and various size, and either of similar or of very different figure, also present analogous motions in like circumstances.

"I have formerly stated my belief that these motions of the particles neither arose from currents in the fluid containing them, nor depended on that intestine motion which may be supposed to accompany its evaporation.

"These causes of motion, however, either singly or combined with others,—as, the attractions and repulsions among the particles themselves, their unstable equilibrium in the fluid in which they are suspended, their hygrometrical or capillary action, and in some cases the disengagement of volatile matter, or of minute air bubbles,—have been considered by several writers as sufficiently accounting for the appearances. Some of the alleged causes here stated, with others which I have considered it unnecessary to mention, are not likely to be overlooked or to deceive observers of any experience in microscopical researches: and the insufficiency of those enumerated, may, I think, be satisfactorily shown by means of a very simple experiment.

"This experiment consists in reducing the drop of water containing the particles to microscopic minuteness, and prolonging its existence by immersing it in a transparent fluid of inferior specific gravity, with which it is not miscible, and in which evaporation is extremely slow. If to almond-oil, which is a fluid having these properties, a considerably smaller proportion of water, duly impregnated with particles, be added, and the two fluids shaken or triturated together, drops of water of various sizes, from 1-50th to 1-2000dth of an inch in diameter, will be immediately produced. Of these, the most minute necessarily contain but few particles, and some may be occasionally observed with one particle only. In this manner minute drops, which if exposed to the air would be dissipated in less than a minute, may be retained for more than an hour. But in all the drops thus formed and protected, the motion of the particles takes place with undiminished activity, while the principal causes assigned for that motion, namely, evaporation and their mutual attraction and repulsion, are either materially reduced or absolutely null."

Mr. Brown concludes these supplementary remarks by notes, where he considers these observations to have been anticipated, and quotes the works of Leeuwenhoeck, Stephen, Gray, Needham, Buffon, Spallanzani, Gleichen, Wrisberg, Muller, Dr. Drummond, and Mr. Bywater of Liverpool, who all, he states, include active molecules with true animalcules.

We think, from the historical sketch which we have given of those modern observations and discoveries which have excited so much interest, both from the high scientific attainments of the observers, and from the extensive application of which they seemed to be capable, that, amidst such perplexing evidence, if we have not satisfied our readers of what is the actual truth, we have at least laid before them, as far as has been in our power, those statements on which the discussion has hitherto hung.

The elements of the question are thus at the disposal of observers, and every one may at his leisure verify the assertions which have been made on each side, satisfying himself on a question which presents nothing positive, and every thing to be contested.

The Natural History of several new, popular, and diverting Living Objects for the Microscope, with the Phenomena presented by them under observation, &c. Illustrated by highly-finished Coloured Engravings, from drawings of the actual Living Subjects. By C. R. GORING, M.D. and ANDREW PRITCHARD. No. II. Pp. 64. with Three Plates. Whittaker & Co. London, 1829.

GREAT as is our horror of these *diverting* titles, we have been tempted to approach this work by a hope which certainly has not been delusive. To the young microscopist, chapters of practical instruction are given, which, at the same time, show how well these gentlemen understand their profession, and how capable they are of communicating it to others; and most elegant coloured engravings of magnified objects of Natural History, beautify the whole.

The publication is irregularly periodical; each number being complete in itself.

The writings of Dr. Goring will be known to the readers of Brande's Journal, to which the author refers, with the observation, that as "periodical publications are considered of small value, whatever their merit may be, when their date is passed, it becomes necessary to reserve matter worthy of notice from the oblivion to which it is too frequently consigned in them, by presenting it to the public in another form;" and when we repeat that it is the object of Dr. Goring to "add to, abstract from, change, alter, and improve" the various tracts he has already written, or to give entirely fresh matter, we give a favourable idea of the execution of his department of the work.

The portion undertaken by Mr. Pritchard—the drawings and descriptions of subjects of Natural History—is, however, more attractive than the description and explanation of the instruments and test objects.

"The specimens which I have selected," says the writer, "are those which experience has shewn to excite the strongest emotions of pleasure and satisfaction in the great mass of observers of all ranks; whom I have always found to be most delighted by *comparatively large living objects*, seen with *medium powers.* In fact, they seem to afford the same sort of gratification with a menagerie of living wild beasts on the large scale; and most certainly many of them wonderfully emulate the ferocity, voracity, cunning, and cruelty of the mammalia. They prey on each other, and fight with a degree of determined obstinacy not inferior to that of any beings whatever. They have likewise a thousand diverting pranks and humours, quite peculiar to themselves. In addition to these amiable and amusing qualities, they possess such a high degree of transparency, that their unique and beautiful internal machinery is as clearly perceptible as if they were made of glass; so that, without any dissection, we can unravel all the mysterious workings of their nature; such as the circulation of the blood, the pulsations of the heart, the peristaltic motion of the intestines, and the play of every muscular fibre. This property of transparency is not possessed by any other living beings with which I am acquainted, except the *animalcula infusoria.* I may observe, that no *perfect insects* present so many facilities for adaptation to the microscope, or can be so easily preserved and managed; so that the larvæ, &c. appear to me peculiarly and exclusively devoted to the consideration of microscopists."—P. 6.

It would be entirely unnecessary to vindicate the value of such a work as might be expected from this outline,—a question can only exist as to its execution. Now though the matter, as we have stated, is practically excellent, we cannot refrain from giving Dr. Goring our ideas on the manner in which we have been taught to believe that science ought to be treated, as compared with the papers to which his initials are affixed. There is a gentlemanlike style, an absence of slang, an ignorance of the kitchen, found in the writings of our favourite models, which we vainly look for in these pages. It may be said that the mob will not read, and, what is more important, that they will not buy, unless there be some buffoonery to stimulate their gross appetites. But rather let them perish in their ignorance, than our men of science turn panders to their desires by the prostitution of all that is fair and amiable; and if they will not purchase, do not you, then, prepare; but seek your bread after some more honourable vocation. That we are not unnecessarily fastidious, may be gathered from the following address to his pupil:—

"Now, courteous disciple, I will endeavour to instruct thee how to manage thy tackle, and will, moreover, have the extreme complaisance to suppose thee (in all microscopic matters at least) one of the *awkward squad*, as stupid as an owl, and as ignorant as a cart-horse. I will tell thee as well as I can all that thou art *to do*, and all that thou art *not to do*. I will try to make thee know the right end of thy instrument from the wrong one; how to put a fly's eye before the object-glass, and a fool's eye before the eye-piece; with many other things equally curious, important, and interesting; and if perchance I shall succeed in learning thee how to deal with the instrument under consideration, (the operative aplanatic engiscope,) together with the Amician reflector, the management of *all others* thou canst meet with will be as easy to thee as the guidance of a cock-boat is to the seaman who can work a line-of-battle ship."—P. 61.

And that we have probably successfully divined the circle in which our author has moved, will be seen from the following illustrative narrative:—

"I had a Spanish cook who piqued herself very much upon frying fish, and who certainly cooked it most inimitably, according to her own country fashion, that is, quite plain, and in oil. I once wanted some smelts fried in the English way, *i. e.* with eggs and crumbs in lard. Though cooking is notoriously a matter of taste, yet I think cooks are more obstinate and bigotted, in their own way, than any other artists whatever. I suspected I should have a tough job, so I resolved to be very gracious, and accordingly stepped down to Teresa's laboratory, with a brandy bottle in my hand, to smooth her over, and resolved to go about the bush very cleverly. It did not do though. Having prefaced the subject with a glass, I entered into the detail, and thought I was getting on famously, as she heard me to an end very patiently, with merely a few short coughs. She then, however, burst at once into a volcanic paroxysm of rage, and as she always spoke Spanish when in a passion, I could but very imperfectly understand her. After a volley of invocations and execrations, her oration was, I believe, something to the tune of what follows:—"Holy Mother of God, look down upon me! Fry fish in lard with egg and crumbs!!! What beasts these English heretics are!!! *You teach me to fry fish? You? You?* [Here she lifted up the frying-pan, which she had just been polishing in the inside with a brickbat.] By St. Jago and St. Dennis"—I did not wait to hear any more, but sneaked up stairs again, with my tail betwixt my legs, (just as a well-bred dog does out of a room when he sees preparations making for kicking him out,) blessing my stars that I did not get a spank with the frying-pan on that part of me which escaped last. Finally, I ate the fish, fried in oil, and before Teresa would be pacified, was obliged to recant my filthy and damnable heresies, and say I was only *in fun*; that her way was much the best; and, moreover, give her two more glasses of brandy; and thus ended my unfortunate expedition. (I should not have truckled to her at this rate, but that she was the most industrious, cleanly, and honest domestic that ever poor miscrosopher had.) Now what this she Spaniard expressed, with the fierce energy of her clime and country, every man, I suspect, feels more or less, when any attempt is made to put him out of his way in matters in which he thinks it is his exclusive province to dictate. I have never forgot Teresa's lesson, and expect about as much luck in reforming microscopes as I had in teaching her to fry fish."—*Note*, p. 36.

We conclude, then, with the opinion, that this is a very serviceable, and indeed necessary work, got up in such a manner, that those to whom it must be exclusively useful, will be prevented from giving it that support which they desire; for it must be recollected that the microscope is not used in Billinsgate. But we trust that, as a broken and contrite spirit cannot be despised, the purity of future numbers will atone for the imperfections of the past.

GEOGRAPHICAL COLLECTIONS.

Geographical Details on the Rio Colorado.

NOTWITHSTANDING the numerous mountains which intersect Mexico, there is a general want of water and of navigable rivers. The great rivers Rio-Bravo-del-Norte, and the Rio Colorado, are the only ones which fix the geographer's attention, both on account of the length of their course, and of the great mass of water which they carry into the ocean; but passing through that portion of the country which is least cultivated, and to which little attention has been hitherto paid, they have remained without commercial interest. Lieutenant Hardy, in his journey undertaken in pursuit of the pearl fishery in the Gulf of California, explored the Rio Colorado at its mouth; and we have copied a chart, (Vide Pl. IV.) introduced by that gentlemen into his work, (Travels in the Interior of Mexico,) which does him great credit. The soundings indicate a navigation of little extent, and rendered still more intricate by a succession of reaches or shoals.

There is no account, as far as Lieutenant Hardy knows, of any vessel having gone higher up the Gulf of California than the southern extremity of the island called "El Angel de la Guarda," which in most maps is laid down as forming a part of the mainland of Lower California. The printed maps of this gulf are sadly erroneous; but there is a manuscript one which extends as high as Sal si Puedes, and which is sufficiently correct for navigating those seas as far as it goes; but as soon as Lieutenant Hardy had passed that island, it became perfectly useless.

In running up the gulf, in lat. 31° 12′ N., long. 112° 45′ W. of Greenwich, the Lieutenant met with land composed of four small islands, about 100 yards wide, and extending in a straight line about 2000. As they did not appear on any of the charts, he gave them the name of George's Islands, in honour of his majesty George the Fourth. These islands were perfectly white, being composed of soft sand and limestone. The sea-birds make them resting-places, and deposit their eggs upon them: the beech was also numerously surrounded by seals. Beyond George's Islands the southward and eastward shore is a deep half-moon bay; the westernmost point Lieutenant Hardy called Rocky Point. Bearing up to Shoal Point, which lies in lat. 31° 15′ N., long. 113° 45′ W. our navigator fell in with another island, whose latitude he ascertained to be 31° 1′ N. and long. 113° 45′ W., and Rocky Point, by bearings, 31° 23′ N. lat. and 113° 0′ W. long. To this new island he gave the name of Clarence Island.

From this latter Lieutenant Hardy bore up and stood for an opening to the eastward of Shoal Point, supposing it to be the mouth of the Rio Colorado, being under the impression that Shoal Point was the large island of Santa Innes, laid down in Arrowsmith's chart, and by M. Humboldt, in lat. 32° 30′ N.

But here they were fated to fresh disappointment; for instead of this being, as he had flattered himself, the mouth of the river, he ascertained, when they got into four fathoms and a half water, that it was merely a bay, of about fifteen miles depth, formed by the coast of Sonora on the east, and Shoal Point on the west; and this point, looking exactly like an island, he very naturally supposes to be the one which is laid down in some maps as Santa Innes, and in others as San Ignacio. The bay, which is completely open to the south-east, Lieut. Hardy named "Adair Bay."

Standing back to Clarence Island, which is composed of alternate strata of lime and sandstone, of considerable elevation, and about a mile in circumference, they came close to a high bluff, which our navigator named Cole Point, on the Californian coast, in eight fathoms water, bottom soft pipe-clay; the latitude was 31° 18′ N. and longitude 114° 1′ W. From this Point they bore directly up into the river, which now appeared before them with two, if not three mouths, and the land on either side very low: both seas were covered with a delicate green, arising from the herbage growing on the banks. The three mouths of the Rio Colorado are formed by two islands, the coast of Sonora to the eastward, and the coast of California on the west.

The largest of these islands Lieutenant Hardy named after his patron, Admiral Sir George Montagu, G. C. B.: the other he called Gore Island; and to the point on the Californian side, together with the southern point of Montagu Island, he gave the name of Sargent's Point. The coast from Cole Point to the Rio Colorado was in a continual smoke, from the fine particles of sand which the wind carried full a mile into the air. He accordingly christened it "Smoky Coast."

Having got under weigh with the first of the flood-tide, he got tolerably well through Sea Reach, (so named after the river Thames,) but met afterwards with many difficulties, from the strong setting of the tide, and the nests of shoals.

In the plan of the Rio Colorado, the soundings are all laid down at low water, at the time of full and change. Before beating up Howard's Reach, where the deep channel is not above ninety yards wide, they had passed the channels of Sea Reach, N. N. E. seven miles; Lower Hope, W. by N. five miles; Halfway Reach, W. by N. five miles; and Greenhithe Reach, W. by S. about seven miles.

On the western side of the river there are forests of a thorny shrub, and on the banks there was a profusion of stems and large branches of the willow, poplar and acacia, which had been brought down by the flood, and were now permanently lodged in their present situations. On the eastern bank there were also wrecks of these trees; but, except a dwarf reed, there was no other vegetation. From the mast-head nothing on this side was distinguishable, except the waters of the Rio Colorado and Rio Gila, and an interminable plain; and to the westward rises the Cordillera, which extends from Cape San Lucas, on the southern extremity of Lower California. To the northward and eastward, there was a long row of lofty trees, which Lieut. Hardy concluded were growing on the banks of the Rio Gila, that stream falling into the Rio Colorado half a league below them. The point of land which divides the Rio Colorado from the Gila, the lieutenant named Arnold's Point, and the one on the opposite side of the same reach, he called Newburgh's Point.

In proceeding up the river in a small boat, Mr. Hardy fell in with some of the natives, who afterwards frequently visited the vessel. The natives were entirely naked, having only a few strips of the willow or acacia tied scantily round their waists. They had a beautiful fishing-net made of grass, and also burnt earthen jars extremely well made. Their nation, which is called the "Axua," are remarkable for being very dirty, and will even roll themselves in mud. They are of a middle stature, and formed for labour rather than for the more active employment of the chase.

The cacique of this nation is called Comayo, which seems to be a family name; and it appears that the Jesuits fell into a mistake in calling the whole nation after the name of its chief, as we see "Comayo Nation" in the maps of this country. There is another chief whose name is Yahmaho. Mr. Hardy thinks Comayo means, in the Axua language, "Great Captain," and Yahmaho, "Son of the Captain."

The Indians live upon fish, fruits, and vegetables, and the seeds of grass, and many of them are dreadfully scorbutic. Their arms of offence are bows and arrows, a very fine lance, and what is called Macána, a short club like a wooden mallet, which is used in close quarters. Their intentions towards Lieut. Hardy were at first very hostile. He succeeded in gaining their friendship by bringing an old woman over to his side.

The most northerly island which our navigator reached was Thomas' Island, in lat. 32° 12′ N., and long. 114° 24′ W.

Mr. Hardy regretted exceedingly, in determining the longitude of the mouth of the Rio Colorado, as well as other islands, bays, and points, which he discovared near the head of the Gulf of California, that he had not with him a first-rate chronometer. Neither could he determine them from lunar observations; *first*, because he had no sextant; and *secondly*, for the want of a nautical almanack. In the chart which we have copied, drawn up by himself and Mr. Lindon, he has laid down, as correctly as his means of observation enabled him to do, every headland, island, rock, and shoal; and, by its assistance, he thinks every navigator may go from the Port of Guaymas to the Rio Colorado with the greatest safety, and the utmost confidence.

Captain Forster's Scientific Voyage.

The arrival of the Chanticleer (Captain Forster) at Mussel Bay, Cape of Good Hope, has enabled us to obtain some further details on the route pursued by that vessel. It appears that the magnetic experiments began at Monte Video, which the Chanticleer left on the 5th October last year, and proceeded to Staten Island, on the east coast of Terra del Fuego. On the 21st they put into this island, and remained in a snug little cove on the northern side for two months, making numerous philosophical experiments, and swinging the pendulum. This harbour Captain Forster named Port Cook, after the great navigator. Staten Island is covered with extensive woods, crowning even the summit of the hills. Plants, shells, sea weeds, and a great collection of geological specimens, illustrative of the places visited, with some stuffed birds and insects, have been sent home. The barometric pressure is low, the mean being 29.32 inches; magnetic intensity low; the predominating winds westerly; electric phenomena extremely rare.

The principal tree is the antarctic beech, (Betula antarctica, Forst.) which, being an evergreen, clothes the country with a perpetual verdure. Celery, scurvy grass, and some berries of an elegant arbutus, were among the most useful vegetables. The ground is wet and swampy, and covered with lichens, mosses, and peat. Seeds have been forwarded of the Fuegean rush, (Juncus grandiflorus,) of which most admirable baskets are made, table mats, chair bottoms, &c.; it will grow on moist, boggy soils, where nothing else will thrive. The seeds of a barberry, intermediate in quality between a grape and a gooseberry; seeds of a large and luxuriant celery; a freschsia of great merit, being a shrub of good size, bearing clusters of pendant flowers of the greatest beauty; an embothrium, an auricula of great promise, and a chelone of most vivid hue, are among the handsome and ornamental plants. The berries of the Hamadryas magellanica, furnish a colour between turmeric and arnotta, and there is a curious wood which forms an admirable paint, green as verdigris. The sea weeds of these regions are gigantic and magnificent. A similar structure to what is observed in the seals of the north, was met with in dissecting a seal of South Shetland: the vein which receives the blood during the immersion of the animal, was found to be seventeen inches in diameter.

The Chanticleer sailed from Port Cook on the 21st of December, with a view to secure the advantages of the summer at South Shetland. On the 2d January, they fell in with the first iceberg, lat. 60°, and as they advanced they became more numerous; at one time eighty-three were in sight from deck.

The Chanticleer stood a little to the southward of the Shetland group, and came upon an extensive tract of land, with a range of lofty mountains, covered down to the water's edge with ice and snow. Being near shore, Captain Forster landed and took possession of the country in the name of King George IV. depositing a copper cylinder containing a notice to that effect. The place was called Cape Possession, and the land was named at the same time Clarence Land, in honour of his royal highness. Cape Possession is, according to one report that we have seen, in lat. 64° S. and according to another, 63° 45′ S. and long. 60° W. In the chart prefixed to Captain Weddell's voyage, we find "Trinity Land," as a part of South Shetland, laid down as stretching to the south, between lat. 64° and 65°. The rock is called agenite, probably *granite*. They were surrounded by numerous icebergs of immense size, from 300 to 400 feet in height, and upwards of 1000 feet in length. Some red snow was collected, similar to that of the Arctic regions.

On the 19th January, the Chanticleer put into the harbour of Deception Island. It is of volcanic origin, consisting of hills of black ashes and cinders, red tufa, and superincumbent masses of ice and snow, of prodigious magnitude. The shores reek with steam, while enormous icebergs stand upon their brink, and the summits of the snow-clad hills smoke with vapour. The only living things on it were penguins, and their numbers exceeded computation. Some thousands of them were slaughtered, and several hundreds of them salted and packed for sea-store. Some sea-leopards were obtained: they yielded a considerable quantity of oil. Deception Island offers no trace of vegetation.

On the 8th of March the Chanticleer quitted this remarkable place, and proceeded to Cape Horn, to prosecute the experiments, and obtain the necessary observations. It approximates in climate, character, and productions, to Staten Island. The climate of the southern regions has been somewhat misrepresented, and its rigour and severity too highly coloured: its vegetation is as luxuriant and vigorous as the corresponding latitude of the northern hemisphere.

Having achieved the object of her voyage to the southern regions, the Chanticleer left Cape Horn on the 24th May, and after a prosperous run of twenty-seven days made the Table Land; but, by the prevalence of adverse winds, put into Mussel Bay, for the purpose of getting time to recruit their health, and enjoy the luxuries of fruit, vegetables, and fresh meat, to which they had been strangers for nine months.

Journey of Mr. E. Eversman, Russian Counsellor of State, to the Steps which extend to the South of the Volga, in the month of May 1827. (Hertha, Sept. 1828.)

On the 11th of May, says Mr. Eversman, I quitted Orenburg, and I arrived in six days at Ouralsk. The country consists of vast steps without trees. It is only on the banks of the Oural, and of the rivers which empty themselves into it, that woods are met with, to which the natives of Tartar origin give the name of Urana, whilst, in their language, all other forests are known by the name of Urman. Oaks, elms, birch trees, and tall black and white poplars, grow on the banks of the rivers. The Tartars make use of the trunk of these trees to construct their boats, (Budori.)

The characteristic feature of these solitudes, is formed by all those species of plants common to salt soils.

The Tartars lead their flocks to feed in the steps : the meadow-land, situated on the borders of the rivers, which is inundated in spring, furnishes the hay which they require for winter.

Seventy versts south of Orenburg, is the famous mine of salt, Keokoï, where pure rock salt is met with four or six feet beneath the sand, which is covered with beds of gypsum, forming hills of little magnitude.

The road from Orenburg to Ouralsk is sufficiently well known from the voyages of the celebrated Pallas. The traveller follows the course of the Oural, whose sinuosities alternately contract and widen. Sometimes he traverses meadows and forests, and sometimes more elevated steps and the forts of the Cossacks.

The number of rivers which, between Orenburg and Ouralsk, course into the Oural, is considerable. They mostly occur on the first half of the road: they can only be considered as rivulets, and yet, in the spring time, they increase so much, as not to be fordable, and must then be crossed in boats.

The town of Ouralsk is still very prosperous, though not so flourishing as it was formerly. The Cossacks of the Oural are active, laborious, and endure fatigue with patience.

The women differ remarkably from the men, both in their education and attainments. The men possess a certain degree of intellectual wealth : the wars which they carry on in foreign parts, present to them the spectacle of new manners and new customs ; in addition to which, some regiments of the Cossacks of the Oural are always quartered in the different countries of the empire, as well as in the capital, and every year these regiments are renewed. The women, on the contrary, are strongly attached to their ancient customs.

For the space of half a century, many of the richest inhabitants of the Oural have been devoting part of their patrimony to the establishment of fruit gardens. These gardens occur about five versts to the north of the town, on the farther bank of the Tchegan ; the houses which have been constructed there, denote riches and ease. The garden of the hetman Borodin is the most remarkable.

A little wood of willows and poplar trees, full of huts, neighbours these gardens ; each hut is inhabited by a woman, and this is what they call a convent of nuns. On Sundays and fast days, the inhabitants of the town go in pilgrimage to visit their relations or friends.

The total number of the Cossacks of the Oural, is valued at 15,000 individuals of the male sex, out of this number 5,500 men are inscribed at the ministry of war, as capable of becoming soldiers. They have the right to fish in the Oural, under the obligation of military service, whenever they are in requisition. Ordinarily the Cossack of the Oural only enters the service at the age of 18. There are always 3,000 men in the service ; but whenever they are wanted, they must furnish 10 regiments, each of which contains 500 men. In this case, there only remain to take care of their own country, 500 men taken out of the Cossacks, enlisted for service.

Of 3000 Cossacks in permanent service, 1500 are on duty on the line of the Caspian sea, for an extent of 650 versts, extending up the Oural ; the remainder are disseminated in the other provinces of the Russian Empire. Those who have equipped the Cossacks sent to service, exercise the sole right of fishing, as long as that service lasts. The fishery is carried on entirely upon a military system; there are annually three principal, and two accessory fisheries. The principal fisheries are, first, that of the spring, which lasts a month and a half, the quantity of fish, principally sturgeons, taken at that period, is valued at 4000 cart loads, of 36 *puds* each. Secondly, the autumnal fishery, which lasts all the month of October, and is also very productive. Thirdly, the fishery called *Braganse*, which lasts from the 30th of December to the 30th of January. The accessory fisheries are those of the river Kurchai, the northern bank of the Caspian sea, and the fishery with great nets, called *Achani*, which are cast into the sea, under the ice.

The annual consumption of salt is 200,000 puds. The salt lake of Inder furnishes, alone, 100,000 puds; the remainder is obtained from other salt lakes, amongst which, lake Jakrysk, between the two Useens, is the most remarkable. It furnishes near a thousand cart loads.

On the importation of the fish of the Oural into the Empire, a considerable tax is levied upon the salt; the amount of which is nearly 8,480,000 roubles. The military chancellor of the Oural, formerly received this tax; but for these few years back, a private person has taken it into his hands, by paying an annual sum of 120,000 roubles.

It would be difficult to find, in the whole extent of the Russian Empire, a people furnishing so large a revenue to the country, as this little nation of the Cossacks of the Oural.

At Glinenor, I traversed the Useen, and gained the territory of the horde of Bucaic—Kirghise Tartars.

Farther on, while descending, we walked among vast salt lands; and after havingtravelled 16 versts, we reached the great road of the caravans of Astrachan, which is now little frequented. Not far from the road, to the left hand side, is a well, which, at a certain depth, is pure; near this we passed the night. We perceived in the neighbourhood, the tombs of the Tchoudes, ancient inhabitants of the country; they are met with in all the steps, but particularly in the vicinity of Naryn; they are most numerous where the country is fertile and habitable.

We had not made more than 18 versts, when the horses, exhausted with fatigue, could not go further; and, as I had no hopes that they would quickly recover I sent a Cossack, who had accompanied us from Glinenor, to the Khan with a letter, in which I exposed our sorrowful situation, and asked for immediate assistance.

Like all the Kirghises, the Khan has no fixed residence, in consequence of which, his actual place of abode is only imperfectly known, at any distance. It is requisite to go from tent to tent making enquiries, and the answer becomes the more precise, as one approaches his habitation. Shortly after his departure, our Cossack arrived at the tent of a certain Sultan, who, as soon as he learnt our position, told the Cossack to announce to us, that he would see that we were escorted to the camp of the Khan. He soon arrived himself; but the Kirghises, whom he ordered to furnish us with horses, would not obey him, and he retired abashed and confused. I learnt on this occasion, that, generally speaking, the Sultans are not loved by the people; and that, whenever there are law suits, it is to the patriarchs (starthena) that they address themselves, and not to the Sultan. The patriarchs are instituted by the Khan and by the people. The sultans, on the contrary, are what we call the aristocracy. In the language of the country they are called *akfiujak*, that is to say, men having white bones. As my Cossack had already travelled 18 versts in a sandy soil, I ordered a kirghise to bear my letter to the khan. The kirghise mounted his horse, and we pitched our tents.

The salt lands present a picture of the greatest sterility; no traces of vegetation are to be seen; but their borders are covered by an innumerable quantity of saline plants, and their soil is a mud composed of bitter salt, which dries during the great heats, or freezes during the winter season; the Kirghises call them *Isonn*. Sometimes they consist of saline marshes, or salt mud, which gives no support to the foot. These marshes neither dry up, nor freeze; the Kirghises designate them by the name of *chak;* the Russians call them *Isolantchak*. The saline marshes have so little consistency, that a few years back 2000 horses, frightened by an accident, threw themselves into the chak, to the west of Naryn, and were all lost.

As I did not place much reliance upon the aid of the khan, and was equally in doubt as to whether the Kirghise would conscientiously acquit himself of his commission, I resolved, after 30 hours repose, to continue my journey slowly, with the fatigued horses. But we had scarcely gone six miles, when we saw the assistance of the khan arriving. He sent in five horses and a *teleugut*, (serf of the khan, or Kirghise of rank), who could ask for new horses when required, in the name of his master. The teleugut, who brought us the letter from the khan, had come rapidly, for the spot where the khan was encamped, was still 60 versts distance.

On our arrival, the khan had a kibitka, a kind of tent, immediately set up, which would have contained 50 men with ease; two lambs were killed, and wood of the calligonum of Pallas was brought. This is an object of luxury in a country so entirely deprived of wood, that the dried dung of cattle and horses is alone used for fuel. A teleugut was, besides, ordered to procure any thing that we might require.

The khan Dschangir is not more than 30 years of age. The khan Buké, his father, had obtained from government the permission to lead a nomadic life in the steps between the Volga and the Oural, a long time uninhabited after the emigration af the Kalmoucks. At the beginning of the 19th century, he arrived with a great number of the Kirghises from the step beyond the Oural, and submitted himself entirely to the Russian domination. The horde, which at present enjoys a very prosperous condition, is composed of 12,000 kibitks: in these 12,000 kibitks, or families, there are said to be 60,000 males; but the number appears to be exaggerated. The riches of the horde consists in 4,000,000 sheep, 1,000,000 horses, 500,000 camels, and 200,000 horned cattle.

The Kirghises dispose of the greater part of their riches in dress: the men particularly like red cloth or velvet, as well as chains of gold and silver: the women seek for corals, pearls, silver plates, silver medals, and worked stuffs. These objects are brought to them by Tartar, Armenian, and Russian merchants, who received beasts for them in exchange. The Khan passed his youth at Astrakhan until the death of his father. He cannot therefore be compared to the Khans beyond the Oural. He has a very fair knowledge of the physical and natural sciences: he is constantly asking questions on natural phenomena. His wife is the daughter of the Mufti, who died some years ago. He has also two other wives; but the daughter of the Mufti, who has received an European education, is his favourite. He generally resides during the winter at Astrakhan.

I had some hope of going from Noor to Kalmoukova upon the Oural, and of visiting the salt lake of Inder; but the Cossacks of the outpost of Karmanof, which is 15 versts from Noor, near Kuschum, having assured me that the water of the wells had disappeared, I gave up the journey, and, travelling along the western bank of the Kuschum, to the advanced post of Mergenen, near the Oural, I followed the road to Ouralsk, and from thence to Orenburg.

Baron von Humboldt.—In a letter from Baron von Humboldt, read in the French Academy of Sciences, he gives an account of his visit to the rich mines in the Oural mountains. He observes that it is always on the Asiatic declivity of these mountains that the auriferous sands lie, which contain pieces of gold, platina, and chromate of iron united with platina. He also discovered a piece of platina of a pretty large size, and presenting a crystallization towards the centre. These metals are often found a foot below the surface. The annual produce of these newly discovered mines is 6000 kilog. of gold. M. Humboldt found in these mines an analogy of position with the auriferous sands of the Cordilleras. He also observed in those mountains, mines of osmium and iridium, each having separate beds. Thence he crossed the Kirghise step, along the frontiers of Chinese Tartary, and visited the ruins of the ancient city of Bulgaride, or Bolgari, formerly the capital of the Tartar empire, and the residence of the family of Tamerlane. On the 20th of August M. Humboldt crossed Chinese Tartary, and visited rich mines of beryls and topazes, and also a silver mine, which produces annually above 40,000 pounds of auriferous silver. Lastly he entered a Chinese town: the governor received the learned traveller in a tent, a point which he insisted upon, saying, that he would do the same if he were travelling in another country. He gave him a very polite reception, and sold to him an historical Chinese work, in five volumes, for some yards of velvet and red cloth. This town has a wretched appearance, and contains nothing remarkable but a temple and two mean towers, inhabited by Chinese soldiers. The Russian Government has behaved in the most handsome manner to Baron Humboldt. He is accompanied by a general and some superior officers, and also three carriages and thirty horse, with every thing requisite for his journey. He hopes to be in France next summer, enriched with valuable discoveries in geology, mineralogy, and botany.

Expedition to the Caucasus.—On the 26th of June the expedition left the warm mineral waters of Tefliz, for the mountain Elborouss, (Elborus, Elburus, Alburz: Pallas calls it Osha Mashua, "happy mountain,") with an escort of 600 Russians and 350 Cossacks, under the command of the general of cavalry, Emmanuel, in person. They arrived on the 8th of July at the foot of the Elborous, and encamped on the river Malka. The baggage was left about ten English miles from the mountain. The scarp of the ascents and descents, and the little width of the paths traced along the steep sides of the mountain, did not allow them to advance further otherwise than on foot.

The next morning of their arrival the sky became clear and bright, and the two pinnacles of the Elborouss appeared in all their majesty. The academicians resolved to avail themselves of this weather, so favourable for an ascent. They provided themselves with pointed staves, cords, &c. They left the camp at nine in the morning, and it was only towards evening that they reached the first snows, when they made preparations for passing the night. The next day, the 10th, they began their ascent at three o'clock in the morning, and they advanced with success enough; but it became more and more painful as the snow, beginning to fall, clogged their feet. They were obliged to make frequent halts, and to part themselves into small divisions. Towards nine o'clock in the morning, they had climbed more than half way up the mountain, and stopped to rest themselves behind some rocks, which concealed them from the sight of those who were anxiously watching their progress from the plain below. An hour afterwards, one man, only appeared beyond the rocks, advancing with a firm and measured step towards the summit of the Elborouss. It was in vain they waited to see him followed by the other travellers; nobody appeared. All eyes were fixed on him who accomplished so daring an enterprise. Resting every five or six steps, he advanced with the greatest courage: just close to the summit, he disappeared among the rocks. The spectators long waited for his appearance with interest and impatience: towards eleven o'clock he was seen suddenly on the very top of the Elborouss. A discharge of musketry, music, songs, and cheerings of joy, made the air reverberate at this sight. On the return of the travellers, they learned that this audacious adventurer was a Kabardian, an old herdsman named Kilian, lame and deformed. He received the reward of the prize of 400 roubles, and 5 archines of cloth, which had been offered by General Emmanuel.

Messrs. Lentz and Kupfer reached the height of 15,200 feet. The latter gentleman, in a letter to the Academy of Paris, stated that the experiments he had made on the decrease of magnetic intensity, coincided with those made by Mr Gay Lussac in the ascent in a balloon. The total elevation of the Elborouss above the level of the Atlantic Ocean, is reckoned to be 16,800 feet. The whole chain is granite.

Arctic Voyage.—On the 25th of July Captain Ross was in lat. 57° 8′. The fair wind with which they had sailed left them the day after, and they lost part of their fore-mast; but would not touch at any port to refit, lest it should give rise to unfavourable reports. After five days more, they got again a fair wind, which in a fortnight carried them to the harbour of Holsteinberg in Greenland, where they providentially found the Rockwood of London, deserted by her crew, and from which, therefore, they replaced their mast, and supplied themselves with provisions and stores. In a few hours afterwards, they sailed in a more complete state than when they left England. They were all in good health and spirits, and had received the most cheering account possible of the state of the ice. The wind was fair, the weather extremely favourable, and the crew behaving in a most exemplary manner. The newspapers further add, that Captain James Clark Ross, F. R. S. the captain's nephew, who accompanied him and Captain Sir E. Parry in all the former voyages to the polar regions, has also gone out in the present expedition.

Etymology of Kasbec, in the Caucasus.—Mr. Bell informs us in a communication, that Kasbec is not the name of the mountain which Parrot and Englehardt ascended in the Caucasus, but the title of the Caucasian chief to whom that mountain and district belong. It signifies *the lord of the mountain*, or, as we would say in Scotch, *the laird of the hill;* and yet this gentleman is very pleasantly styled, in Robert Kerr Porter's narrative, General Kasbec. The name of the mountain which those celebrated travellers ascended, is Mquinari in Georgian. We find that, in these countries, and more especially in Russia, an etymology, composed of an appendage to the family name, derived from the place of a military exploit, or the seat of large possessions, has been in constant use. Thus Field-Marshall Romanzoff, the first Russian commander who, in modern times, forced the passage of the Danube, was honoured with the surname of Sadunaiskoi, or the ultra-Danubian, and the epithet "Sabalkaniskoi," has been affixed to the name of Count Diebitsch, signifying ultra-Balkanite, or passer of the Balkan. From our own notes, we find that the mountain is indifferently spelt Kasbec, Kasibek, Kaprybeg, and Ghazibeg, and that Klaproth calls it Meguinivari, (Snow mountain.) It is also called Tseritai Tsoub, Peak of Christ or Khotkh; as Mount Ghazibeg, in the Turkish language, means Hero of the True Faith. According to Englehardt and Parrot, its elevation is 14,000 feet, and according to Mr Bell 15,360.

Dr. Belenger's Travels.—Baron Cuvier, in the name of a numerous commission chosen from the different sections of the Academy of Sciences, gave in, at the meeting of the 28th Sept. 1829, a very favourable report on the collections made by Dr. Belenger in his journey to the East Indies, to which country he went by land with Mr. Desbassyus.

The Baron Cuvier, specially charged with the zoological part of the journey, Mr. Mirbel, who examined the botanical, and Mr. Latreille the entomological, united in giving the greatest praise, not only to the riches brought home by Dr. B. but to the disinterested zeal which led him to make these collections. The commission hoped that the Academy would inform the ministry, how important it would be for science that the publication of the results of Dr. Belenger's voyage should be favoured.

Lieutenant Holman, R. N.—This eccentric traveller, whose name we have already had occasion to mention in these pages, was, we find, in the month of July at Port Louis, in the island of Mauritius. Dr. Lyall and his lady had arrived there on the same day, having been persecuted and driven out of Madagascar. This latter gentleman had come under suspicion as a sorcerer, and under that idea, had been subjected to much personal inconvenienee.

Mr. Holman is proceeding from Port Louis to Bengal, after staying about two months in the former place.

Elevation of the Mountains on the western coast of Africa.—A correspondent informs us that Captain Owen, employed by the Admiralty in the survey of the island of Fernando Po, opposite the mouth of the Callabar River, one of the supposed branches of the mysterious Niger, has taken a trigonometrical mensuration of the snow-clad mountains which run parallel with the coast, at the distance of twenty miles from the shore, and found the average elevation to be upwards of 17,000 feet perpendicular.

The range runs north-east and south-west, between the rivers Del Rey on the west, and the Cameroons on the east. This latter river rises on the south-east side of this lofty range, which in fact constitutes the eastern boundary of the Delta of the Niger, extending more than six degrees of longitude beyond the Rio Formosa, its supposed western mouth. The mountainous range between the Del Rey and the Cameroons, fronting the shores, is called Terra Alta or the highland of Ambosi, by the Portuguese. The whole coast, east from the Rio Formosa to that range, is completely interwoven with connecting branches of innumerable streams, for more than 200 miles inland. It is, in fact, a complete labyrinth of rivers. The mountains of Fernando Po, as ascertained by Capt. Owen, were more than 9000 feet high. These measurements, along with the survey and chart of that coast, are deposited in the Admiralty Office.

Measurements of the most remarkable heights of Germany, after Charpentier, de Gersdorf, de Lindenau, Wild, Klinger, Hoser, Lauckner and others.

The Sudètes, or the Riesengebirge.

Schneekuppe, - - -	4950 feet.
Grosse Sturmhaube, - -	4540
Spieglitzer Schneeberg, - -	4380
Tafelfichte, - - -	3379
Hohe Meese, - - -	3242
Heidelberger Ziegenrücken, - -	3042
Jauersberg, - - -	3000
Heuscheuer, - - -	2893
Grosse Schneeberg, - - -	4300

Fichtelgebirge.

Ochsenkopf, - - -	4920 feet.
Schneeberg, - - -	3219
Fichtelberg, - - -	2198
Annaberg, - - - -	1729

Schwarz-Wald, (Black Forest.)

Feldberg, - - - -	4608 feet.
Belchen, - - - -	4357
Kandelberg, - - -	3901
Blauen, - - - -	3597

Boehmerwald.

Heidelberg, - - -	4203 feet.
Arber, - - - -	3840
Rachel, - - - -	3793

Obererzgebirge.

Keilberg in Bohemia, - -	3900 feet.
Fichtelsberge, facing the Keilberg,	3870
Auersberg, - - -	3795
Forest district of Eibenstock -	3175

Rauhe Alp, or Schwaebische Alp.

Rossberg, - - - -	3699 feet.

The Harz.

Brocken, - - - -	3633 feet.
Bruchberg, - - -	3018
Wurmberg, - - -	2880
Kahlenberg, - - -	2184
Rammelsberg, - - -	1914
Kiffhaeuser, - - -	1444

Thuringer Wald.

Schneekopf, - - -	3141 feet.
Inselsberg, - - -	2949
Bless, - - - -	2791
Dalmar, - - - -	2403
Ettersberg, near Weimar, - -	1551

Rœhngebirge.

Kreuzberg, - - -	2641 feet.
Dammersfeld, - - -	2529
Milzeburg, - - -	2527

Lausitzerzbirge.

Dammersberg, - - -	2641 feet.
Lautsche, - - - -	2407
Schneeberg, - - -	2289

(*Ueber den Walban, &c.* On the Cultivation of Forests in general, and particularly on the Forests of the Mountains of Germany. By M. E. Thiersch, Grand Master of the Forests in Saxony. Leipzig, 1825. Fleischer.)

Heidleberg.—During last winter session, there were at the University of Heidelberg 566 students, out of which 301 were strangers ; at the university of Fribourg, there were 667, of which 126 were strangers.

Population of Munich.—Independent of the suburbs of Au, and of Haidhausen, this city in 1828, had a population of 75,000 inhabitants, among which were 6,000 soldiers. There were 68,000 Roman Catholics, 6,000 Protestants, 500 reformers, 42 of the Greek church, and 860 Jews.—*(Allg. Haudl. Zeitung, No. 168.)*

Exportation of Corn from Canada.—In the space of twenty five years, there have been exported from Canada, 568,321 sacks of flour, and 4,833,190, bushels of barley, which gives 22,732 sacks of flour, and 163,328 bushels of barley for every year.—*(Nile's Register.)*

Population of Erie, and state of New York.—The population of Erie, in which is situated the town of Buffalo, is 24,142 ; having increased since 1820, 8,474 persons. The state of New York will have in 1820, a population of more than two millions.—*(Nile's Register.)*

Statistics of Mexico.—The attention of our readers has been particularly turned towards Mexico, in this number. In a work published in 1825, on that country, Mr. Fernando Navarro says it contains a population of 6,122,354 souls, which is beneath Balbi's average; 118,478 square leagues of territory; 242 districts; 1,072 parishes; 185 missions; 30 cities; 95 towns; 4,682 villages; 206 silver mines; 1,195 meadows; 308 convents; 4,229 priests; and more than 5,000 monks. The entire population consists of 1,097,029 Spaniards; 3,676,281 Indians; 1,338,706 of divers casts.—*(National Journal.)*

Commerce of the Island of Mauritius.—It appears from an article on this subject in the Asiatic Journal, that at the epoch of which the island was occupied by the English in 1810, agriculture and commerce were in a state of complete stagnation; five years afterwards commence had required its activity; rich houses from England and from India had made establishments, and staked capitals which had doubled the prosperity of the country. But there still exists some restrictions which do harm to the planters, who can cultivate sugar alone, and though that of the island of Bourbon is of an inferior quality, France having allowed its free exportation, it sells better than the other, and ships go in preference to fetch their supplies at the isle of Bourbon, while commerce gradually leaves the harbours of Mauritius. It has cost government £100,000 annually, to keep up the expences of the civil and military government of the island; for all of which England has only obtained in the same period, 5,000 barrels of sugar.

Pittsburg and Philadelphia.—In 1756, Pittsburgh contained 30 huts made with the trunks of trees, 1 mansion of stone, 1 house of wood, and 6 little shops. Pittsburg now consists of 2;360 houses, churches, magazines, &c., the actual population of Philadelphia is 26,048; Nashville contains 6,000 souls.—*(Nile's Register.)*

NATURAL-HISTORICAL COLLECTIONS.

Extract from the Analysis of the Labours of the Academy of Sciences during the year 1828; *by* Baron Cuvier. *(Continued from the last Number.)*

Geology.—English and French geologists have, for some time, been studying with care the coasts of La Manche in comparison with those of England, which are opposite to them. We saw, in 1822, the table which M. Constant Prevost gave of the coasts of Lower Normandy. These researches have been pursued, and the Academy has received from M. Rozet a geognostical description of the coasts of the Lower Boulonnais, from Etaples to Vissant. Some years since, Mr. Fitton, a learned English geologist, after many years of study, proved that this department is exactly similar, both in the nature of its strata and their relative position, to the opposite county in England. It is this proposition which M. Rozet developes; but his work is full of interest from its new and numerous details, and from the cuts and map with which it is accompanied. The oolitic series, chalk, and their subordinates, principally compose this country; the strata are almost horizontal. A small formation, composed of marbles analogous to those of Belgium, and of the coals series, pierces the oolite and chalk, and shows itself in strata almost vertical, which has been converted to very useful purposes. Caps of a tertiary sandstone crown the chalky heights; and in the lowest parts, alluvia of various ages conceal the different rocks. And lastly, the sands of the sea assume the form of downs, advancing with a tardy step, in the direction of the prevailing winds.

A locality for manganese, situated at Romanèche, near Mâcon, has attracted the attention of many geologists. Dolomieu, who visited it in 1796, considered it to be neither a bed nor a vein, but a sort of mass, immediately superimposed upon the granite; other observers thought that it was a strong granitic vein. According to some new researches made by M. de Bonnard, the mineral would combine in itself both of these characters.

Many caverns, where no bones had been discovered, had been found to contain them, since Professsor Buckland remarked the situation which they generally occupy, and the method which one ought to follow in seeking for them.

Last year we spoke of the cave of Oselles, near Besançon, and of that of Echenoz, near Vesoul.

M. Delanoue has observed, in a cave at Miremont, department of Dordogne, a new example of the astonishing constancy of this phenomenon. This cave seems to be formed in an intermediate series between the chalk and the jura limestone. Its galleries extend to upwards of 2000 paces, and terminate in a multitude of strait and low ramifications, which have furnished many bones. A red clay envelopes them; and they are principally the bones and teeth of bears. Examinations made at 200 and 400 paces from the opening, underneath different beds of marl, which appear to be much newer than red clay, have led to the discovery of fragments of pottery similar to those which are found in some ruins, and in the alluvial beds, and which we refer to an epoch when the Roman arts were not yet introduced amongst the Gauls.

More recently, one of the caverns discovered at Bize, department of Aude, has been the object of investigation by M. Tournal, apothecary at Narbonne. It is in the jurassic series; many of its bones are enveloped in a stony concretion, and, according to the author, belong to extinct species, already described from this kind of caverns; the others are in a black mud, and differ entirely from the former. M. Tournal adds, that there are human bones, and fragments of pottery, not only in the black mud, but in the calcareous concretions, where they are mixed with the remains of extinct species.

M. Destrem, engineer of bridges and roads, who has examined the same cavern, has found the bones of ruminants only, principally of the genus *cervus*, and some debris of rabbits and birds. He affirms that the human bones do not merit any serious attention; they are neither impregnated with clay, nor coated with the ferruginous crust which surrounds the truly fossil bones. Finally, M. Destrem regards them as deposited at recent epochs in these caverns, where it is known that malefactors have frequently retired.

There is nothing extraordinary in these facts. One may, indeed, conceive, that since the period when the animals, whose remains principally form the floor of these caverns, were destroyed, others may have been introduced; and were they even encrusted with the former, it is natural that the stalagmite, which is incessantly forming, should have promiscuously enveloped them. M. Buckland has found, in a cavern in Glamorganshire, a skeleton of a woman almost entire, and bearing evidence of not having lain there for any very great length of time. We ourselves have observed, in the osseous breccia which fills certain fissures in the rock of Nice, a human upper jaw, already clothed with a thin coat of stalagmite.

MM. Marcel de Serres, Dubreuil, and Jean-Jean, professors at Montpellier, have commenced the publication of a description of the caverns of Lunel-Vieil, long celebrated for the abundance and variety of the bones which they contain.

Another locality, very rich in fossil bones, exists at Auvergne, in a mountain near the Issoire, department of Puy-de-Dome, and has been explored with as much ability as emulation, on the one hand by MM. Devèze de Chabriol and Bouillet, and on the other, by MM. Abbe Croisat and Jobert.

Since it has been determined that the animal population of different climates has undergone changes, attested by the remains which they have left in the beds of which the envelope of the globe is formed, and since we have known that at certain epochs the reptiles prevailed, and at others, the pachydermatous mammifera, and that the proportion of genera and species has only arrived by degrees or by successive stages, at a state resembling that which we now behold,—it was natural to inquire if the vegetable kingdom had not undergone analogous alterations; but it was no easy matter to answer such a question, because it would be requisite for that purpose to determine with precision the species of fossil vegetables; and the principles of this determination, in the ordinary methods, are founded upon the observation of such delicate organs, that we can never hope to recognize them in these impressions, or preserved remains of the vegetation of the former world.

M. Adolphe Brongniart, who has pursued this problem with an admirable perseverance, has, therefore, found it necessary to invent a particular method, and to discover recognizable characters in the most constant and marked appearances, presented by the surface and structure of the stems, by the distribution of the nerves of the leaves, and by other particularities of organization. Applying this method to the objects with which the strata of the globe have furnished him, he has commenced to publish a work wherein he is to classify and describe upwards of 500 species of fossil vegetables, and to make known all the circumstances of their positions. He has presented to the Academy an abstract of his researches, in which he establishes the fact, that in a certain number of successive formations, vegetables belonging to the same genera and the same families, are often found with little variation, and that even the numerical relations of the great classes remain nearly constant, whilst in other series of formations, a portion of the genera and families change suddenly, and the relations of the classes become very different. The points where he has observed these rapid changes, have furnished his geological vegetable epochs, if one may so express it, and he has thus fixed fourperiods, during each of which the vegetation has only presented variations of little moment, but the passage of which from one to the other has been marked by important charges.

Anatomy and Animal Physiology.—M. Magendie has collected together his observations upon the brain and the fluid which moistens it, as well as the spinal marrow, on which we have already reported in our preceeding analysis; and he presented them at the public meeting of the last year.

An adult man has about three ounces of this liquid; women have more; in aged men, in whom the mass of the brain is diminished, the fluid is increased to about 6 or 7 ounces. It forms a film of one or two lines around the brain, and in certain circumstances, and certain places, of nearly an inch; which, by the way, appears to M. Magendie a very strong objection against a system which is based on the intimate relations between the form of the cranium, and that of the brain.

Much is wanting that the dimensions of the brain should be as uniform as one would be led to believe, in judging from the fixed form of the cranium. In all disorders of a certain duration, in which the body is much wasted, the brain undergoes a similar diminution; it regains, with the progress of convalescence, its former bulk, and one of the principal offices of the fluid in question, is to supply during these conditions the void which is produced. The most ferocious animal, from which it has been removed by tapping, becomes calm and motionless; but its natural state returns after a very short interval, during which the fluid is regenerated. If it be restored after being made cold, the animal puts on a general tremor. If water heated to the same temprature be substituted for it, the animal falls into an extreme agitation, and appears to have lost its instinct and its faculties.

M. Magendie has investigated the condition of this fluid during mental diseases. Individuals who have become idiotic and old men in their dotage, afforded it in large quantity, often as much as 6 or 7 ounces; in them it occupied the surface of the brain, distended the cavities, and displaced all the parts. It also considerably fills and distends the ventricles in madness, whatever may be the kind; but then it does not accumulate on the surface of the brain. In individuals possessed of their reason, on the contrary, the ventricles of the brain contain scarcely a drachm, and the whole of it does not exceed two ounces.

M. Magendie thinks that the terms aqueduct, bridge, valvule, employed by the ancient anatomists in their descriptions of the organ, show that they were not strangers to the knowledge of the fluid, which fills the cavities of this organ. In more modern times, Haller conjectured that it was subjected to a certain degree of humidity, destined to prevent the union of their parietes, and that its accumulation could proceed only from disease; but M. de Sœmmerring, in a treatise on the organ of the mind, published in 1796, has already refuted this opinion, and shown that the ventricles of the brain are not solutions of continuity, possible cavities alone, but true cavities constantly filled with a concrete fluid. It is even by the changes in composition which are produced in the fluid by means of nervous agency, that he attempts to account for the impressions which the mind experiences; it is in this fluid, if we may be permitted so to speak, that he places its seat; but he does not speak of the opening described by M. Magendie, and by which the fluid of the ventricles communicates with that which fills the the spinal canal.

M. Flourens, whose important discoveries on the effects of the removal of living parts of the encephalon were made known in our last report, has this year applied his method to the medulla oblongata and the spinal marrow, and has sought to ascertain their limits, and to compare their influence over respiration in the four classes of vertebral animals.

M. Gireux de Buzareingues, corresponding member of the academy, has employed a method peculiar to him, to determine the functions of different parts of the encephalon; it is by observing the occasional changes in different sheep, from the disease known by the name of *tournis*,* and by remarking after death, the place in the brain which was occupied by the parasitical animal or hydatid which produces this disease, the *Tænia cerebralis* of Gmelin, or *Cœnurus* of Rudolphi.

Dr Foville, physician to the Alien Hospital at Rouen, has presented to the Academy a memoir on the brain, wherein he views in a new manner the relations between the different parts of the organ and the spinal marrow, which he regards as analogous in composition to the brain itself. We have already made known in our analysis for 1823, a memoir of M. Bailly upon the analogy of composition; but M. Foville does not view it in a manner altogether the same; he considers the spinal marrow as formed, in each half of three fasciculi; one anterior, one posterior, and one much larger, forming an imperfect canal, in which there is a band of gray substance; the chords are united by a posterior white commissure. Arrived at the base of the cranium, the marrow enlarges and constitutes the anterior pyramids, the olivary bodies, the restiform bodies, and the posterior pyramids. The restiform bodies, as every one knows, are prolonged into the cerebellum. A little fasciculus, which seems to be a continuation of the olivary bodies, terminates, according to M. Foville, in the tubercula quadrigemina; the anterior and posterior pyramids form the peduncles of the brain, where they are separated by the locus niger of Sœmmerring; in the anterior ones only, the fibres decussate. According to the author,—and it is here that his ideas begin to take a peculiar direction,—the fasciculus formed by the peduncle, in advancing from the corpora striata, divides into three superincumbent planes.

The superior plane disengages itself the first, rises and curves from without inwards, to unite with its fellow of the other side, and to form the corpus callosum, which is thus only a repetition of the commissure which joins the superior chords of the marrow, and has not that connection with the hemispheres themselves, which M. Gall attributes to it, when he regards it as their commissure. The intermediate plane, the most considerable of the three, passing externally to the preceding, and lengthening itself on all sides, within the cortical substance,

* A kind of paralysis which makes the animal turn round involuntarily.—Ed.

forms the principal mass of the hemispheres. The third plane, which is the thinnest, has a similar extent with the second; but its direction is exactly opposite, and its fibres, passing from the base of the corpus striatum, are employed, some to expand the temporal lobe, others to reach the cornu ammonis, and to continue with the corpora fimbriata to the fornix,—and lastly, to form the septum lucidum, or that portion which rises from the fornix to the corpus callosum.

In young children, these three planes which terminate the peduncle, separate easily, and, so to speak, are only superjacent on each other. M. Foville even believes, that, if at any time their adhesion is so great as to prevent the separation, it is to be attributed to a diseased alteration.

M. Foville thinks that this theory of the structure of the brain explains the facts, that in nervous diseases, free from complication, which effect the mental faculties, apparent lesion is always found in the cineritious matter of the convolutions, and that, when the locomotive powers alone are affected, lesion only takes place in the central and medullary parts.

We observed, in 1827, that, after the repeated experiments of M. Geroux de Busareingues on the reproduction of animals, the sex of the product depends especially on the relative vigour of the father and mother. This result has been positively confirmed.

On the prismatic form in Mountain Rocks.—Unconnected with any theoretic views, it has long been known that many secondary rocks divide themselves into rectangular masses, or to speak more correctly into rectangular parallelopipeds: this is particularly the case in sandstones, in some limestones, and in coal. But the prismatic, form which basalt, of all mountain rocks, shows in the most characteristic manner, has given origin to much discussion as to how far that form was connected with igneous action. This property, it has been assumed, may arise chiefly from the predominance of argil. It has been found to take place in some varieties of marl and even argillaceous sandstones, substances which have evidently never been fused, and Bergmann has compared the columnar structure to the drying of starch. The striking examples of prismatic division which we have figured in this number, present coincidences which oppose these deductions. The specimens of Fig. 1. and Fig. 2. Plate V. were obtained from the vitrified fort of Craig Phadrick, near Inverness, on fracturing with the hammer a large mass of gneiss, whose exterior was converted into scoria, the more compact central parts divided into pretty regular prisms, with four and sometimes five or six planes.

The specimen represented in Fig. 3. is from a bed of argillaceous ironstone, which had been elevated and distorted by a dyke of toadstone in a valley near Tideswell in Derbyshire. Here the prismatic form was remarkably perfect, the whole mass when in the vicinity of the toadstone, breaking into prisms from which we obtained some nearly regular hexagons. But while it thus becomes, from the first specimens, a certain fact, that the action of the heat will be a cause f this phenomonon; and that we see produced, by a rock very generally considered as volcanic, appearances which are repeated in lavas, in leucostines, or rocks with feldspathic bases, and trachytes or rocks with augitic or pyroxenic bases, still we have equal evidence of the same form being assumed under different circumstances. Baron Humboldt, Messrs Jameson, Reuss, &c. have seen granites divided into prisms; D'Aubuisson has remarked a similar division in the euritic porphyries, which in Saxony are embedded in gneiss. It may be seen in a striking manner in some of the Gypsum quarries of Montmartre, near Paris; and rock salt in the mines of Northwich, presents the same appearances in great perfection.

Hecatostoma (Hecatoncotylus,) a new genus of parasitical worms, described by M. Cuvier, before the Academy of Paris, 11*th October*, 1829. —Amongst the intestinal, or parisitical worms, there is a certain number which have on the inferior surface, or at the posterior extremity of the body; one or more organs in the form of suckers, more or less similar to those which we observe upon the arms of the Sepiaria, or at the posterior extremity of the body of the leech. Some naturalists have derived, from the number of these organs, the names which they have given to the animal; but, as if they had taken them for mouths they have compounded the names of numerals and the word *stoma;* thus we have *distoma, hexastoma, polystoma.* And Cuvier, himself, when, twenty-seven years ago, he discovered, in the Mediterranean, a species of this family with the suckers, conformed to the established custom, and named it *tristoma.*

It is now well known, that the organs of which we speak, are no more used for the suction of food, than those of similar form which belong to the Sepiaria and leeches; the animal employs them for attachment alone, and, with a little attention, we may easily observe the true mouth, which is unique, and very different from these suckers.

The terms *distoma, polystoma,* are, then, improper, and the great natural inconvenience which natural history experiences from a perpetual change of names, alone, induced M. Cuvier to prefer them to those of *hexacotybus,* and to the others which M. de Blainville has proposed, and which represent more exactly the organization which ought to be designated.*

But be this as it may, the animal presented to the Academy by M. Cuvier, belongs to the group of which we have spoken; but it is infinitely more *polystomatous* or *polycotylous,* than any of these which have been hitherto described; moreover it is the giant of *polycotyli.* Most of these animals are small; many are microscopical; but this individual is four, five, and six inches long. It has more than a hundred suckers, and if we would preserve, in its nomenclature, an analogy with the neighbouring genera, it must be named *hecatestoma* or *hecatoncotylus.*

In addition to the singularity of its comformation, the habitation it has chosen or which has been assigned to it by nature, is very remarkable. It lives in the abdominal cavity, or even in the substance of the flesh of the Octopus, the only animal which surpasses it in the number of suckers.

M. Cuvier remarks how this circumstance may appear favourable to those metaphysicians who amuse themselves compounding the entire intestinal worms, of elements furnished by the bodies of the animals in which they live. The illusion will be at its height when they observe the body of an Octopus, which has a parasite so much resembling its arm. One of the two Octopi exhibited to the Academy, had the hecatoncotylus attached to one of its arms, which is even in some degree destroyed by it, and which it replaces in such a manner, that at the first glance one might take it for the arm itself. "Only consider," says M. Cuvier, "how many systems might be founded on such extraordinary resemblances. Never was there a more curious subject on which the imagination might work. As for ourselves, who have long professed to record positive facts alone, we are confined to as exact a description as we are able to give, of the exterior and interior of our animal."

Naturalists owe the discovery of this worm to M. Laurillard, conservator of the anatomical galleries of the Museum of Natural History, who, being sent to Nice to collect the fishes of the Mediterranean, devoted himself at the same time to the observation and collection of all the other productions of this sea, so rich, and yet so little known.

* With much less parade the same observations were made by Dr. Kuhn, in Saigey and Raspail's Annal's for June last. In describing a new species of Polystoma, (*P. appendiculatum,* from the branchiæ of the *squalus catulus,*) he remarks, "from examination of the animal, during life, I am able to verify the opinion of Professor Baer of Kœnigsberg, viz. that the six pores of the Polystoma are not really mouths, but a kind of suckers, serving only to fix the animal, and that the organ which M. Rudolphi and other helminthologists have considered as the anus, is, on the contrary, the true mouth. The name Polystoma is, consequently inexact; but since it is generally received, and since, besides, we always know in what sense to take it we had better preserve it, than create new terms at every moment."

He found this species of worm on the *Octopus granulatus*, (Lamk.) Neither the *O. communis* nor the *Eledona*, nor any other of the Cephalopoda furnished it, notwithstanding the trouble which he took in examining them for this purpose ; so that the hecatoncotylus seems to be peculiar to the *O. granulatus*.

Of five individuals which fell into the hands of M. Laurillard, three were in the bag of a single Octopus, their heads being attached to some point of its interior, and the tails allongated into the *abdominal* sac, but without penetrating the peritoneum. A fourth was in another animal, but in a similar position. The fifth alone was attached, as we have said, to the arm of an Octopus, and had transformed it into a kind of pouch, where it had introduced its head, the rest of the body hanging unattached externally. The hecatoncotylus is, then, properly speaking but semi-intestinal, or rather semi-externally parasitical, like the *polystoma*, *tristoma*, and like the *lernæa*, and *chondrecanthus*. It detaches itself easily from the animal upon which it lives, and commits itself to the waters of the sea, or mounts the solid rock, without appearing to suffer much inconvenience from these changes of position ; it attaches itself closely, by means of its suckers, to the fingers or to any other body, imitating in this respect its patronal Octopus, for that is the term by which we must designate an animal which a parasite devours.

M. Cuvier gives the following anatomical description of this animal. Its form is elongated, and somewhat prismatic, its dorsal surface being rounded, and the inferior a plane. The ordinary length is from four to five inches. It is thicker and more elevated anteriorly, where its breadth is from four to five lines, and its height from six to seven ; each of these dimensions gradually diminish posteriorly, but especially the height, which is reduced to less than a line, whilst its breadth is still two lines ; the anterior extremity is obtuse. But we cannot follow the author through his anatomical details. The suckers are placed on the external surface ; fifty-two pairs may be counted. M. Cuvier then describes the stomach, intestines, and alimentary orifice which appears to be unique in this animal. He passes next to a very remarkable apparatus, which he supposes to be connected with generation. This organ, whose functions still remain to be determined in a precise manner, will offer a curious subject of research to those naturalists who may have an opportunity of examining the living hecatoncotylus.—*Le Globe.*

To the Editors of the Edinburgh Journal of Natural and Geographical Science.

Gentlemen,—I beg leave to send you some extracts, from a letter I have received from Mr. Kenyon, in answer to my observations on his paper, which appeared in your Journal for October last, page 65. I am gentlemen, your obedient servant,
Thos. Brown.

Valvata piscinalis. Your remarks on this shell are doubtless correct. I believe the *V. planorbis* of Drapernaud, is the *V. cristata* of Fleming. Drapernaud's *V. spinorbis*, (spelt *V. assiorbis*, in the Magazine of Natural History, by the printers mistake), is not British ; and the *V. minuta*, is Dr. Turton's *Turbo serpuloides*, according to the latter observations, in a letter to me, by my friends.

Lymnæa fragilis. When I first sent the paper for insertion, to the Magazine of Natural History, it was not my design to have it illustrated by any figures. Mr. J. D. C. Sowerby, however, addressed a letter to me, informing me, that it was the Editor's wish, as much as possible, to give figures of the subjects of which scientific names were used, and stated, that he had in the museum of his late father, (James Sowerby,) most of the species I had mentioned, but there were a few others, he observed, which might not be the same shells, as those I had mentioned under the same names, and he particularly requested me to send him specimens of *Valvata piscinalis*, large and small, *Lymnæa ovata*, *Helix hispida*, *H. serica*, *H. fusca*, the four species called *Pupa muscorum*, and the *Lymnæa fragilis*. I sent specimens of all these, except one of the species of *Pupa muscorum*, and the *Lymnæa fragilis*, which I had not in my possessiou. Therefore, whatever blunders are made, in figuring any of the shells alluded to in my paper, except the eight species furnished by me, are attributable to the publishers; the figure of the shells, under consideration, being made from a specimen supplied by Sowerby, exculpates me; and is, doubtless, as you observe, a figure of the *Lym. palustris.*

Lymnæa detrita has long puzzled me, and I have, since I saw your remarks, struck it out of my list of British land and fresh water species. I am as much at a loss, as you can be, to divine what the shell is that Sowerby has figured in reference to this species.

Lymnæa peregra, *Ly. limosa*, Fleming, (*Planorbis*) *nitidus.* Your observations on these precisely accord with my own.

Succinea amphibia. There is one point, however, in which I must beg leave to differ from you, with respect to the shell in question, which is, that it is the *H. limosa* of Linnæus, who has referred to Gualtier, Tom. V, Fig. 2. and which, as I observed in the Magazine, is, undoubtedly, *Succinea amphibia.* Gualtier's description of the species, also agrees with the shell in question: it is in these words, "*Buccinum fluviatile, subflavium, pellucidum, trium spirarum, tenuissimum, ore magno ovali oblongato, mucrone non brevissimo.*" Your shell, on the contrary, appears to possess five whirls, is of a brownish red, and may probably be a variety of *L. ovata*, or *peregra.* If a distinct species, I beg to suggest the propriety of naming it *Lymnæa brunnea;* and, I may also add, and which is a circumstance deserving attention, that Dillwyn, Drapernaud, and Lamarck, have all referred to Gualtier's figure for this shell; you say, too, that your shell was found in a "ditch," which is not the habitat of Dr. Turton's *H. limosa*, which he describes as inhabiting "wet meadows."

Clausilia ventricosa. You say this is not the *T. biplicatus* of Montagu. Sowerby has probably copied the figure of Drapernaud's *C. ventricosa.* My observation was, that judging from the two specimens of *T. biplicatus* in my possession, and which came originally from Mr. Gray, I considered them the *C. ventricosa.*

Clausilia solida. The figure is Sowerby's.

Pupa muscorum. The species figured in the Magazine, are

1. *P. muscorum*, Lam. *P. marginata.* Drap. T. Chrysolis
2. *P. umbilicata*, Lam. *P. muscorum*, Flem. Dill. Turt.
3. *P. muscorum*, Drap. and not British to my knowledge.
4. *Cyclostoma truncatulum*, Lam. (*T. muscorum*, Don. *quoad figura.*) this last probably not British. It is the *Cyclostoma subcylindricum*, of Fleming,

Helix sylvatica. Sowerby's figure may probably be from a shell of one of the varieties of Lamark's *H. hortensis;* but I do not understand you to say, that the shell described by Lamarck, and figured by Drapernaud, under this name, is, in reality, a variety of *Helix hortensis.* I wished to know if the true *sylvatica* is really British?*

Helix carthusianella, I am informed, is very rare as a British shell; but has been found, by Mr. Gray, about Little Hampton Down. The British *H. cautiana* is not referable to this last, but is the *H. carthusiana.*

Helix cellaria. The species allied to this are several, and intricate; and Dr. Fleming, under the name of *H. nitida*, includes five species, if not more.

Helix sericea. What I suppose to be this, is the *Helix hispida* of Pennant, Dillwyn, Wood, and Fleming, and quite a distinct species from the *Helix hispida*, of Donovan, Drapernaud, and Lamarck. One of my correspondents

* I stated in my observations on Mr. Kenyon's paper, that his *Helix sylvatica*, was only the banded variety of *Helix hortensis.* I am not aware that the former shell has been ever found in Great Britain. T. B.

thinks, however, that we do not possess the *Helix sericea* of Drapernaud, in this country; and adds, that Dr. Turton now calls the shell in question *Helix granulata*, "on account of the fine granulated appearance it has, when deprived of the hairs."

Pupa Britannica. Although the *Turbo tridens* of English authors agrees better with the genus *pupa* of Lamarck, than with any other of his genera; yet, I think, on account of the peculiar formation of the mouth of the shell in question, and its ovoid shape, it ought to be separated from it; and I now call the shell *Chondrus britannicus*, as I am not aware of any objection to its being arranged in the latter genus.

EDINBURGH, 5*th November*, 1829.

On the distribution of Fishes in the Asiatic Seas; by R. P. LESSON.—Nature, in dispersing her creations over the surface of this great globe, seems to have imposed limits upon each, or, at least, she has only permitted to a certain number of priviledged species, the power to live indifferently in opposite circumstances, and under the varied influence of different zones and climates. But inhabiting a fluid whose temperature is more uniform than that of the air, the fishes are subject to numerous exceptions, extending to great distances from their primitive locations, adopting new climates, living indifferently, in a word, under any zones, since nothing is opposed to their migration; wherein they are more favoured than birds or other animals, confined to certain islands, to particular lands, whence they cannot pass without traversing immense extents of sea. But the power, which created the world, and assigned to it its limits, imposed also upon different animals, boundaries which they could not with impunity pass over; and the fishes especially, submitted to the influence of climates, and of latitudes, and organized for numerous modes of existence, appropriate to their manners, and to certain localities, were distributed by parallels, and maintained themselves in marked zones, beyond which they never passed except from rare and accidental causes. What a diversity do we observe in the form of these beings, according as they are destined to frequent the rocky coast, the long declivities of the sandy beach, the mud of the river's mouth, the confined channel of the archipelago, the polar ice, or the tropical sea!

In casting a general glance on the geographical distribution of fishes, we recognize at once this great truth, that certain families or certain species inhabit a determinate zone around the globe. Thus, some species live between the tropics, under almost every meridian, and do not pass these limits, or at most to a very little distance; others, on the contrary, seem to be proper to the temperate or the frigid zones of the northern hemisphere, whilst others belong exclusively to the south; for instance the southern chimæra, (*chimæra australis*,) abounds equally at the south of the three great capes Horn, Dieman's, and Good Hope, and seems to be fixed between the 60th and 25th degrees of latitude. On the other hand, however, the greatest number of the families of fishes occupy permanently some of the grea basins, which we purpose to pass successively under review.

In following the order established in the excellent work of M. Cuvier, in and examining the natural families of fishes, we may thus form an idea of the distribution of genera, or even of species, in the seas of the different countries of the earth.

The first family, the *cyclostomi* of Dumeril, comprises the lampreys, which live in the fresh water; *ammocœtes* which inhabits the sands of our coasts, both of the Atlantic and the Mediterranean; the *gastrobranchi*, which afford the singular phenomenon in the two species of the genus, that one of them (*gastrobranchus glutinosa*) lives in the north sea, whilst the other (*g. dombeyi*) inhabits the seas of the southern hemisphere.

The *Selachii* (*Plagiostomi*, Dum.) remarkable for the great number of voracious and dangerous fishes, which are grouped under that division, are disseminated throughout all the seas, almost without exception, frequenting principally and in the greatest numbers, the coasts of Europe. General opinion regards the white shark, (*Squalus carcharias*) as a cosmopolite; it is found indifferently in the seas of Europe, of the Indies, and in the Pacific Ocean, It is most common, however, in warm latitudes; but it appears altogether to be displaced in the seas of the Molluccas and New Guinea, by the black-finned shark, *(Sq. melapterus,)* whilst the *scyllii, musteli, notidani, pristes,* &c. frequent both our coasts and those of America, as do also the *zygænæ* and *squatinæ.* There is one genus which does not seem to move from the shores of Australasia, and the only species it contains *(cestracion philippi)* never attains a large size, and is rare even there. The rays *(raiæ)* are found in all seas. Their forms are varied, but seldom very characterestic; the Mediterranean furnishes a great number of species; our coasts possess many, and especially the torpedo, *(raia torpedo,)* which is represented on the coasts of Brazil, by the electrical ray of Schneider. By no means remarkable in their colours, these species have almost universally a sombre brown tint. However the *raia thouin* of the coast of Peru, is striking from its two marked colours, and the *trygon* of the seas of the Molluccas presents beautiful citrine tints, spotted with azure. It is principally in the Mediterranean that the sea eagles *(myliobatis aquila,)* and the *cephaloptera giorna* are found; in the Atlantic Ocean of the United States, we remark the great vampyre ray of Dr Mitchell, and in the south seas we have frequently observed shoals of rays of an immeasurable size, which we know not to what species to refer. As to the two species of *chimæra* which compose the genus, one *(C. monstrosa,)* inhabits the cold latitudes of the north of Europe, and the other, actually particularized by the denomination *callorynchus Australis* is continually caught at Chili, Dieman's Land, and the Cape of Good Hope, never passing out of southern latitudes. Amongst the Sturiones, the common sturgeon of all Europe *(acipenser sturio)* is the object of an immense fishery in Russia, whilst two species live in fresh water. The *spatularia reticulata* is found only in the Mississipi.

The osseous fishes, of which innumerable legions are spread throughout all waters, differ from each other to infinity. One may group them into genera, which are sometimes numerous in species, whilst under other circumstances they contain very few, and are even sometimes unique. But those singular families *diodon* and *tetraodon* seen to be proper to warm climates. They appear to exist upon the coasts of all inter-tropical countries, and to pass their lives especially with the *balistes,* amongst the reefs of coral. At the isles of Teneriffe, however, we meet with the *tetraodon lineatus,* so abundant in the Red Sea; and it is only in the seas of the Isle of France, that we have observed the remarkable species which forms the new genus *triodon.* The *balistes,* vacillating and irresolute in their movements, people in brilliant swarms all the warm seas, and especially those surrounding the islands under the equator. However, the Mediterranean nourishes many species, and even those which inhabit those seas, are remarkable from the colour of their clothing. Nature has particularly lavished on the *balistes* all kinds of embellishments, and the manner in which their bodies are ornamented, is as varied as admirable. They principally live in the numerous channels of the small islands which are encompassed by Taïti and Barabora, New Ireland, the reefs of Waigiou, of New Guinea, and the volcanic shores of St Helena and Ascension. In the European seas is found that singular fish, named the sun fish, *(tetraodon mola,)* whose orbicular form and posterior truncation is as eccentric as it is ungraceful.

The *monocanthi, aluteres,* and *ostraciones* are all fishes of the coral seas; and their species are the more numerous, as their localities approximate the line. Thus from 5° N. lat. to 5° S. lat. the *ostraciones,* like the spinous *balistes,* are excessively varied.

The fishes whose branchiæ are disposed in a tufted form, the *lophobranchii,* are not numerous. The pike-fish *(syngnathi)* are found in all warm or temperate seas. Amongst the *hippocampi,* the *h. communis* lives on the coasts of Europe; the *h. foliatus* inhabits only the shores of New Holland; the *h. abdominalis,* north of New Zealand; the *solenostomus,* and the *pegasus,* in the Indian Ocean.

The numerous family of *Salmonides* peoples the fresh waters of our European rivers and lakes. The salmon, *(salmo salar)*, common in the north, ascends the rivers. The *carimata* and *myletes* have many species in the great bays of South America, and one in Egypt, *(salmo dentex*, Hasselq.*)* The rivers of the torrid zone are inhabited by the *hydrocini*, one of which is Egyptian, and many of Brazil. The *sauri* are of the Atlantic Ocean and of the Mediterranean, as are also the *scopeti* and *aulopi*.

The *clupeæ* contain many genera of great interest in political economy, as the revenue of some states is founded on the commerce which they support. Such are the herrings, *(clupeæ harengus)*, shoals of which, form colonies which come every years from the poles, pass along the coasts of European states, and furnish annually an immense supply in the northern seas, on the shores of France and Scotland. The sprat *(clupea sprattus)* is the anchovy of the Atlantic and Mediterranean. The herrings are replaced in warm climates by the *mogalops*, a neighbouring genus which attains a large size. Numerous *clupeæ* inhabit the Antilles, the coasts of Brazil and of Peru, but diminish sensibly in the Indian ocean, where we can name only the *clupea synuva*, Sch. *(notopterus* Lacep.) The *elopa* belongs to both hemispheres, says M. Cuvier, whilst the *chirocentrus* *(clupea dorab* Gmel.) is of India, the *sudis* of Senegal and Brazil, and the *erythrinus* and *amia*, the former of the fresh waters of Malabar and Brazil, the latter of the rivers of Carolina. This family furnishes besides the *lepisosteus* of the lakes of South America, and the *polypterus* of the Nile.—*Journ. des Voyages, Sept.* 1829.

Generation of the Ornithorynchus.—The Monotrema are at length proved to be oviparous. Dr. Robert Grant has communicated to the Academy of Sciences, through M. Geoffroy St. Hilaire, a drawing and description on an egg of the ornithorynchus, which will terminate the animated and hitherto unsettled discussion between M. Meckel and M. Geoffroy. In a monograph on the anatomy of the ornithorynchus, Meckel described two glandular organs which he had discovered in the female, and which he considered to be mammæ; thereby overturning the arrangement of St. Hilaire, who had placed the ornithorynchus and echidna in a fifth class, as they appeared to him to be altogther distinct from the mammalia. M. Geoffroy, however, thought that these glands bore much more analogy to those which are found upon the flank of the shrew. But M. Meckel, not the less satisfied with his own theory, answered the general objections of St. Hilaire, in a letter addressed to the French translators of his Treatise on comparative anatomy, wherein he argues in favour of his opinion thus: "1. The glands to which M. Geoffroy has compared mine, are found in the males as well as in females, whilst I could observe no trace of them in a male (ornithorynchus,) much larger than the female in which I discovered them; 2. The differences of size which my gland assumes, accord much more with these mammæ, than with any other gland, except the ovaries and testicles; 3. The number of cœcums, which my gland exhibits, is neither proof against me, nor for M. Geoffroy; because it is the true character of all glands, and secondly, it is reasonable that in the mammary glands, even of the female, they should be more developed than in others; 4. The presence of a teat is not an essential character of the mammary gland, any more than the presence of the external genitals in the glands of the sexual system, &c.; 5. The exceeding sensibility of the large lips of the onithorynchus place it eminently in a condition to suck without a teat. (p. xi.) But the question seems now to be decided.

We hope to have it in our power to present our readers with a copy of Dr. Grant's notice in an ensuing number. Though it has for some time been rumoured by travellers that these animals are oviporous, this is the first authentic account which has been given of the egg.

Original habitats of the Lilac and the Lime.—The Lilac tree adorned our gardens for many ages, and yet we were ignorant of the country which gave birth to this elegant shrub. It has been discovered in our days, in the last voyages undertaken to determine the height of the peaks of the Himmaleh ; the English naturalists found this tree flourishing with the Indian chestnut, in shrubby wood, 4000 yards above the level of the sea ; and this explains how a tropical shrub resists in our country the most intense cold, and is enabled to propagate itself as far as the freezing zone of Iceland and Greenland.

I myself " says M. Dureau de la Malle,". have discovered the cradle of two species of trees very common in our towns, the lime tree known by the name of wild lime, (Tilia sylvestris), and lime tree of Holland, (Tilia platyphyllos.) In a voyage made to the Pyrenees in the year 1807, I found near the port of Gavarnie at 2000 yards above the level of the sea, in the midst of the most sterile rocks, which men had never endeavoured to subject to cultivation, these two limes growing in low wood, or as isolated trees, by the side of the primitive forests, and shrub-wood of pines and Rhododendrons.—*Annales des Sciences Nat. June* 1829.

On the Duration of the Germinative Power of the Seeds of Plants, particularly of the Cucurbitaceæ.—The Society for the encouragement of horticulture in Prussia, proposes from time to time certain questions, to which it directs the attention of horticulturists.

The following is selected from a recent date :—" Is it true that the seeds of the melon and cucumber, being preserved for some years, yield a greater abundance of fruit ?" Most obsrevers remark that the plants obtained from the seeds of the preceding year produce many leaves, but few fruitful flowers, and almost entirely male ones ; but that these same seeds, dried by the heat of the sun, or of a stove, yield more fruitful plants, and that it is particularly at the end of some years they acquire this property. These experiments vary from three to twenty years. The heat of the human body may be useful, but it must be used with discretion, or the germinative power of the seeds will be destroyed.

The author of this article has made experiments of the same kind on balsams and gillyflowers. He sowed at the same time some seeds of the last, some of which were of the preceding year, others of some years previous. The first came up much sooner than the second, and gave only simple flowers ; the others produced only sixteen out of several hundred plants.

M. Schmidt employs seed from five to twelve years old ; those of twenty years did not grow. Professor Sprengel of Halle says he obtained no fruit from seed a year old. M. d'Arenstorff, of Drebleau, obtained fruit, most remarkable for their flavour and size, from seed of twenty years old. The observations of Professor Treviranus, of Berlin, have afforded the same result. A vigorous vegetation produces, in monœcious plants, male flowers in the greatest abundance, sometimes even exclusively. This has been proved, as far as regards the Cucurbitaceæ ; but seeds, which are too old, produce an opposite result. He has seen seeds of five years old produce only female flowers ; they were fecundated by male flowers of another bed, and yielded fruit.

M. Voss, head gardener at Sans Souci, sowed on the 7th of February, 1827, twenty-four seeds of a Spanish melon of the year 1790, being consequently thirty-seven years old, and he obtained eight plants which gave good fruit. This experiment, the most remarkable of all, will excuse our citing eleven others which he made with seed of a less age, and of different species. Cucumber seeds of seventeen years old afforded the same results. M. Voss adds, that some seeds of the *alcea rosea*, of twenty-three years old, afforded very well conditioned plants.

" We admit, as incontestable, the above-mentioned observations. It is known that the seeds of different families retain for a greater or less time, their germinative power ; to cite only one example from among the leguminous plant,—about twenty years since, we believe, fruit was obtained in the Royal Garden from a species of Phaseolus or Dolichos, taken in the herbarium of Tournefort."—*Verhandl. des Vereins zur Befœrd. des Gurtenbaurs in den Preuss. Staat.*

NATURAL-PHILOSOPHICAL COLLECTIONS.

Extract from a letter from M. Kupffer to M. Arago, concerning the composition of the Atmosphere at Kazan.

THE observations which I have conducted in this place, on the composition of the atmosphere, may serve as a supplement to those which have already been made in so many different situations, and from which it results, that, independently of climates and cultivation, the proportion of the two principal constituents of the air is every where the same. In civilized Europe, one might anticipate that the slightest difference in this respect would soon be removed by the admixture which portions of air, not separated by more than some hundreds of leagues, must experience from the influence of the winds; but Kazan, which is surrounded, on one side, by a country in a low state of cultivation, and on the other by the steps and immense forests of Siberia, where vegetation is lifeless during the greater portion of the year, might have an atmosphere somewhat different from the rest of Europe. The instrument I used was the Eudiomater of Volta; 198 parts of atmospheric air mixed with 99 parts of hydrogen gas, afforded me constantly 171 to 172 parts, after detonation; which gives 21,0 to 21,2 of oxygen in 100 parts of atmospheric air. I have taken the greatest care to experiment always at the same temperature, and under the same pressure, so no correction is necessary in this respect. The gases were saturated with humidity; for I made my experiments under water. *Ann. de Chim. Aug.* 1829.

Extract from a Memoir on the Causes of Diffraction, by M. Haldat.

The phenomena of diffraction, the examination of which has furnished of late such powerful arguments against the hypothesis of Newton, and has drawn our philosophers towards the opinion of Descartes, seem to M. Haldat not to have been sufficiently discussed in relation to the circumstances which may modify them, and to the discovery of the cause. Under this point of view he has tried a great number of experiments in which the bodies which produced diffraction, (and which he names *diffringents*), have been submitted to the action of the most proper agents for modifying them; and as the attractive force is the property on which the Newtonians have supposed the diffraction to depend, he has brought into action in his experiments all the agents most capable of influencing it. After having assured himself that, as many experimentalists had announced, this phenomenon was neither modified by the density nor by the chemical nature of the bodies, he turned his attention towards the greatest powers in nature, caloric, electricity, magnetism, electro-chemical currents and, lastly, affinity, so powerful in altering the attractive force, were successively, as well as at the same time employed to modify the state of the bodies while they were exercising over the luminous rays, the influence by which diffraction is produced, without the phenomena by which it is characterised undergoing any sensible change. Thus metallic wires, diffringent plates of iron, of copper, and of silver, have been heated to redness and cooled again to —10°. without the coloured bands produced by their action upon the luminous rays having presented any appreciable difference from those which the same bodies exhibited at the medium temperature of the atmosphere.

Wires of diffringent plates have been traversed by currents of common electricity, by violent discharges of powerful batteries, and by electro-chemical currents sufficiently energetic to redden and to dissolve them. Moving currents have been employed in the same or in opposite directions, a ray of light has been received upon the inclined plane of diffringent plates, which had been powerfully magnetised, without the phenomena undergoing any observable alteration. Rays of light have even been traversed by rays of vivid flame, by powerful electrical currents or discharges, before their arrival at the diffringent plates or wires, without any change being manifested in the fringes and other phenomena of attraction. The obscure bands, in the shade of these wires, have remained equally invariable in intensity or dimension.

From these experiments, M. Haldat thought that the explanation of diffraction, founded on the influence of an attractive force, or on the existence of certain atmospheres previously attributed to bodies, could not obtain the assent of philosophers when the attractive force and the atmospheres, submitted to the influence of agents so well calculated to alter them, had produced no change in the phenomena. These facts, doubtless, do not directly establish the theory of undulations, but they lead to it, by overthrowing the only explanation which could be opposed to it. The author, moreover, does not conceal the difficulties which spring from these experiments with relation to the system of undulations, and he inquires how the movements of luminous waves, which must be so regular, are not affected by a flux of subtle fluids which strike against them in their course. He remits the solution of these questions to the epoch when science shall have penetrated into the minute actions of these agents which are at present only known to us by their effects. *Ibid.*

Resistance in Space to the Motion of Heavenly Bodies.—In an account of the last appearance of Encke's comet in 1828, M. Gautier states, that the results then obtained accorded with those which Encke had previously procured, and which induced him, in 1823, to suppose the existence of a medium or ethereal fluid in space, of which the resistance, acting as a tangential force against the motion of the comet, would augment the power of the sun, and shorten the period of revolution. The most celebrated geometers, and even Newton himself, had already calculated the influence which such a resisting medium could exercise on the motions of comets and planets. They had found that its effect would be to diminish continually the eccentricity of their orbits, and to shorten the longer axes and the periods of their revolutions; that the length of the perihelium would suffer only a periodical change; and that the nodes and the inclination of the orbit would not be altered. In the case of Encke's comet, the two first effects have been decidedly produced, and there are two circumstances to facilitate the calculation; the first is, that this comet is always seen in the same point of its orbit and near to its perihelium; and the second, that its orbit is subjected only to very slow alterations. Both these circumstances permit the supposition that the times of revolution (at least for some periods) diminish by an equal quantity, so that their diminution may be considered as proportional to the square of the times; the periodical variation of the perihelium may also be neglected without inconvenience. M. Encke supposes, with Newton, that the ether, or resisting medium, is diffused through all space; that its density diminishes in the inverse ratio of the square of the sun's distance, and that the resisting force is always proportional to the square of the actual linear velocity of the comet.—*Bib. Univ. May* 1829.

On the Production of Artificial Ultramarine.—The possibility of making ultramarine was first observed, when the blue matter found in a soda furnace was shown by Vauquelin to have the properties of that pigment; and since then the experiments of Gmelin and Guimet have proved highly satisfactory and successful; but as the processes published are still expensive, M. Kuhlman has been induced to publish an observation he has made, in hopes it may assist in simplifying them. Whilst repairing a reverberating furnace for the calcination of sulphate of soda, he remarked that the brick bridge, separating the salt from the fire, was covered in different places with a coat of ultramarine. It appeared that previous to the formation of the ultramarine, a sulphuret of sodium was produced, for the blue places were surrounded by small, brilliant, reddish-brown crystals of this sulphuret.

Whether the sulphate of soda is decomposed by the action of heat only, or by the simultaneous action of the heat and the fuel, or by the influence of the silica and alumina of the clay in the bricks, are questions M. Kuhlman could not answer ; but the important point of being able to make artificial ultramarine, by the action of clay and sulphate of soda, was distinctly ascertained. It is also remarked that sulphate of soda, prepared without any excess of acid, may be converted into sulphuret, and become reddish brown by the sole influence of heat ; but that when excess of acid is present, this decomposition cannot take place, and no ultramarine can be formed.—*Annales de Chimie*, xl. 439.

On the Formation of Acids in Vegetables, by M. Vauquelin.—I have thought that, in a great number of cases, the developement of acids in vegetables was principally occasioned by the presence of alkalies. We find, in fact, the acids almost always neutralized altogether, or in part, by various alkalies, as lime, potash, soda, magnesia, and sometimes by vegeto-alkalies ; and I do not know that the latter have ever been found in a free state in the vegetable kingdom.

The alkali which plays the greatest part in this respect is certainly lime, for it is most generally diffused, is most abundant at the surface of the earth, and powerfully attracts acids. It does not, certainly, enter into the organic kingdom in the state of lime, but as a carbonate, which, without exerting any deleterious action on vegetables, still retains sufficient alkaline force to determine the formation of acids, and particularly the oxalic, which it prefers to all others.

We may thus, as I have said elsewhere, explain the effect of calcareous manures on vegetables. Immediately after its introduction into the organs of plants, the carbonate of lime determines the developement of an acid which decomposes it, and sets its carbonic acid at liberty, which, by means of light, is turned to account in the vegetable kingdom. From hence, it may be concluded that calcarous manures fill two important functions ; namely, the division of the soil, and the nutrition of the plants.—*Ann. de Chimie*, xli. 59.

Results of Mr. Rennie's experiments on the friction and abrasion of the surfaces of Solids.—The following are the results of a series of very valuable experiments on friction, made by John Rennie, Esq.

The table shows the amount of friction (without unguents) of different substances, the insistent weight being 36lbs. and within the limits of abrasion of the softest substance.

	Parts of the whole weight.
Steel on ice,	69.81
Ice on ice,	36.00
Hard wood on hard wood,	7.73
Brass on wrought iron,	7.38
Brass on cast iron,	7.11
Brass on steel,	7.20
Soft steel on soft steel,	6.85
Cast iron on steel,	6.62
Wrought iron on wrought iron,	6.26
Cast iron on cast iron,	6.12
Hard brass on cast iron,	6.00
Cast iron on wrought iron,	5.87
Brass on brass,	5.70
Tin on cast iron.	5.59
Tin on wrought iron,	5.53
Soft steel on wrought iron,	5.28
Leather on iron,	4.00
Tin on tin,	3.78
Granite on granite,	3.30
Yellow deal on yellow deal.	2.88
Sand-stone on sand-stone,	2.75
Woollen cloth on woollen cloth,	2.30

These results are collected from the different Tables, but the comparison may be made by selecting other values within the limits of abrasion for a minimum.

General Conclusions.

From what has been stated hitherto it is obvious,—

1*st*, That the laws which govern the retardation of bodies, gliding over each other, are as the nature of those bodies.

2*d*, That with fibrous substances, such as cloth, &c. friction is increased by surface and time, and diminished by pressure and velocity.

3*d*, That with harder substances, such as woods, metals, and stones, and within the limits of abrasion, the amount of friction is as the pressure directly, without regard to surface, time, or velocity.

4*th*, That with dissimilar substances gliding against each other, the measure of friction will be determined by the limit of abrasion of the softer substance.

5*th*, That friction is greatest with soft, and least with hard substances.

6*th*, That the diminution of friction by unguents is as the nature of the unguents, without reference to the substances moving over them.

The very soft woods, stones, and metals, approximate to the laws which govern the fibrous substances.

In comparing the present experiments with those of Colomb, the discordances found to exist relate principally to time. The limited pressures (varying from 1 to 45lbs. per square inch) under which his experiments were made, account in some degree for the anomaly. But in many of the minor, and in the general results, they will be found to coincide.—*Vide Phil. Trans.* 1829, p. 169.

On the cold produced by the dilatation of air ; by M. Legrand.—The general law that air is cooled by its dilatation was controverted by MM. Gay-Lussac and Welter, in the particular case where it is blown out of an aperture under a constant pressure. This strange result which was deduced from an experiment made with a fire engine at Chaillot, is published in the *Ann. de Chim.* tom. xix. p, 416. M. Legrand, Professor of Natural Philosophy at Besançon, has obtained very different results from the same engine. The following were his observations :—

Distance from the aperture or cock.	Temperature, Cent.	Cooling.
10 millimeters.	22	7°.5
50	25.5	4
100	26.8	2.7
200	28.8	0.7
250	29	0.5

The temperature of the external air was 29°.5, and the third column is the difference between this number and the temperature in the second column. When the cock was taken out altogether, and the bulb of the thermometer put in its place, the temperature oscillated between 12°.5 and 13°.5, so that the cooling was here about *fifteen degrees* centigrade, or *twenty-seven* degrees of Fahrenheit.

The experiments were repeated in June 1829 by M. Saigey, who obtained analogous results.—*Annales des Sciences d'Observation*, No. i. p. 45.

Brown's Active Molecules.—Mr. Holland, the inventor of a microscope sold by Carey, of the Strand, has inclosed some of the particles described by Mr. Brown, as active molecules, between glass and talc, closing the whole hermetically so as to exclude, as much as care could do, all interference of external causes. Notwithstanding this, the motion continued equally vivid, even after ten days. The lens used had a focus of the thirtieth of an inch ; and the particles were obtained, as we understand, from gamboge.—*Brande's Journal, Sept.* 2829.

CATALOGUE RAISONNÉ.

Mesures Barométriques, suivies de quelques Observations d'Histoire Naturelle et de Physique, faites dans les Alpes Francaises, et d'un precis de la Meteorologie d'Avignon; par J. Guerin, M.D. &c. 1 vol. 12mo. Avignon, 1829.

This little work contains a great number of useful data, judiciously collected, upon the aspect and climate of the French Alps. It is not susceptible of analysis, because all its pages contain numbers. There is a barometric levelling of the greater part of the Dauphine, of Provence, and of the department of Avignon, including roads, rivers, mountains, and all the remarkable spots in the country.

The mean inclination of the Rhone from Geneva to the sea, is about 13 French feet to the league: that of the Isere, from Grenoble to the Rhone, about 4 feet.

A great number of observations, made in different seasons on the Mount Ventoux, an isolated and conical mountain, whose summit is elevated more than 2000 yards above the level of the sea, have shown to the author, that in latitude 44°, and to a height of 2000 yards, the temperature of the atmosphere decreases in summer one centesimal degree for 160 yards in elevation, and one degree in winter for 200 yards, and the same quantity for 180 iu the intervening seasons.

As a proof of the cooling effects produced in solid bodies by radiation in an open atmosphere, Mr. Guerin has found, by very delicate observations, that the temperature of trees and plants is often very much below that of the air. The 24th January 1827, at seven o'clock in the morning, the air being at —11°,3 cent. snow adhering to the branches of the cypress, and to other plants and shrubs, it was at —14°,5 and 15°, that is to say 30°,5 more than the atmosphere. In 1828, the temperature of the 31st of March, and of the 1st of April, which was for the trees and flowers —2°,5, was for the air only + 1°,5.

The mean temperature of Avignon, obtained by twenty-seven years of observations, is + 11°,5 Reaumur, (14°,38 cent.) The elevation of the barometer, from a mean of ten years, is 28 in. 1,8 lin. or 762 mill. The annual quantity of rain, from a mean of twenty years, is 20 in. 3,8 lin. Those who take an interest in meteorological science, and in physical geography, will be anxious to obtain, on the different countries of the globe, data as complete as those which Mr. Guerin furnishes upon the country which he inhabits.

Viaggi in Asia, in Africa, nel Mare delle Indie. Travels in Asia, in Africa, and the Indian Seas; written in the 13th century by Marco Polo, Venetian. Ry B. Gamba. Venice, 1829.

The author of this edition of Marco Polo's travels, has undertaken to render a service to history, to geography, and to the Italian language. Modern travellers, and those who devote themselves to the study of geographical science, have long felt the great importance of narratives so exact and so impartial as those which Marco Polo has left us of his travels. We are indebted to the Count J. B. Baldelli for a beautiful edition of this work in four vols. 4to. and Mr. Gamba has formed the project of publishing a less voluminous and more convenient edition. He has confined himself solely to the addition of those notes and explanations which are indispensable to its comprehension; and he will terminate by some very brief notes upon the author, and the work, and by explanations which were actually necessary.

General Observations on Univalves. By Charles Collier, Esq. Staff-Surgeon at Ceylon.—*Edin. New Phil. Journ. No. XIV. p.* 225.

Mr. Collier, finding the difficulties to be encountered in an arrangement of shells founded on the structure of the animal, too many and too great, to render it conducive to any practical result, vindicates the method based on the characters of the shell. After giving a brief review of the features of mollusca, showing them to be often different among individuals of the same family, considered as to the form of the shell, and to be always so intermingled as not to afford generic distinctions, the author animadverts upon the erroneous application of terms which have no relation to distinguishing characters, and enumerates the *parts* or *conditions* peculiar to univalve shells, by which he proposes to distinguish and nominate families. *Cavity, lip, columella, rostrum* or *beak, spire, open, tubular,* are the parts and conditions for generic distinction and denomination. "Having objections to the Linnæan classification and principle of nomenclature," says Mr. Collier, "I beg to submit the above, as at least preferable, *though not perhaps the very best which the subject will admit of.*" When will this rage for system-hunting cease? Mr. Collier should recollect that an influential character in science can alone authorize an attempt to disturb the accepted principles of arrangement.

Observations on certain Resinous and Balsamic Substances found in Guiana. By Dr. Hancock.—*Ibid, p.* 233.

A botanical and medical description of carana, (a gum resin which exudes spontaneously from the ackaiari tree;) Hyowa, (a balsam obtained from the Amyris ambrosiaca of Willdenow–Icica 7–phyllæ of Aublet;) Arakusiri, (a balsam more odoriferous even than the true balm of Gilead, and produced by the Icica aracouchine of Aublet, A. heterophyllæ, as improperly named by Willd.;) Mani, (the gum of the Moronobea coccinea of Aublet;) Simiri, (ths resin of the Hymenea courbaril;) Ducali, (a milky substance produced by a tree apparently of the family Sapotaceæ;) Caoutchuc, (from the Siphonia elastica;) Balsamo Real, (from a species of Amyris;) Vesicamo, (a new aromatic resin, which Dr. H. has committed to the examination of Professor Brande;) and Kofa, (the produce of a species of Clusia.)

On the Temple of Jupiter Serapis at Pozzuoli, and the Phenomena which it exhibits. By James D. Forbes, Esq.—*Ibid, p.* 260.

This paper, whose interest will principally be appreciated by the classical antiquary, connects itself with natural history by a detail of the theories which propose to account for the singular phenomenon exhibited in the ruins of the temple near Pozzuoli. At the height of 10 feet above the base of the pillars, and in a position exactly corresponding in all, is a zone of 6 feet in height, where the marble has been perforated by the Mytilus lithophagus.

"The perforations," says Mr. Forbes, "are of considerable depth and size, and therefore manifest a long-continued abode of the *Mytili,* and consequently a long-continued immersion in sea water. How this should have taken place it is most perplexing to explain. With regard to their present height above the sea, it is a singular fact, that the platform of the temple is about one foot *below* high water-mark, (for there are small tides in the Bay of Naples,) so that the sea water actually rises and falls at present in the building, being only 100 feet from it. It cannot possibly be imagined that the temple was built under such circumstances. There are, therefore, proved to be two *relative* changes of the level of the sea, which it is the business of the naturalist to explain. By losing sight of the latter change altogether, or by purposely giving it up as inexplicable, some writers have given a novel and ingenious speculation, but rather, we think, overshot the mark."

After weighing the different hypotheses which have been advanced to account for this remarkable fact, Mr. Forbes states the arguments *pro* and *con* the opinion which he adopts, viz. That the land was alternately lowered and elevated by earthquakes, and hence the *relative* level of the sea changed,—an idea entertained by the greater number of the older writers, and particnlarly supported by Playfair, as confirmatory of the Huttonian theory.

Analysis of Galena, from Castleland Hill, near Inverkeithing. By Mr. A. Robertson Jun. Inverkeithing.—*Ibid, p.* 256.

"The galena of Castleland Hill is partly massive, and partly in very regular octahedral crystals, some of them almost as large as a pullet's egg. It is contained partly in greenstone, partly in a quartzy sandstone, both belonging to the coal formation. It appears to have been disposed in a vein, not in a bed, or irregularly intermingled with the neighbouring rocks."

We can discover nothing new in this analysis, the statement of which is "sulphur 13.21, lead 84.63 = 97.84."

Naturgeschichtliche Reisen durch Nord-Afrika, &c. Travels in northern Africa and the west of Asia, from the year 1820 to 1826. By F. Hemprich and G. Ehrenberg. In 8vo. with Map and Plates in 4to. Berlin, 1828.—*Historical Part.*

This narrative of a journey is divided into eight chapters or sections :—journey from Trieste to Egypt; residence at Montenegro and Cattaro; mineralogical, botanical, and zoological description of the Cattaro, (the language of the country is Illyric; the natives have a well marked national character;) arrival at Alexandria; the pretended Pompey's pillar, by the Arabians called Amude; portrait of the pacha Mehemed Ali; preparations for a journey into the desert; excursion preparatory to the journey into the desert of Libya; on the Bedouins; journey in the desert of Libya, as far as Katabathmus Minor; journey to the Katabathmus Magnus of the desert of Libya; upon the traces of Paraetonium; journey to the base of Jupiter Ammon; departure from Suva; visit to a mountain of catacombs; mineralogical excursion to the *plateau* of the desert, north-east of Suva; description of the precipice of Kara, and of its buildings; departure for Masr and Kahira, after the opening of the Nile near Fuca; arrival at Boulack, suburbs of Caire. The large illustrated map contains the itinerary of the travellers. Mr. Hemprich died on the road, as well as eight other European companions. Mr. Ehrenberg, our readers will remember, is now gone with Baron Humboldt into the interior of Asia.

Zapisski izdavaïemouia Gossoudarstvennimme admiralteïskimme departamentomme. Memoirs published by the Imperial Department of the Marine.

Navigation of the Russian Sloop Apollo in 1821, 22, 23, and 24, under the order of Captain Toloubief. St. Petersburgh, 1826. Vol. X.

Navigation of the Sloop Ladoga in 1822, 23, 24. Vol. XI.

The first of these expeditions, whose object was to transport to Okhotsk and to Petropavlovsk different materials necessary for the fortification of these harbours, and to visit the Russian colonies situated upon the N. E. coast of America, presents nothing very remarkable in a scientific point of view. Captain Kroustchof, who took the place, in the command of the sloop Apollo, of Mr. Touloubief, deceased during the voyage, reentered the harbour of Cronstadt the 15th of October 1824, after a voyage of three years and seventeen days.

The voyage of the sloop Ladoga, under the orders of Lieutenant Lazarof, which took glace in 1922, 23, and 24, with similar objects, also offers nothing interesting to science.

Mr. Lazarof observes in his narrative, that, at his passage at Novo-Archangelsk, (New Archangell,) he did every thing in his power to discover the land, whose existence Commodore Behring thought he had ascertained the 12th June 1741, at the time when he was in latitude 49° north, and 172° 19′ west longitude of Greenwich; but that he discovered nothing in the south-east which could lead to the presumption that there was an island.

Notice of a large Greenstone Boulder in the Pentland Hills. By James D. Forbes, Esq.—*Edin. New Phil. Journ. No. XIV.*

This boulder was situated at the opening of a valley named Haw Dean, and lies, by the mean of two observations, at 333 feet above Mr. Forbes's room, (Colinton house,) which is 415 feet above the mean level of the sea. It is of highly crystallized greenstone, weighing about 200 weight, sp. gr. about 2.895 : no greenstone rocks occur within many miles. Being placed upon the actual declivity of a small but steep ravine, the author remarks thst it seems physically impossible that had that valley existed at the time of its journey, it should have been precipitated to the bottom of it. If it came from the last, it is not credible that it should have crossed the channel of the streamlet, aud ascended half way up the northern bank; and it is equally beyond explanation, that by any power short of a miracle, had it come from the west, the course of so enormous a mass should have come to a stand under the influence of the tremendous impetus, of whatever kind, by which it was moved in the middle of a short and steep descent of this description. From these facts, Mr. Forbes considers the induction undeniable, that the excavation of the valley must have taken place subsequently to the deposition of this boulder.

Memoir on the Geognostical Structure of the Mountain of Cassel. By M. J. Desmitter.—*Societé de Sciences Agriculturales et Arts de Lille.*

The formations of the mountain of Cassel, argillaceous in some parts, appear to be principally composed of sandy layers, either horizontal, or regularly inclined with the slope of the mountain. Their colour varies between white, yellow, and orange yellow. Some are mixed with pebbles of quartz, and friable stones of a deep red brown, formed of oxide of iron and agglutinated sand; others are strewed over with fossil shells, more or less well preserved. Deep beds are entirely composed of marine shells, united into an heterogeneous mass, often difficult to be broken. This formation is of a tertiary date. A superior sandy deposit evidently covers one of chalk, whose layers are, generally speaking, horizontal. A bed of plastic clay, unctuous, tenacious, and containing silex, covers in certain parts the chalky beds; and this clay sometimes contains radiated pyrites. The fossil shells which have been collected, are similar to the species found at Montmartre near Paris. At the foot of the mountain, more especially on the eastern side, we meet with numerous very perfect shells, which appear to be the product of a recent marine formation: their analogies have been found living in the British Channel.

Observations on the Monkeys of Sennaar, of Cordofan, and of Arabia; by Messrs. Hemprich and Ehrenberg. (Verhandlungen der Gesellschaft Naturforsch. Freunde in Berlin. Tom. I. Cah. 6.)

In the journey which Mr. Ehrenberg, and the late Mr. Hemprich, his companion, made in the north of Africa and the western parts of Asia, they met with the first monkeys in Africa at the 18th, and in Arabia in the 19th degree of latitude. They observed three species, the *Cercocebus saboeus*, the *Cercopithecus pyrronotus*, and the *Cynocephalus hamadryas*. The first species has been found wild in Darschakie, between the Sennaar and the Dongala. The *Cercopithecus pyrronotus* is a species unnoticed to the present day, nearly allied to the red patas of Senegal, but which is immediately distinguished by the superior brightness of its colours. A male individual of this species, which has been brought back from Dongala, is actually found in the menagerie of the king of Prussia, near Potsdam.

With respect to the *Cynocephalus hamadryas*, it appears that it has, through mistake, been considered, as two species,—the one, the baboon *Simia cynocephalus*, is nothing but the animal in his early youth,—the other, the *Simia hamadryas*, is only the male in the adult state. The author, who promises more complete details upon this subject, has seen with Mr. Hemprich, considerable troops of this species of monkeys in Arabia and in Abyssinia. They caught two adult individuals,—a young male, and they have brought home a young female alive, who is also in the menagerie of Potsdam.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

Royal Society of London—Nov. 19th. The meetings of the Royal Society commenced this evening; the President in the chair. Part of a long and able paper, from the pen of Mr. Faraday, on the manufacture of glass for optical purposes, was read. A folio edition, in five volumes, of the Catalogue of the King's Library, was presented by his Majesty, and other literary presents were made, for which thanks were voted to the donors.

Geological Society.—Nov. 6th. This Society held its first meeting for the season this evening; the President, the Rev. Adam Sedgwick, M. A. in the chair. An interesting paper, "On the Tertiary Formation of Gosau," by Roderick Impey Murchison, Esq. F. R. S. secretary, was read.

Linnean Society.—Nov. 2d. The first meeting of the present session took place this evening; A. B. Lambert, one of the Vice-Presidents, in the chair. There was a very full attendance of fellows.

A long paper was read on the parasitical connexion of *Lathræa squamaria*, and the peculiar structure of its subterranean leaves, by J. E. Bowman, Esq. F. L. S. Several beautiful illustrative drawings accompanied the communication. The author seems to consider that the absence of green colour, so common in parisitical plants, (for instance *Orobanche*, *Monotrapa*, and some others familiar to our botanical readers,) is to be attributed to the want of proper leaves.—Six gentlemen were admitted fellows; and seven others proposed. On the table lay a considerable number of valuable presents; amongst them, an extensive collection of plants presented by the East India Company. These had formed part of the collection brought to England lately by Dr. Wallich, superintendent of the Company's garden at Calcutta; there were also presented by J. W. Bennett, Esq. two cases, containing specimens of fish from Ceylon; together with various foreign works of literature and art.

15*th Session of the Helvetic Society of Naturalists, held at the Hospital of the Great St. Bernard, the* 21*st*, 22*d*, *and* 23*d of July* 1829.—The remarkable situation of the place in which the members met this year, was eminently favourable to the lovers of natural history, and all the intervals which occurred between the meetings and the repasts, which were held in common, were passed in research of the picturesque, or of objects of natural history.

About 100 persons were present; and, among the strangers, were Messrs. Leopold de Buch, Bouvard of the Board of Longitude of Paris, and Michaud, Member of the Royal Society of Agriculture of the same town.

Mr. Biselx, rector of Vauvry, in the absence of the President, Mr. de Rivaz, opened the meetings by an historical account of the Hospital, in which they were met, and announced that the government of Vallais had given the Society a sum of 600 francs French, and that a Cantonal Society of Natural History had been formed in Vallais.

Necrological notices were read upon two members which the Society had the misfortune to lose last year, Messrs. Meckel of Berne and Schæurer of Saleure.

Mr. Horner of Zurich made a communication relative to the meteorological observations which have been carried on for the last three years in various parts of Switzerland.

Mr. Ebel informed the Society, that the commission charged with the analysis of the thermal waters of Switzerland, has not finished its labours, but that they will be presented in the meeting of 1830.

Dr. Mayer of Lausanne described a bed for moving diseased persons.

Mr. de Charpentier read an itinerary of the road from Bex to the Great St. Bernard, with geological and botanical observations.

Mr. Leopold de Buch presented a map of the formations comprised between lake Orta and Lugano.

Mr. Gaudet de Neuchatel, gave some interesting descriptions of the plains at the northern foot of the Caucasus.

Mr. Bouvard read a memoir on the diurnal variations of the barometer.

Mr. Usteri presented to the Society a memoir of Mr. Hegetscheviler, on the *Phyteuma orbiculare* and *P. betonicifolium.*

Mr. Baup of Vevez announced, that a great number of experiments had shown him that the weight of the atoms of simple bodies, are exact multiples of each other.

Professor Gautier of Geneva, gave some details on the observatory which is about to be constructed at Geneva. He announced the publication of a Meteorological Journal at Yverdun, and read a memoir of Mr. d'Hombres Firmas, on Meteorology.

Professor Aug. de la Rive of Geneva, stated that the results of some observations on the dip of the needle, made by Professor Gautier and himself at Geneva, and at the Hospital, seem to indicate that, independently of the difference of latitude, the dip would be less at the convent of St. Bernard than at Geneva.

Mr. de la Rive laid before the Society some instruments for measuring the intensity of radiation, and others for ascertaining the little quantities of electricity, and more particularly of atmospheric electricity. It resulted from some observations made on the St. Bernard, that the intensity of radiation is much greater there than at Geneva, nnd that atmospheric electricity is almost imperceptible.

Mr. Lardy of Lausanne, read a memoir on the geognostic constitution of St. Gothard.

Mr. Venetz, engineer of the canton of Vallais, read a memoir on the transportation of glaciers, and on the phenomena to which these discharges give rise.

Mr. de Luc read a memoir on the fossil shells of the valley of the Reposoir.

The Rector of Sion read a very extensive paper on meteorological observations in general, and more particularly on those of the barometer.

Mr. Michaud laid before the Society a specimen of the wood of the Planera crenata, a tree which grows on the banks of the Caspian Sea, and which appears, by its elasticity and tenacity, to be superior to the elm and the ash.

St. Gall was chosen for the place of meeting of the Society in 1830, and Dr. Zollikoffer was named president for the same year.

Northern Institution.—(From the Inverness Courier of 30*th October*, 1829.*)* —The Annual General Meeting of this Society was held on Friday last, Captain Fraser of Balnain in the chair. The following gentlemen were elected ordinary members :—The Hon. Col. Grant, M. P. ; J. A. Robertson, Esq. W. S., Edinburgh; J. B. Fraser, Esq. younger of Relig, (author of " Travels in the Himăla Mountains"—" Kuzzilbash," &c.) Sir Francis Mackenzie of Gairloch, Bart. Office-bearers were also appointed for the ensuing year, his Grace the

Duke of Gordon President; after which Mr Anderson, the able and indefatigable secretary of the institution, read a report of the Society's proceedings for the previous year, embracing also a sketch of the general progress of science during the same period. The Society's proceedings were duly chronicled at the dates of the various meetings, and we need only say here, that they all tended either to familiarize the student with the wonderful works of nature, or to illustrate the history and antiquities of Scotland.

The following donations were announced and exhibited by the secretary :—

Two large scorpions found in a garden at Hydrabad, East Indies, and two dresses worn by the Indian Carian women, a mountain tribe in Burmah.—From Miss Atkins, London, through Dr Nicol.

File of the *Canton Register.*—From James Matheson, Esq. Canton, late vice-consul for Britain.

Collection of insects from the Mauritius, with a beautiful assortment of shells from the tropical seas, petrified wood, and volcanic and other productions from Mauritius and New Holland.—From Miss E. Baigrie, Mauritius, through Miss Bethune, Ness Bank.

Very large snout of the saw-fish from the coast of Africa.—From Lieut. Col. Findlay.

Bar of Silver.—current coin of the kingdom of Candy in Ceylon.—From Mr. H. Falconer, Forres.

Vegetable impression in coal. Iron battle-axe found in the island of Skye, and edition of Terence, published in 1560.—From Mr Robert Macpherson, Murray Place, Inverness.

Communication from Professor C. C. Rafn, secretary to the Royal Society of Northern Antiquaries, at Copenhagen, with notices of the Society's transactions, and plates of ancient Scandinavian armour, &c. &c.

Geological Collection.—Rocks of the neighbourhood of Heidelberg, Germany. —From Professor De Leonhard, Heidelberg, to the general secretary, and by him made over to the Institution.

Ancient hand-mill, supposed from its shape and small size to be Roman, from Loch Leven, Argyleshire.—From Captain Macintyre, Marine Cottage, near Inverness.

Series of specimens, chiefly from the metallic districts of England and Norway.—From William Hutton, Esq. Newcastle.

Dried specimens in flower of the Linneæ Borealis, found on the Knock of Alves, near Elgin, by the donor.—From Mr Wilson, schoolmaster of Alves.

Series of dried plants (rare) found in Sutherlandshire in summer 1829.—From Dr Robert Dickson, London.

Two specimens of the rattlesnake and reptiles, from Demerara, and nests with eggs of a species of humming bird.—From Mr Maclennan, Glasgow.

Sketch of an ancient carved stone in Kinbeachie Cottage. Resolis, representing the arms of Sir Thomas Urquhart of Cromarty, 1651. The stone is 5 feet long by 3 feet broad.—From Geo. Mackenzie, Esq. Dingwall.

Specimen of the great northern diver, killed at Ardcronie near Bonar Bridge, on the Dornoch Frith.—From Captain Mackenzie, Ardcronie.

Burmese map of the river Irrawaddy, by which the British forces advanced to the capital of Ava; Madras silver and copper coins; Indian gods, shoes, and models of domestic utensils.—From W. Mackenzie, Esq. Drynie.

Hillhouse's map of British Guiana, published in 1828.—From George Ross, Esq. Demerara.

Case of fresh water fish from British Guiana, beautifully preserved.—From R. Mackenzie, Esq. Demerara.

Two urns found under cairns on the estate of H. Rose, Esq. Glastullich.—From Mr Lawson, Ballimore, near Tain.

Several books have also been presented to the Society on geology, &c. including some scarce old works, and altogether we may congratulate the members on the rich additions made during the summer to the stores of the institution.

Society of Arts.—Nov. 4th, Mr. Hobly in the chair.—This evening the first meeting of the season took place. The Marquess of Northampton was elected a member; thanks were voted to Mr. Peel for obtaining certain bills, votes, and papers, of the House of Commons, chiefly connected with commerce, manufactures, and the arts, for the use of the Society. A great variety of communications from competitors for the Society's premiums were read; amongst them was one for a glass clock. These were generally referred to the respective committees. Baron Ferusac, director of the bulletin Universel, made an application, requesting the Society to take some shares in the literary scheme he is at present attempting to establish in Paris. We understood the Society to decline the baron's request. This meeting being of the old series, no original paper was read by Mr. Aikin.

Royal Physical Society.—*November* 3*d*, 1829. The Society was opened with an introductory address from Mr John Deuchar, the president, in which he took the opportunity of tracing the recent important results to which the enthusiastic exertions of its members had led. During the summer session of 1828, no less than 72 new members were introduced. During the succeeding winter, 63 gentlemen were added to the roll, from many of whom important papers and notices of discoveries in science had been received, from which numerous extracts have appeared in the different philosophical journals.

Mr. Henry H. Cheek read a paper on the Natural History of the *Dugong*, (Halicore Indicus, Desm.) the Mermaid of early writers; and particularly on the differences whlch occur in its dental characters. (Vide. Jour. of Nat. and Geog. Science, vol. i. No. 3, p. 161.)

November 10*th*. Donation of a course of the French Language, by Mr. Theodore Le Clerc, and a collection of shells from the county of Kent, by a Lady, through Mr Wotherspoon, were made to the Society. Captain Brown, F. R. S. E. exhibited elegantly coloured drawings of the three stages of the plumage of the Paradise Bunting, from a living specimen now in the possession of Sir Patrick Walker of Drumsheugh.

Mr. Hunter exhibited a drawing of the Quizel, from North America.

Mr. William Ainsworth read part of his Essay on the history of Uncultivated Tracts in connection with the dispersion of Man.

November 18*th*. Mr. William Ainsworth made a communication on the Prismatic Form in Mountain Rocks, with specimens.

Mr. Wotherspoon, F. S. S. A. read an Essay on the derivation of the Human Race from a Single Pair.

In consequence of the Meetings of the Plinian Society (devoted to pursuits similar to those of the Royal Physical Society) taking place on the Tuesday evenings, the Society assembled in their Hall on the evening of Wednesday the 18th, and will continue to meet on the same evening during the session.

Plinian Society.—The first meeting for the session of this Society took place on Tuesday, Nov. 16th, when Mr. Balfour, after congratulating the members on its flourishing condition, the rapid progress it has made, and the prosperous state of its finances, proceeded to communicate to the Society, from the Rev. George Gordon, a new locality for that very rare and interesting plant, *Pyrola Uniflora*. It was gathered by John Lawson, Esq. in the Oak Wood near Elgin and not far from the Knock of Alves, where another botanical rarity, the *Linnæa Borealis*, was discovered last year.

Mr. Robert Spittal then read a paper upon the analogies existing between the animal and vegetable kingdoms.

November 17*th*. Mr. Wilson announced the discovery of a new habitat in Scotland for the *Acorus Calamus*. It was only lately known to be an inhabitant of this country, and was found by Mr. W. near Ayr.

MISCELLANEOUS INTELLIGENCE.

Glasgow.—On the 17th day of November, the election of Lord Rector of the University took place. The candidates were the Marquis of Lansdowne, Lord President Hope, and Lord Moncreiff. The state of the votes in the four nations being announced, was as follows :—Glottiana, Marquis of Lansdowne ; Loudoniana, ditto; Transforthiana, Lord President Hope ; and Rothsiana, Marquis of Lansdowne.

Sinking of Lands.—On the 15th day of October, at Lausanne, in Switzerland, on the western slope of Mont Bloney, a pasture ground suddenly sunk to a depth of from 8 to 10 feet, and an extent of 300, to the boarders of the Beveyse ; a new chalet of 80 cows built on this land also fell in, and the roots of a number of trees were all laid bare. On tho same day on the eastern slope, crevices and rents of from 15, 20 to 50 feet were formed, chalets and huts were rent and divided, and the sinking of the lands extended to the bay of Clareus.

Paris.—M. de la Martine has been elected to the Academy of Paris, in the place of Count Daru ; his opponents were M. de Segur, Azaïs, David. The place vacant by the death of Mr Pelletan, has been filled by Mr Larrey. The decoration of the Legion d'honneur has been given to Dupuytren and Magendie.

Necrology.—George Leonard Hartmann, known by many zoological writings, and more especially his Natural History of the fishes of Switzerland, died at St. Gall, the 16th of May 1828.

Mr. Barnes of a New York, skilful observer, and known by many works on the shells and reptiles of America, died at the latter end of October 1828. He was one of the founders of the High School of New York.

At his residence in the Strand, died Mr John Mawe, author of Travels in the Interior of Brazil, &c. of Lessons on Mineralogy and Geology ; of a Treatise on Diamonds and several Introductions to Conchology. Mr. Mawe was one of the most active collectors of shells and minerals that England possessed ; his correspondence with the Continent was constant and active ; his extensive connection with Derbyshire gave him a great command of the mineral and fossil productions of that interesting county, and after a long life of honourable and succesful exertion, usefully engaged in literary and scientific pursuits, he has departed with the respect, esteem, and the regard of all who knew him.

Travellers.—Mr. Isidore Geoffroy St. Hilaire, informs us that Mr. Dessalines d'Arbigny, known by his researches on the microscopic cephalopoda, and who is now in South America, is about to visit Patagonia. The Museum at Paris is expecting objects sent by him from Buenos Ayres. Mr. Champollion and his companions, and also the Tuscan portion of the Egyptian expedition, are on their way home to France.

Meeting of the German Naturalists.—The annual meeting of the German Naturalists took place at Heidelberg on the 16th, 17th, and 18th day of September last. Dr. Duncan, Professor of Materia Medica in this University, was there, and has given us an interesting narrative of the proceedings. We regret that want of space prevents us from noticing them in this number, but we hope to give an account of the essays, &c. in our next. The meeting, for the ensuing year, is appointed to be held at Hamburg.

The United Siamese Twins.—The Siamese twins left New York on their way to London direct, on the 31st of last month. The colour of their skin and the form of their faces point them out at once as belo nging to the Chinese race. They have high but narrow foreheads, and are below the middle height. There is a striking resemblance between them at first sight; but, on examining them closely, a great difference is observable. Both are lively and intelligent; they pay much attention to what is passing around them; and are very grateful for anything that is done for them. As a proof of their intelligence, it may be stated that they learned to play at draughts very readily, and were soon able to beat those who had assisted in teaching them. They appear to have a great affection for each other; and so far from looking upon their extraordinary position with regard to each other as a misfortune, they always seem to attach an idea of happiness to it.

Each has a name of his own—the one, *Chang*, and the other, *Eng;* but when persons wish to address them as one—to claim their attention to any thing, for example, or to call them—they are addressed as one, *Chang-Eng.*

The point most worthy of remark, in regard to their actions and movements, is, that they seem, generally speaking, to be actuated by but one will; and that, from whichever of them the volition of the moment may proceed, it seems imperative on both. Now and then, however, an exception offers itself to this remark—as, on the voyage from Siam to the United States, when one of them wanted to bathe, and the other refused on account of the coldness of the weather; and they had a quarrel on the subject.

It is stated that they never consult together as to their bodily movements, and yet never appear in the slighest degree to embarass each other by anything like opposing wishes or volition. It is another most remarkable circumstance, too, as stated by Dr. Warren, of Boston, who was officially appointed to report on them, that he has *never heard them speak to each other*, though they are very fond of talking with a young Siamese, who has been brought with them as a companion.

Cultivation of Maize.—It is stated in the annals of the Horticultural Society of Paris, that the white maize of China, although it produces a smaller grain than the maize of Pennsylvania, which has been hitherto much cultivated in France, yields more abundantly, and gives a much finer flour. Some Chinese maize sown in the south of France during the present year, is stated to have turned out very well, notwithstanding the badness of the season.

Iron Shipping.—An *iron* vessel was last week launched at Liverpool, and not only looked handsome, but floated buoyantly on the water. It is intended for the Irish inland navigation.

The Weather at Naples.—The Gazette of Naples says, that on the first of October the heat was such that it would have been considered as extraordinary in summer, even in that climate. The thermometer rose to 26 degrees of Reaumur.

Zoological Society.—The death of a male ostrich, which had been for some time in the collection of the Marchioness of Londonderry, and subsequently presented, with other valuable animals, to the Zoological Society, has afforded an opportunity, which rarely occurs, of examining the internal structure of that extraordinary bird, in comparison with that of man and other animals. The Society, we are informed, has also received from India the body of a female orang-outang, which has recently been sent over in spirits by George Swinton, Esq. a corresponding member of the Society.

Newcastle Natural History Society.—If it were only on account of the amiable qualities and universal sympathies which it calls forth, Natural History is certainly deserving of the cultivation of every one who desires the moral and intellectual improvement of our nature. Let an individual only be seen capturing a butterfly, even with his hat, or even labouring amongst the broken heaps of stones by the road side, and he is immediately the acquaintance and soon the friend, of every naturalist who passes by. We are excited to these recollections from the polite attention we have received, as a stranger, from several of the members of the Newcastle Natural History Society, during a late excursion to the coal district of that neighbourhood. In our next number we shall give an account of this Institution, which ranks, in point of talented members, amongst the first of our provincial societies.

LITERARY NOTICES.

Works in the Press.

We understand that a Posthumous Volume by the late Mr. Alexander Balfour, Author of "Campbell," "Contemplation and other Poems," "Characters omitted in Crabbe's Parish Register," &c. &c. is in the press, and will be published in December. It is to be entitled "Weeds and Wildflowers," and prefaced by a Biographical Sketch of the Author, with Selections from his Correspondence, and Original Letters from Sir Walter Scott, Dr. Robert Anderson, Delta, Mr. Pringle, Mr. Mudie, Dr. Brewster, &c. &c. The whole free profits of the publication are intended for the Author's family. It will form a handsome post 8vo.

An Historical and Topographical Atlas of England and Wales, exhibiting its Geographical Features during the Roman, Saxon, Danish, and Norman Governments, is preparing by Thomas Allen.—Mr. Colburn has in preparation Travels in South America, across the Pampas, and in several parts of Peru, including a residence of Twelve Months at Potosi; by Sir Edward Temple, 2 vols. 8vo.—Travels in the East; by John Carne, Esq. 1 vol. post 8vo.—In the Press, Delineations of the North-Western Division of the County of Somerset, with a Descriptive Account of the Antediluvian Bone Caverns in the Mendip Hills, and a Geological Sketch of the District; by John Rutter.

List of New Books.

Wallich's Plantæ Asiaticæ, No. I. coloured, L. 2, 10s. bds.—Hooker's Flora Boreali Americana, No. I. L. 1, 1s.—Collins' Emigrants' Guide to the United States, 12mo. 3s. 6d. bds.—Recollections of Italy, 4to. L. 1 : 11 : 6.—The Botanical Miscellany, No. II.; by Dr. Hooker, 10s. 6d.—Murray's North America, 2 vols. 8vo. L. 1, 7s.—Rose's Four Years in South Africa, 8vo. 10s. 6d.—Higgins on Sight and Optical Instruments, 8vo. 7s.—Richard's Elements of Botany, by Clinton, 8vo. 14s.—Thompson's General Classical Atlas, folio, L. 8, 8s.—Mr. Rhind's Studies in Natural History, 1 vol. 8vo.—The British Naturalist, 18mo. 8s. 6d.—Landseer's Animals, Part I. 4to. 9s.—Williams' Geography of Ancient Asia, 9s. 6d.

ERRATA.

In the last Number,

Page 198. Line 34. *for* Anales de Ciencias, *read* Ann. de Sciences.
—— 156. —— 18. *for* Jarbiue *read* Jardine.

W. Cartwright, Printer, Edinburgh.

THE

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OF

NATURAL AND GEOGRAPHICAL SCIENCE.

JANUARY 1830.

ORIGINAL COMMUNICATIONS.

ART. I. *Observations on a Collection of Birds lately received from Madeira, with the Description of some New Species from that Island.* By SIR W. JARDINE, BART. F. R. S. E. F. L. S. M. W. S. &c. &c.

THE zoology and natural history of Madeira is at present comparatively little known, and the late political insurrections have rendered the endeavours of several individuals of little use. I believe some foreign naturalists have, to a certain extent, explored the island, aud at present Mr. Lowe from this country is making researches with the view of illustrating its natural history. Independent of these, there are several resident scientific gentlemen, but few of their observations have yet reached us. Mr. Lowe has communicated some valuable plants, which have been partly published by Drs. Hooker and Greville, in their elegant *Icones Filicum,* and one species *(Gymnogramma Lovei)* is dedicated to that gentleman. Dr. Heineken has made some observations on the birds and meteorology; and Dr. Renton has been engaged in researches on the climate of the country. For the present collection I am indebted to the kindness and attention of my friend, W. T. Carruthers, Esq. of Dormont, who unhappily arrived at the very commencement of the late struggles, by which both the collection and the notes accompanying it were much curtailed. I am also indebted to the Rev. Mr. Bulwer for several specimens from the same island. Some species from both these collections I have been unable to make out in any of our modern publications, and have little doubt of their being yet undescribed; while others being birds of our own country, some our summer birds of passage, and remaining in the island through the year, have an interest attached to them connected with their migrations and geographical distribution, which gives a value to any information that can be obtained regarding them.

1. *Buteo vulgaris,* Common Buzzard.—A male, and not varying from the dark-coloured specimens of Europe: common on the south side of the island.

Note. The common kestrel often frequents the gardens. Common sparrowhawk also met with.

2. *Aluco flammea,* Flem. Common White Owl.—Received from Mr. Bulwer.—The whole plumage with a very tawny tinge, as sometimes occurs in the young of the year in this country. Under parts are dull ochre yellow, with numerous black spots.

Note. Mr. Carruthers also mentions the occurrence of this species, with another which he thinks is our tawny or brown owl, *Strix Stridula,* Flem.

3. *Cypselus murarius,* Common Swift.—The specimen, a male, was shot in April. Has the throat pure white, and the upper parts of a pale pitch black, with a greenish reflection; the feathers on the head and rump tipped with a still paler tinge. The breast, belly and vent are darker, the feathers tipped with nearly pure white. Remains in the island during the whole year.

Note. The swift, on its arrival in this country, generally has the plumage of a deeper and more glossy appearance; but before leaving us, and as the moulting season approaches, the feathers become of a paler shade. This is the case, I believe, with the plumage of all birds previous to the moult; when the feathers have performed their duty, and the juices are of necessity withdrawn for the support of others, the same gloss and beanty cannot be kept up. The young of the first year have the feathers of the upper parts tipped with a paler tinge, and the throat nearly pure white.

4. *Cypselus unicolor, mihi Spec. Nov.*—This is mentioned by Dr. Heineken, in his *Observations on the Birds of Madeira,* published in Dr. Brewster's journal, with the description of the common swift, from which it is certainly different, and I cannot find any described species agreeing with the specimen in my possession. According to Mr. Carruthers, it differs in its habits from the species of this country, feeding lower, and hunting the outlets of rivers, like the common swallow. The cry is nearly the same, but not so noisy or incessant as that of *C. murarius,* and it is more abundant.

C. unicolor, Mas.—Corpore nigrescente-viride, gula pallidiore, abdomine leviter fusco fasciata.

Long. rostro ad caudem 6¼ polls. alarum 6 polls. lat. 13 polls.
Hab. Madeira.

The whole plumage of a uniform dull black, with greenish reflections. The throat and upper part of the breast slightly paler. The species to which it approaches nearest is the Indian Swift of Latham; in this the size is not mentioned, and the tail is said to be scarcely forked; in the present the fork extends to one inch and a quarter. (See Plate VI.)

5. *Curruca atricapilla*, Black Cap.—Very common in the gardens and shrubberies. They are found during the whole year; but it is probable that a partial annual migration takes place to and from the island.

Long. Maris 6 polls. Fæm. $6\frac{1}{4}$

6. *Curruca Heineken,* mihi Spec. Nov.* Dr. Heineken's Black Cap.—The first discovery of this bird is I believe due to Dr. Heineken, and, at the request of Mr. Carruthers, I have named it in honour of that gentleman. The species is common, but not so abundant as the preceding, of which, by the natives, it is considered only a variety. This, however, is inadmissible. The markings are very distinct, and continue the same in different individuals; the dimensions also vary.

C. Heiniken, Mas.—Corpore olivaceo, capite, nucha, gula pectoreque nigris.

Long. $5\frac{1}{2}$ polls.

C. Heineken, Fæm. ?—Corpore olivaceo subtus pallidiore, gula genisque griseis, vertice castaneo.

Long. $5\frac{3}{4}$ polls.

Hab. hortis, arbusculis Madeiræ.

In the male, the head, back of the neck, cheeks, throat, and breast, are deep black, shaded into a uniform oil green, which covers the other parts of the bird; slightly paler beneath, and of a much yellower tinge than the common species. The female brought by Mr. Carruthers, closely resembles that of *C. Atricapilla,* except in being more olive-coloured on the back; and the characters of this, as the real female, are given with some doubt, several of both species being in the same tree when the one in question was shot. They remain during the whole year.

Note. Motacilla boarula, Grey Wagtail, is mentioned as met with during the whole year. *Sialia ? rubicula,* Common Red-breast, was met with abundantly in several parts of the island.

7. *Anthus pratensis,* Common Tit-Lark.—On the dry, level grounds; the specimens sent appear to have been killed in the summer or spring season. The bill is a little longer and more slender, but the differences are so slight, as hardly to entitle a distinction of species.

Note. Mr. Carruthers observed another species, which he was unable to procure or determine.

8. *Passer petronia,* Ring Sparrow, Lath. said by Mr. Carruthers to build on the house-tops, and also on the rocks: abundant, and having the same chirrup with the common sparrow. The real country of this species seems to be Italy and the southern counties of France, there, to a certain extent, taking the place of *F. domestica,* the geographical distribution must be rather extensive, and Madeira may be almost called the most tropical limit.

* *Cypselus unicolor* and *Curruca Heineken* will be figured in the Sixth Part of Ornith. Illust. by Sir W. Jardine and P. J. Selby, Esq.

9. *Linota? canaria, Mas.*—Infra olivacea nigro striata, uropigio flavo; subtus flavescente-viridi, hypochondriis nigro striatis.

Fœm.—Obscurior, subtus nigro striata.

This curious and beautiful species has the upper parts of a pale greenish yellow, the head with very narrow darker striæ, the back, with the centre of the feathers broadly marked with black, and the rump bright yellowish green; the under parts are of the same colour, paler as approaching the tail, and, with the flanks, longitudinally striated with black. The wings and tail are nearly black, with pale edges.

I have been thus particular in the description of the individual brought home by Mr. Carruthers, from the general idea we have of the canary as we see it in a state of confinement in this country. In its native countries, which have a considerable range, we always find it as in the characters now given, and also without any notes peculiarly famed for their melody or sprightliness. Domestication appears to act almost immediately on them in changing the colour of the plumage, and in after breeding the change appears to be kept up. Their notes are the fruits of tuition, being very different from those in a natural state. In Madeira they are found in flocks, and frequent the gardens; in a wild state they never change the colours except by a very accidental variation.

Note. Mr. Carruthers mentions the common chaffinch as stationary during the year, and also our common linnet.

10. *Columba Trocaz,* Heineken.—This species is described by Dr. Heineken in a late number of Dr. Brewster's journal as new, and I certainly have been unable to make it out, either in Temminck's *Pigeons et Gallinaces,* or in Wagler's *Systema Avium,* It may be thus characterized:

C. trocaz, Mas.—Corpore plumbeo, pectore, superiore abdominis vinaceis, cauda nigra medio plumbeo fasciata.

Fœm.—Coloribus obscurioribus.

Long. Maris circiter 19 polls. Fæm. 18 polls. Lat. 30 polls.

Hab. sylvis Madeiræ.

Note. Mr. Carruthers has noted the common blue rock pigeon, and another very similar, which he could not ascertain; also the common wood pigeon of this country. The turtle-dove is an occasional but rare visitant.

11. *Coturnix vulgaris,* Common Quail. — The specimen sent was a female, and not differing from those killed in this country. In Madeira they are very abundant, and are brought plentifully to the markets. They migrate partially about the island, but remain in it for the whole year.

Note. One of the *red-legged partridges* is found, but no species was sent with the present collection. From the description given by Mr. Carruthers, it seems most probably *Perdix petrosa* (Francolinus petrosa) of modern ornithologists.

12. *Sterna Dougalli,* Roseate Tern.—Received from Mr. Bulwer.—Does uot differ from those of this country.

13. *Procellaria Bulwerii,* Bulwer's Petrel. — Received from Mr. Bulwer, figured in "Illustrations of Ornithology" by myself and Mr. Selby, and there described as a new species. We have still been unable to find any thing with which it agrees, and it may at once be distinguished from those described, by the elongation of the two centre tail feathers.

14. *Procellaria Leachii,* Leach's Petrel.—One specimen sent by Mr. Bulwer, in very good preservation, and afforded all the characters of the species.

Note. Dr. Heineken, in a short paper on the birds of Madeira, mentions the *Procellaria Bulwerii* as closely allied to a species described by him, but to which it certainly cannot be referred. His species has the tail forked, *P. Bulwerii* has it elongated in the centre. Neither can it belong to the smaller fork-tailed species, being entirely of a uniform black, and I can find none bearing according characters: it must therefore stand as new, and will be the *Procellaria Anjinho,* HEINEKEN.

ART. II. *Account of the Series of Islands usually denominated the Outer Hebrides.* By WILLIAM MACGILLIVRAY, A.M. &c.

Section I.—Introductory Sketch of the Outer Hebrides.

PERHAPS no extensive portion of Great Britain has less attracted the attention of the more civilized and densely populated parts of that country than the Outer Hebrides, which few travellers have visited, and respecting which the only information of importance that we possess, is to be found in Sir John Sinclair's Statistical Account of Scotland, Dr. Walker's Economical History of the Hebrides, M'Donald's Agricultural Survey, and the writings of Dr. M'Culloch. Yet these islands, constituting a range having a longitudinal extent of 130 miles, varying in breadth from 15 miles to a few yards, separated only by narrow channels, and presenting a great similarity in geological structure, soil, and productions, are peculiarly interesting in many important points of view. They form the abode of a race of people, among whom the purest vestiges of ancient Celtic manners and customs still linger,—they constitute a district of themselves completely separated from all others,—amid all their sterility and gloom, they afford facilities for the establishment of fisheries and manufactories not possessed in a greater degree by any other portion of the kingdom; and to the naturalist they present a field of observation, hitherto less explored than many of the islands of the Indian Archipelago or Southern Ocean.

The Inner Hebrides, which are daily becoming more known to the public, lie along the western shores of the northern and middle divisions of Scotland, like so many disjected fragments of the mainland, or like portions of some primeval continent, isolated by the irruption of a mighty flood that has retained its new level. Beyond these, and separated from them by a channel, varying in breadth from 15 to 40 miles, are extended the Outer Hebrides, forming a range of islands consisting of five principal masses, and a multitude of islets of all forms and dimensions, from conical to flat, and from the diameter of three or four miles to that of a few yards. The direction of this range is from north-east to south-west. It is bounded on the east by the Minch, on the west by the Atlantic Ocean. The principal islands are the following: Lewis and Harris, which form the northernmost island, North Uist, Benbecula, South Uist, and Barray. Each of these islands has in its train a multitude of satellites, which, however, occur principally in the channels by which they are separated. These channels are the Sound of Harris, which separates the district of that name from North Uist, the North Ford, between the latter island and Benbeculn, the South Ford, between Benbecula and South Uist, and the Sound of Barray, between South Uist and the island of that name. At low water there are in fact only two channels, and consequently only three islands; for the sands between Benbecula and the two Uists are then dry, and a passage is obtained on foot from North Uist to South Uist. The Sounds of Barray and Harris, however, are never left dry, although there is not in general great depth of water in them. Perhaps from this circumstance, together with the rectilinear direction of the range, these islands collectively have received the denomination of the Long Island.

Having in view to speak particularly of the extent of each of the principal islands, in a subsequent part of the series of papers intended to be submitted to the public on this subject, I shall at present confine myself to some general observations, tending to afford an introductory view of the whole range. A great portion of these islands is mountainous. In Lewis there are four principal groups, of which one is a ramification of the Harris mountains. Harris is entirely mountainous, and consists of two ranges, one running across the general direction of the islands, the other parallel to it, and forming the southern portion of that district. In North Uist there are two ranges of inferior elevation. Benbecula has a large but low hill in its central part. South Uist, in a great part, consists of an elongated group; and Barray, like Harris, is entirely mountainous. Some of these mountains are of great elevation. Hecla, or more properly Eachcla, in South Uist, and Clisheim in Harris, which are the loftiest, appear to be considerably upwards of 3000 feet, and many of the Park and Uig mountains in Lewis, and especially those of the Forest of Harris, are little inferior. These mountains possess the common characteristics of extreme ruggedness and sterility. There could hardly be a more perfect picture of desolation than that which the Harris and Lewis hills present from the Minch. The total absence of wood, however, and the uniformly bare and dreary aspect which these mountains exhibit, deprive them of the picturesque features which one might expect to find among them. Yet in the Forest of Harris, there are scenes hardly surpassed in grandeur in any part of Scotland. The Pass of Miavag presents a precipice 1000 feet in height, and in the Glen of Ulladil there is a rock of not much less elevation, perhaps one of the finest masses to be seen in the kingdom. From the geological nature of these islands, however, there are comparatively few precipices in them of any great elevation; and rounded outlines, with only occasional ridges and crests, and some corries, or rounded excavations, are all that present themselves. Yet in a humid climate like this, where the clouds exhibit every diversity of form and elevation, one may easily imagine what magic effects they produce upon the landscape.

A considerable portion of Lewis, the greater part of North Uist and Benbecula, and much of South Uist, consist of low swampy ground, covered with peat moss. The whole eastern parts of the islands, participate more or less of this general character. The coasts there are rugged in the highest degree, but they are rarely precipitous, although in a few places rocks of great elevation are seen. They are greatly indented by lochs and creeks, and present multitudes of small islands, the principal groups of which occur off the northern portion of Harris, in the mouth of the sound of that name, between North Uist and South Uist, and about the island of Barray. Hardly any beaches or sands are met with on this part of the coast. But along the whole of the western coast, which is generally lower, there extends a belt of sand, interrupted by tracts of rocky coast, forming the bottom of thc sea, extending into the sounds, and constituting the numerous fords which present themselves upon this coast. This sand will form the subject of a separate section.

Along the whole of the eastern coasts, there are excellent harbours and anchorages in abundance, of which the more remarkable are the South Loch of Stornoway in Lewis; the harbonrs in the parish of Lochs in the same district; those of Scalpay and East Loch Tarbert in Harris; Loch Maddy in North Uist; Lochskiport, Lochunort, and Lochboisdale, in South Uist; Ottirvore, Flodday Sound, Tirivay, Kisamul Bay, and the harbour of Vatersay, in Barray. The western coasts, on the contrary, present very few safe harbours, in this respect resembling the eastern coasts of Great Britain as compared with the western. In Lewis, however, there are several excellent harbours on the west coast, of which those furnished by Loch Rog may be particularly noticed.

The predominant soil is peat, which upon the mountains occur only in patches, but in the lower grounds covers large tracts continuously to a great depth. The vegetation of this soil consists principally of heath, carices, and eriophora, with lichens and mosses. These islands may, in a general sense, be said to be destitute of wood, although, botanically speaking, this statement is by no means correct, the number of ligneous vegetables, exclusive of willows and such diminutive shrubs as the Arbutus, Vaccinium, Rosæ,

&c. amounting to nearly twenty. The few trees that occur, are chiefly found in the beds of torrents, and in islands in lakes, as well as sometimes on the rocks of the interior.

Perhaps the most singular feature in some of these islands, as in North Uist more particularly, is the astonishing number of lakes. In the eastern part of that island, one would be puzzled to determine whether land or water predominated. This is equally the case in the lower parts of South Uist, Benbecula, and Lewis, and even along the eastern coast of Harris, although in the latter district the ground is nowhere low to any great extent. Some of the lakes are of considerable dimensions. The largest is Loch Langavat in Lewis, which is upwards of ten miles in length, and singularly tortuous. But, contrary to all our ideas of lake scenery, the lakes of the Outer Hebrides, instead of giving beauty, add to the gloom of the landscape. Their sullen, dark brown, opaque waters, presenting the idea of unfathomable and mysterious depth, excite au undefined feeling of dread. No difference is in general exhibited between their marginal vegetation and that of the surrounding heaths; and the only remarkable appearances which they present in this respect, are a few stunted shrubs, some green islands which owe their verdure to the fertilizing effect of the excrements of sea-birds which nestle upon them, and the frequent patches of Nymphæa alba, and sometimes of Nuphar lutea, which are seen floating upon them, intermixed with carices, scirpi, and potamogetons. They are, however, abundantly stocked with excellent trout of numberless varieties, among which some future ichthyologist will find a rich harvest.

Of running water there is also abundance in all parts, although in summer the streams dwindle into very insignificant stripes; and although springs are sufficiently numerous, they are rarely of large size. Many of them are chalybeate. Hardly any of the streams are so large as to deserve the name of rivers: yet by those which attain any magnitude, although only periodically, salmon and sea-trout make their way to the lakes in great quantities. Many of them are abundantly stocked with pearl mussels, *(unio elongata.)*

The soil of the western side of these islands is greatly superior to that of the eastern, owing to the intermixture of sand; and along the shores, where the soil is sandy, the vegetation exhibits the greatest luxuriance and diversity. In no parts of Britain, perhaps, are there so beautiful pastures as along the western coasts of the Outer Hebrides. But this beauty endures only for a few months, and from October to June little else is to be seen than a dreary wilderness of drifting sand.

The climate is subject to great variations. It is, however, generally characterized by its great dampness. In every part of the range iron is covered with rust in a few days, and finer articles of wooden furniture, brought from foreign parts, invariably swell and warp. Spring commences about the end of March, when the first shoots of grass make their appearance in sheltered places, and the

Draba verna, Ranunculus Ficaria, and Bellis perennis, unfold their blossoms. It is not until the end of May, however, that in the pasture-grounds the green livery of summer has fairly superseded the grey and brown tints of the withered herbage of winter. From the beginning of July to the end of August is the season of summer. October terminates the autumnal season. During the spring easterly winds prevail, at first interrupted by blasts and gales from other quarters, accompanied by rain or sleet, but ultimately becoming more steady, and accompanied with a comparative dryness of the atmosphere, occasioning the drifting of the sands to a great extent. Summer is sometimes fine, but as frequently wet and boisterous, with southerly and westerly winds. Frequently the wet weather continues with intervals until September, from which period to the middle of October there is generally a continuance of dry weather. After this westerly gales commence, becoming more boisterous as the season advances. It is perhaps singular, that while, in general, little thunder is heard in summer, these winter gales should frequently be accompanied by it. Dreadful tempests sometimes happen through the winter, which often unroof the huts of the natives, destroy their boats, and cover the shores with immense heaps of sea-weeds, shells, and drift timber.

After a continued gale of westerly wind, the Atlantic rolls in its enormous billows upon the western coasts, dashing them with inconceivable fury upon the headlands, and scouring the sounds and creeks, which, from the number of shoals and sunk rocks in them, often exhibit the magnificent spectacle of terrific ranges of breakers extending for miles. Let any one who wishes to have some conception of the sublime, station himself upon a headland of the west coast of Harris, during the violence of a winter tempest, and he will obtain it. The blast howls among the grim and desolate rocks around him. Black clouds are seen advancing from the west in fearful masses, pouring forth torrents of rain and hail. A sudden flash illuminates the gloom, and is followed by the deafening roar of the thunder, which gradually becomes fainter, until the roar of the waves upon the shore prevails over it. Meantime, far as the eye can reach, the ocean boils and heaves, presenting one wide-extended field of foam, the spray from the summits of the billows sweeping along its surface like drifted snow. No sign of life is to be seen, save when a gull, labouring hard to bear itself up against the blast, hovers over head, or shoots athwart the gloom like a meteor. Long ranges of giant waves rush in succession towards the shores. The thunder of the shock echoes among the crevices and caves; the spray mounts along the face of the cliffs to an astonishing height; the rocks shake to their summit; and the baffled wave rolls back to meet its advancing successor. If one at this season ventures by some slippery path to peep into the haunts of the cormorant and rock pigeon, he finds them sitting huddled together in melancholy silence. For whole days and nights they are sometimes doomed to feel the gnawings of hunger, unable to make way against the storm; and often during the winter they can only make a short daily excursion in quest of a precarious morsel of food. In the mean time the natives are snugly seated around their blazing peat-fires, amusing themselves with the tales and songs of other years, and enjoying the domestic harmony which no people can enjoy with less interruption than the Hebridean Celts.

The sea-weeds cast ashore by these storms are employed for manure. Sometimes in winter the shores are seen strewn with logs, staves, and pieces of wrecks. These, however, have hitherto been invariably appropriated by the lairds and factors to themselves, and the poor tenants, although enough of timber comes upon their farms to furnish roofing for their huts, are obliged to make voyages to the Sound of Mull, and various parts of the mainland, for the purpose of obtaining at a high price the wood which they require. These logs are chiefly of fir, pine, and mahogany. Hogsheads of rum, bales of cotton, and bags of coffee, are sometimes also cast ashore. Several species of seeds from the West Indies, together with a few foreign shells, as Janthina communis and Spirula Peronii, are not unfrequent along the shores. Pumice and slags also occur in small quantities.

Scenes of surpassing beauty, however, present themselves among these islands. What can be more delightful than a midnight walk by moonlight along the lone sea-beach of some secluded isle, the glassy sea sending from its surface a long stream of dancing and dazzling light,—no sound to be heard save the small ripple of the idle wavelet, or the scream of a sea-bird watching the fry that swarms along the shores! In the short nights of summer, the melancholy song of the throstle has scarcely ceased on the hill-side, when the merry carol of the lark commences, and the plover and snipe sound their shrill pipe. Again, how glorious is the scene which presents itself from the summit of one of the loftier hills, when the great ocean is seen glowing with the last splendour of the setting sun, and the lofty isles of St. Kilda rear their giant heads, amid the purple blaze, on the extreme verge of the horizon! But as poetry is here out of place, I desist.

The sea affords immense quantities of fish, crustacea, and mollusca, which the natives turn to little account. But as this, and many other subjects, are to be particularly discussed in the subsequent parts of my description, I shall for the present conclude, satisfied with having presented a very general outline of those remote and neglected islands.

(To be continued.)

ART. III. *On the growing power of Russia, and her late Acquisitions, especially those in Asia.* By JAMES BELL, ESQ.

EVER since the accession of Peter the Great, Russia has been advancing with steady, undeviating, and accelerating pace, to the possession of universal empire. At his accession, Russia had neither ships, nor sailors, nor ports, except those of Astracan on the Caspian, and Archangel on the White Sea. The Seas of Azoff and the Euxine were then wholly surrounded by the dominions of the Osmanlee sultans and the khans of the Crimea, whilst the Gulfs of Finland and Bothnia owned the naval sway of the successors of Gustavus Vasa. If Russia was then wholly destitute of naval science, she was equally so of military. Her soldiers were contemptible, as they consisted chiefly of raw, undisciplined boors, collected for the occasion from the serfs of the feudal nobility; and her standing army, the strelitzes, like the janissaries of Turkey, or the prætorian guards of declining Rome, were a haughty, turbulent, and ungovernable race, a disorderly militia, totally unfitted for the purpose of offensive war, and qualified for nothing, but to raise intestine commotions,—cast the die in favour of a successful competitor for imperial power,—and be alternately, as they took the whim, the rulers or the satellites of a tyrant. As to science or literature, or those elegant arts which adorn, or soften, or accomplish humanity, Russia had none; for universal barbarism swayed the whole mass, from the sceptered czar to the rude peasant, the serf of his lord, whilst the intellectual state of the boyars and boors was exactly on a par; and but for the exertions long and steadily pursued by Peter, in spite of numerous and opposing obstacles, sufficient to paralyze an ordinary mind, Russia might have still remained in the same state of national barbarism, rude ignorance, and political imbecility, as her now fallen rival Turkey.

Peter was not merely a successful warrior, like an Attila, or a Zingis Khan, or a Timoor, at the head of rude and barbarous hordes, who conquered but to destroy. He was more. He was the legislator of his country; and, conscious of his own ignorance, as well as that of his subjects, he endeavoured first to have himself instructed, and then his nation. He abolished the strelitzes; set on foot a regular army; and hired military officers from every quarter of Europe to train and command it, as Germans, French, and Scots; and compelled his proud nobility to enrol themselves in the humble rank of recruits, and obey the orders of drill-serjeants. He formed a navy, and got shipwrights from England and Holland to build it, and instruct his subjects in naval science. He erected military and naval academies: obtained the aid of foreign engineers for the purposes of taking levels, making canals, constructing docks and naval arsenals, and founded the city of St. Petersburgh, in the midst of marshes, and whilst he was engaged in active hostilities in the very territories of a people then every way superior to his own, except in numbers. With his infant navy he captured Azoff, at the mouth of the Don, from the Turks, whose attention was then almost wholly occupied with the Austrians, Poles, and Venetians, whom they accounted much more dangerous enemies than the rude and illiterate Russians. The capture of this city, then a place of importance, and its retention, with the neighbouring station of Taganrock, at the peace of Carlowitz in 1699, gave the Russians their first footing on the shores of the Mæotis. But by the unfortunate peace of the Pruth, Peter was subsequently obliged to resign them again to the power of the sultan, and for the present to abandon all ideas of obtaining a share of the commerce of the Euxine; but in the war with Sweden, Peter ultimately gained his object, and the battle of Pultowa for ever decided the contest in favour of Russia.

By the peace of Nyslot in 1723, Russia obtained all Livonia, Ingria, and part of Carelia, and a firm footing on the Baltic, and the Gulfs of Riga and Finland. The disastrous issue of this long war of more than twenty years to Sweden, proved, that whilst Peter was born for the good of his country, Charles XII. was equally so for the ruin of his. That insane monarch, ruined by reading Homer and Quintus Curtius, imagined himself another Alexander, and his rival another Darius, and thought of nothing less than the conquest of Russia. But the battle of Pultowa dispelled the illusion, cured the Swedes of their supposed invincibility, and proved, to their sorrow, that they themselves had taught the Russians how to conquer. Though by the peace of the Pruth, Peter was deprived of his object in that direction, yet still Russia increased in political strength and importance; and the distractions of Persia gave Peter an opportunity of extending his conquests on the shores of the Caspian, and annexing the provinces of Daghistan, Schirwan, and Gheetan, to his dominions. A chart of the Caspian Sea was made by his orders, in consequence of a survey by Van Vorden, and presented to the Academy of Sciences at Paris, as also another by Admiral Cruys. An astronomical observatory was erected at St. Petersburgh, and the most learned academicians of France and Germany were invited to the new scientific and literary institutions he had created in different parts of his empire, to enlighten his subjects, and give them a desire and a taste for knowledge. The plans of Peter for enlightening his subjects, improving them by all possible means in military and naval science, and thus gradually enabling them, not merely to compete with, but to conquer their political rivals on every side, has since been steadily pursued by all his successors; and no state, since the commencement of history, has been so deeply indebted to, and availed herself more of, the military and naval science of other states more enlightened than itself, than Russia. All her conquests, whether by sea or land, have been chiefly achieved by Russians under foreign officers. Most of her celebrated generals or admirals have been Germans or Scotch, as Gordon, Lesly, the Duke of Croy, Schein, Munich, Lascy, Keith, Weissmann, Witgenstein, Le Fort, Elphinstone, Paul Jones, and the Greigs, father and son, the latter of whom still enjoys the command of the Russian naval forces, which his father previously possessed. Under the instructions of these pupils in the science of defence or destruction, the Russians have proved themselves apt scholars, not like their stupid rivals, the Turks or Persians, who will not learn, and cannot teach. Adventurers of every kind find encouragement in Russia, and to foreign aid and foreign instruction she has been more indebted than to her own unassisted efforts in the career of conquest. It is foreigners chiefly that have raised Russia to her present gigantic political pre-eminence over every other nation on the face of the globe. The universal toleration that is enjoyed throughout her vast empire, and the bringing into play, in the service of the state, the varied abilities of all, whatever be their country or their religion, has been of immense service to Russia in the furtherance of her schemes of conquest and commerce. All her literature and science has, since the days of Peter, been in the hands and under the direction of Germans. Almost all her scientific and literary journals, all the expeditions, whether by land or sea, to survey and explore the interior, or the boundaries of her immense dominions, have been conducted and made by foreigners, especially Germans; and at this very moment, scientific tourists are exploring the venerable Ararat, the mighty Caucasus, the extended Altai, and the Ural Tagh, now so famous for its mineral and metallic produce. Colonies have been settled, towns raised, and villages reared, where nought but empty deserts and cheerless solitudes appeared; and as the march of conquest proceeds, colonies, commerce, and civilization bring up the rear.

But her rapid career has been mightily accelerated by co-existing political circumstances, as the distractions in Poland, and the increasing imbecillity of Turkey. France, weakened by the war of seven years in Germany, and her unsuccessful contest with this country, unable to take an active part in the Polish troubles, and assist the stupid and intolerant Catholics of that ruined country, in their insane efforts to keep the dissidents in a state of abject political servitude, and utter exclusion from every privilege, whether sacred or civil, stirred up the Porte, in an evil hour, to commence war with Russia, and this in spite of the remonstrances of her own ambassador, the Count de Vergennes, who told his court repeatedly, that to stir up the Turks to war, was to seal the political destruction of an old and faithful ally, as she was by no means a match for Russia in the game of war. Russia had indeed given the provocation, by pursuing the confederate Poles across the Dniester, and burning the defenceless town of Bata in Little Tartary. But the matter might have been compromised by mutual negociation, and proper representation of the injustice of the deed. But the foolish court of Constantinople, hurried on by the intrigues of France, and the complaints of the Polish rebels, Potocki and Krasinski, immediately declared war against a power by no means averse to the contest, as equally conscious of her own strength, and the growing weakness of her rival. The event justified the sagacity of Vergennes, and manifested the folly of Choiseul. Never was a clearer display of weakness on the one hand, and strength on the other, manifested, than in that contest,—of military science over rude bravery, untutored by discipline, and uninstructed by knowledge. By the peace of Kainardgi, dictated by Romanzoff, and ratified by both courts, Russia obtained her long-desired object, of gaining a firm footing on the Seas of Azoff and the Euxine. She obtained possession of Azoff and Taganrock on the shores of the Mæotis, of Jegnicale and Kirtch on the Straits of Kaffa, and Kinburn at the mouth of the Dneiper, and all the tract between that stream and its western tributary the Bog. What was of more consequence still, she obliged the Porte to acquiesce in the independence of the Khan of the Crimea, and deprived her for ever of his formidable aid. By exciting troubles amongst the subjects of the Khan himself, she compelled him to abdicate the sovereignty of his own dominions, and then seized them all, and obliged the Porte to acquiesce, unable for the contest, in the injustice of the measure, and obtained a further cession of all the tract between the Don and Kooban rivers. Turkey was now stripped of all her territory from the Bog to the Don, and from the Don to the Kooban. Nothing was now left her of her Tartarian dominions, but what lay to the south of the Kooban, in Asia.

By cunning policy she stirred up that weakest and most capricious of sovereigns, the emperor Joseph, to make an unjust attack upon the Turks, at a time when they were unprepared to repel the aggression; and while she contrived to make the weight of Turkish resentment to fall chiefly on that foolish monarch, she had full leisure to undertake the seige of Ockzakoff, and carry it on without any obstruction from a Turkish army. In the succeeding campaigns, Russia had all the success she could desire, and nothing but the interposition of our cabinet, and that of Prussia, saved Turkey from political annihilation. By the peace of Jassy in 1792, Russia again obtained a farther accession of territory, and the Dneister was made the new boundary. By the treaty of Kainadgi in 1774, by the subsequent treaties of 1783 and 1792, she obtained from the Turks, exclusive of her Asiatic acquisitions between the Don and the Kooban, 60,0000 square miles of territory, and at least 500,000 new subjects. The number would have been much greater; but the mass of the Tartars, hitherto subject to the Khan of the Crimea, migrated to Anatolia and to the Caucasus, south of the Kooban.

By the first partition of Poland in 1772, she obtained an additional territory of 33,000 square miles, and 1,226,000 new subjects. Whilst the attention of Europe was engaged in the French revolutionary war, Russia obtained, by two other partitions of Poland, 208,000 square miles of territory, and 5,212,000 inhabitants, in 1793 and 1795. In 1795, Courland was annexed to the Russian crown, containing a superficies of 12,000 square miles, with 570,000 inhabitants. On the side of Persia she gained, by the peace of Teflis in 1797, all Daghistan and Schirwan: in other words, all the coast of the Caspian from Derbend to the mouth of the Kur. In 1807, she obtained a further accession of territory in Poland, by the cession of the district of Bialystock from Prussia, containing 15,000 square miles, and 500,000 inhabitants.

In consequence of a war with Sweden, in which Russia acted as the ally and co-adjutor of Buonaparte, she obtained by the peace of Fredericksham, in 1809, the whole of Swedish Finland, East Bothnia, with Kimi and Tornea Lapmark, comprehending a surface of 140,000 square miles, and 900,000 inhabitants. Besides these continental acquisitions, she also obtained the Isles of Aland, in the very vicinity of Stockholm, and which command the entrance of the Bothnic Gulf.

By the peace of 1812 with Turkey, she gained possession of all the tract between the Dneister and Pruth in one direction, and between the Dneister and most southern arm of the Danube in another, comprehending the Pashalick of Kotchim, Eastern Moldavia, and Bessarabia, with the important fortresses of Kotchim, Bender, Kelia Nova, Akerman, and Ismael. On the side of Persia she obtained, by the peace of 1813, the whole of Georgia, the khanates of Karrabagh and Gandscha, the plain of Mogan, and the northern part of the mountainous district of Talish; and by the last treaty of February 1828, she further obtained the khanates of Naktschivan and Erivan: in other words, all that remained of Persian Armenia to the north of the Araxes. By the present treaty with Turkey, she has acquired the whole coast of the Euxine, rennd about from the mouth of the Kooban to the port of St. Nicholas, near the mouth of the Apsarus. This cession includes the important fortresses of Anapa and Poti, which latter commanded the mouth of the Phasis. In addition to these, she has also obtained the fortresses of Uttsighur, Akhalziche and Akhal-Kalaki, the line of the new demarcation, stretching straight east from the port of St. Nicholas, along the north frontier of Guriel, till it strike the mountains at the western source of the Kur, and which divide Immeretia from Guriel. The line goes due east, passing two hours journey to the south of Akhalziche, and then south-east, passing the same distance to the west of Akhal-Kalaki, till it strike the old Persian and Turkish frontier, at the source of the most eastern branch of the Arpa-Shai. But as all our maps of this region are remarkably inaccurate and deficient, it is not easy to form an accurate idea of the new frontier. No European travellers have explored this tract except Charders, who went from the port of Batoumi across the country, crossed the mountains, and went down the western branch of the Kur to Akhalziche, from thence to Usighur, where the Kur bends to the north-east, and travelled along its banks to Tiflis.

Till we obtain better and more accurate maps, and it is from the Russians only that we shall ever obtain them, it is impossible, from such maps as we at present possess, to form a clear and accurate idea of the new boundary on the side of Asiatic Turkey. Klaproth, indeed, traversed the Caucasus and Georgia, then new acquisitions on the side of Turkey and Persia; but he never explored this new ceded territory, or ever visited the Pashalicks of Tchildir or Akhalziche. The reason is obvious. No traveller can traverse any part of Asiatic Turkey with freedom, nor without exciting the jealousy of the pashas, and is besides, in constant danger of being robbed or murdered, in a country totally destitute of any efficiency to protect its own subjects, and much less a Christian European, travelling to gratify his own curiosity, or wishing to make observations. In order that a just view of the Russian acquisitions, from the time of Peter the Great down to the present day, on the sides of Sweden, Poland, Turkey, and Persia, may be obtained, the following table is subjoined, beginning with Sweden:—

From Sweden Russia has obtained, by successive conquests, the following countries,

	Square Miles.	Population.
Livonia and Esthonia, - - -	30,000	1,200,000
Ingria and part of Carelia, - - -	20,000	800,000
Finland, East Bothnia, with the Isles of Aland, and the two Lapmarks of Kimi and Tornea,	140,000	1,350,000
Total of acquired territory and population,	190,000	3,350,000

From Poland Russia has acquired, by successive partitions and treaties, the whole of the grand dutchy of Lithuania, Samogitia, Podolia, Volhynia, Bialystock, Courland, and what is called the kingdom of Poland, comprehending a superficies of 315,000 square miles, with a population of 11,000,000.

From Turkey Russia has obtained the following territories by successive conquests and treaties. The whole of the Crimea and the Nogaian Steps, extending from the Don to the Dnieper. Territorial surface, 40,000 square miles.

And the country of the Tchernomorskoi Cossacks, between the Don and Kooban: square miles 22,000.*

The whole tract extending from the Dnieper to the Dniester, or

* This district, however, is but a small portion of the territory Russia acquired between the Don and Kooban in 1783. This territory includes the whole shore of the Mæotis, from above Azoff to the mouths of the Kooban, and from above Azoff south-east to the point where the Kooban bends to the west, comprehending a large triangular space of nearly three equal sides, of 200 British miles each. By their cession she not only obtained the whole district of Taurica, included in the space mentioned above, but also the district of Taman, the ancient Phanagovia, included between the mouths of the Kooban, which, with the possession of Kirtsch and Jegnicale, on the opposite side of the strait, completely command the communication between the Euxine and the Mæotis.

the Step of Boudjak, now denominated the government of Cherson, and containing a surface of 26,000 square miles.

The whole of Eastern Moldavia and Bessarabia, including a surface of 20,000 square miles.

In Asia, she has obtained the whole tract from the Kooban to the Black Sea, taking in the whole western range of the mighty Caucasus, from the remotest source of the Kooban, in Mount Elboors, the highest point of the range, till its termination near the Isle of Taman, a space of 300 miles in direct length, N. W. and S. E. by a medium breadth of 100 British miles. In addition to this, Russia has obtained the district of Guriel, on the south of the Phasis, reaching south to the range which bounds the valley of the Apsarus, a tract of perhaps 4000 square miles, and the whole comprehending a space of 35,000 square miles, exclusive of Mingrelia and Immeretia, between the Phasis and the Enguri rivers, which Russia had previously acquired by treaty with Persia, and by cession from the native princes. We cannot define the amount of territory she has acquired in the Pashalick of Tchildir with any thing like precision, from our ignorance of the topography of that district, as before stated; but the whole of the cessions made by Turkey at different periods, may be roughly calculated at 146,000 square miles, namely, 86,000 on the side of Europe, and 60,000 on the side of Asia. What additional population she has gained by these various cessions, it is impossible to state; but it can hardly be less than 2,000,000, including the Nogais, Circassians, and Abkhas of the Western Caucasus.

On the side of Persia, the acquisitions are equally considerable in point of political importance, population and territory.

Though Russia was compelled, from dread of the celebrated Nadir Shah, to restore all the provinces on the Caspian Sea, yet the distracted state of that country, consequent on his death, and the division of the monarchy into Eastern and Western Persia, and the deplorable mis-government of the reigning dynasty, have rendered that country totally incapable of opposing Russian aggrandizement. By a chain of posts, erected at convenient distances from the mouth of the Terek west to the Sea of Azoff, Russia had been enabled to preserve a communication between both seas, and protect her southern frontier from the incursions of the Caucasian tribes, and maintain a permanent footing on the western side of the Caspian. By the increasing weakness of Persia, Prince Heraclius had become independent of Persian power, and to secure himself against all future attempts of the Persian sovereigns to regain their influence in Georgia, had declared himself a vassal of the Russian empire, and obtained a body of Russian troops to maintain his authority, which was so fettered by the feudal nobles of Georgia, that in a military capacity he could do almost nothing. This consequently produced a close and constant correspondence between Russia and the country to the south of the Caucasus. The invasion of Georgia by an army of 60,000 Persian cavalry, under that active but cruel tyrant, Aga Mohammed Khan,—the sack of Teflis,—the return and death of Heraclius, rendered it necessary for Russia to interpose. A Russian army of 50,000 men, under Zuboff, was sent across the Caucasus, to defend a people unable to protect themselves. The Persians had retreated, and on the death of Aga Mohammed Khan, his imbecile successor, the reigning monarch, made a peace with the Russians, to secure his own succession to a disputed sceptre, in 1797, by which the Russians gained all Daghistan and Schirwan, to the mouth of the Kur. In the meantime, the Russians seized Georgia, and partly by intrigue, and partly by force, obtained from the family of Heraclius, and from the sovereigns of Immeretia, a renunciation of all regal authority, and thus deprived the Georgians even of nominal independence, a boon which they had enjoyed even under the Turkish and Persian yoke.

In 1801, the pass from Mosdok to Mskett, at the junction of the Aragwi and Kur, was, for the first time, occupied by a military force, the present road planned, and ultimately executed. By the peace of 1813, Russia obtained a legal and political sanction to the countries she had already seized and maintained in despite of Persian power, and a further extension of her southern frontier, namely, all Georgia, Immeretia, and Guriel, the whole of Mingrelia, or the valley of the Phasis, the khanates of Gandscha and Karrabagh, the step of Mogan, and the district of Talish, from the mouth of the Kur south to Astara. In the subsequent peace of February 1828, the remaining portion of Persian Armenia, north of the Aras, containing the khanates of Naktschivan and Erivan, were yielded to Russia; so that Russia has gained, on the side of the Caspian, a maritime tract of 5 degrees of latitude, from the Sulak river south to Astara, a space of 400 miles and upwards, including the windings of the coast; whilst inland, it extends from the summit of the Elboors and the Pass of Darial, south to the Araxes, a meridional extent of more than 3 degrees, by 5 of longitude, exclusive of Mingrelia, Immeretia, and Guriel. This extent of territory, gained from Persia successively in 1797, 1813, and 1828, comprehends a surface of 60,000 British square miles, and the three latter 20,000 more, or a total of 80,000 square miles. What is the entire population of these districts, taken in whole, is unknown. According to a recent census, the population of Georgia is 2,375,487 persons, unequally scattered within the five principalities, which, under the name of Modern Georgia, extend 50 leagues from Ntos, or from the cross on the summit of the Darial Pass, to the mountains of Pembek, or from 42° 25′ north lat. to 40° 35′ north lat. and 125 leagues from the mouth of the Enguri into the Black Sea, to the junction of the Alayan with the Kur; that is, from west to east in its greatest length. See *Tableau de Caucase, par M. Klaproth,* 1827, p. 93. and the *Nouveau Journal Asiatique,* No. VI. *Juin* 1828, p. 435.

But who can enumerate the numberless tribes of the mighty Caucasus, Nature's grand bulwark between Europe and Asia, all more or less reduced to the sway of the yellow czar? It would require a large vocabulary merely to give their names. In the vicinity of the Kabardians, according to a Russian journal collected from the account of General Debou, between the years 1816 and 1821, more than 100 tribes of different names dwelt amidst the rocks, and vallies, and glens, of this sovereign of mountains, independent of the numerous tribes of the Lesgians. Thus from the four powers of Sweden, Poland, Turkey, and Persia, Russia has acquired, since the time of Peter the Great, 730,000 square miles of territory, and nigh 18,000,000 of subjects, exclusive of the population of all Persian Armenia, and Schirwan, and Talish, and Daghistan, and a host of rude, warlike, and ferocious tribes, who inhabit the wilds of the range of Elboors, and the banks of the innumerable streams, which, in various directions, form the large streams of the Terek, the Kuma, the Kooban, the Phasis, the Kur, the Aragwi, the Iberus or the Ior, and the Alayan, and the Samura, and the Araxes. Of these vast acquisitions of territory and population, more than 4-5ths have been made within little more than half a century.

Let us now take a short view of the vast importance of these acquisitions. In the *first* place, By her Swedish and Polish acquisitions, she is complete mistress of the Baltic, and its various extensive gulphs, by means of which she can export the surplus produce of her northern provinces to the south of Europe. Denmark and Sweden are at her beck, and exist as independent states merely by sufferance, or *durante placito,* and with Prussia, which possesses 500 miles of maritime coast in the Baltic, she is closely connected by marriage and alliance.

In the *second* place, Russia is now complete mistress of the navigation and commerce of the Euxine, round about from the mouth of the Danube to that of the Apsarus. The whole coast of the Euxine is hers; and at no distant period, the whole southern coast from that river to the city of Constantine, and from thence to the mouths of the Ister, will own the Russian sway. The gates of the Bosphorus and the Hellespont are now permanently open to her ships. The Euxine will no longer, but to the barbarous subjects of a barbarous prince, be a *Mare Clausum*, as for ages past, and the shores of that *inhospitable sea* will enjoy the benefits of reciprocal commercial intercourse with the enlightened nations of the west. The humiliated descendant of Osman will no longer have it in his power to shut or open the Dardanelles or the Bosphorus as erst at his pleasure; or if, in a moment of infatuation, he should presume to exercise his wonted power, his expulsion from the City of the Seven Hills will be the inevitable consequence. Placed as he now is, between renovated Greece on the south, and the Russians on the north, he must prepare himself for his final removal from the palace of the Caisars, and the throne of Byzantium, and his flight across the Bosphorus, to the desolated plains and ruined cities of the Asiatic peninsula; and, like another Marius amidst the ruins of Carthage, take up his abode in that vast Necropolis of deported grandeur.

In the *third* place, By the cession of the Turkish fortresses at the southern foot of the Caucasus, and the coast of the Abcassian Tartars, and the cession of Poti at the mouth of the Phasis, the only fortress the sultan possessed in Mingrelia, will produce another important consequence,—the abolition of the Turkish slave trade,—one of those happy consummations ardently desired by the enlightened friends of humanity. From Circassia and Georgia the harams of the Mohammedan sovereigns, and their wealthy subjects, had been replenished in every age with a crowd of captive beauties. From the same regions thousands of unhappy captives, taken in the wars which the rude mountaineers incessantly waged with each other, were sold by the barbarous captives to the Turks and Persians, to be disposed of in the bazaars of Constantinople, Erzeroom, Bagdad and Cairo, Ispahan and Teheran. The continual demand for slaves, male and female, by the mussulmans of Turkey and Persia, encouraged and maintained a continual system of petty warfare amidst the innumerable tribes of the Caucasus, in order to supply the demand. The Russians, by their conquest of Georgia and Mingrelia, put an end to the traffic in that quarter. It is a well known fact, that the Mamelukes, sovereigns of Egypt, for more than six centuries were Circassian slaves imported into that country by the Ayoubites sultans to recruit their armies, and that these slaves deposed their masters, and divided the country amongst themselves; and that their numbers have annually recruited by importations from the mouth of the Phasis, or the slave-market of Constantinople. It is also well known, that from the stoppage of the slave trade in Mingrelia by the Russians, the Mameluke beys of Egypt could no longer, as formerly, keep up the number of their slaves by annual importations, and that the number and power of these lords of the soil of Egypt, gradually diminished since that epoch; and, amongst other causes, paved the way for their downfall and expulsion from that long misgoverned and miserable country.

After the loss of the Crimea, and the country north of the Kooban, the Turks erected the fortress of Anapa, 30 versts (20 British miles) from the mouth of the Liman of the Kooban, and 80 versts, or 54 British miles, from Tmoularakan, the ancient Phanagoria, in 1784. By means of this new fortress, and a few other small forts between this and the frontriers of Mingrelia, the Turks were enabled to maintain a communication with the Circassians, Abkazians, Lesgians, and other mussulman tribes in the Caucasus, who subsisted by plunder and robbery, and particularly by the sale of Russian subjects, whom they carried into slavery in the very midst of peace. By the treaty of Bucharest in 1812, Anapa and Poti were restored, and the rest were promised to be restored, on condition that the garrisons should cease to support the banditti, and that no Russian should be sold as a slave in these forts; but it was refused to deliver them all up without sufficient security that the conditions would be fulfilled. The Turks, however, still continued the old practice of buying Russian subjects as slaves, and Anapa was the grand emporium of this nefarious commerce, the inhabitants of which exported all the prisoners which the mountaineers took in their incursions into Georgia and the Russian territories. From this place Turkish officers went openly into Circassia, to encourage brigandage and the traffic in slaves; and as Constantinople was the chief mart, it was the grand focus of the perpetual war for which the Caucasian tribes kept up with those under the Russian dominion. General Yermoloff, governor of Georgia, kept up an active and persevering war with these banditti; but they always found a secure refuge beyond the Kooban, in the Turkish dominions. The capture of Anapa, therefore, was a principal object in the campaign of 1828, with the other forts along the coast; and in order for ever to prevent all Turkish intercourse with the mountain tribes of Caucasus, and deprive these latter of every inducement to carry on an endless warfare, either mutually, or with those under Russian domination, by finding a ready market for their captives, as heretofore, at the Turkish ports and fortresses on the coast, the whole of that maritime tract has been retained by the Russians, and formally ceded to them by the peace of Adrianople. Thus a final close will be put to the slave trade, so long and so disgracefully carried on at the mouth of the Phasis and the fortress of Anapa.

Further, as Russia wished to establish a commercial intercourse between the port of Odessa and the city of Teflis in Georgia, it was impossible this design could be accomplished whilst the Turks held the fortress of Poti, at the entrance of the Phasis, and on the left bank, and who perpetually molested and stopped all merchant ships under the Russian flag. This obstacle is now removed by the capture and cession of that fortress, and the commercial intercourse between the places above mentioned, will suffer no other impediments but those which arise from the mountainous nature of the country at the heads of the Phasis and Kur.

In the *fourth* place, by the cession of Poti, and the opening up a maritime intercourse with the intermediate regions of the Euxine and Caspian, Russia can now transport her armies from the mouths of the Danube, the Dneister, and the Dneiper, by sea to the mouth of the Phasis, and march them to the east or south as she sees fit, in any future war with Turkey or Persia. By means of a constant naval communication with the ports of Southern Russia, her armies can at all times be supplied with reinforcements, provisions, and military stores, to facilitate her warlike operations and plans of future conquest. By the secure possession of naval stations at the head of the Euxine, her power will be invulnerable to any attack from the undisciplined rabble that generally composes the mass of a Turkish or Persian army. The easy communication which, in ancient times, subsisted between Constantinople and the eastern coast of the Euxine, was of vast advantage to the court of Byzantium. By its means the successors of Constantine were enabled to keep up a constant intercourse with the Christian princes of Colchis and Iberia, and with the Armenians, people always attached to the interests of the Byzantine emperors by the ties of a common faith. By means of it, the Persians, all-powerful under the auspices of the great Nushervan, were always baffled in their attempts to establish a footing in Colchis. By means of a fleet, the renowned Heraclius was enabled to transport an army to the friendly shores of Colchis,—explore his way over the mountains of Armenia,—penetrate into the heart of Persia,—and compel the great king to recall his hitherto victorious armies to the defence of his crown, his throne, and his capital.

(To be continued.)

ART. IV. *Description of Two Thermometers adapted to indicate minute differences of Temperature in the Boiling Point of Liquids in different vessels.* By T. K. KEMP, Esq. Lecturer on Chemistry.*

WHILE engaged in making some experiments on the boiling point of various liquids, and also in investigating the cause why water and some other liquids enter into ebullition at a lower temperature in metallic than in glass vessels, I found great difficulty in marking with accuracy the slight changes which took place in their temperatures on the introduction of various foreign substances, on account of the smallness of the space indicating each degree on the scale of thermometers in common use, in consequence of the great variety of temperatures which they are constructed to determine by a comparatively short stem.

This is owing to the smallness of the ball and the equality of bore throughout the whole extent of the stem, which of course is absolutely necessary where the instrument is employed to determine the various degrees of temperature which exist between the freezing and boiling points of liquids. When caloric enters the mercury contained in the ball of a thermometer, a certain expansion takes place in it, by which a quantity equal to that expansion is displaced and rises in the stem, which becomes the measure of the increase of temperature. The quantity of mercury expelled for each degree of Fahrenheit, in balls of the ordinary size, is so very small that it will not admit of being subdivided upon the scale; and if we increase the size of the ball so as to cause a greater portion of mercury to pass into the stem for each degree of

* Mr. Kemp has permitted us to lay before our readers this valuable modification of the mercurial and differential thermometers, prior to the publication of a series of experiments, which he has conducted with it, on the boiling point of liquids. ED.

Fahrenheit's scale between zero and the boiling points of liquids, its length would render it quite unfit for use.

When a thermometer is to be employed to mark any slight differences which might take place in the boiling point of liquids under a variety of circumstances, as for example, the difference that exists between the boiling point of water in metallic and glass vessels, the whole range of temperature required is only about two degrees; for we know that water boils at 212° under the ordinary pressure of the atmosphere in a metallic, and at 214° in a glass vessel. In experiments, then, of this nature, the whole quantity of mercury which is expelled from the ball, and which rises in the stem of the instrument, ere the temperature arrives at 212°, is here of no service, and consequently the same length of stem might also be dispensed with.

It is quite evident, that in all experiments such as I here allude to, where the range of temperature required does not exceed a few degrees of Fahrenheit's scale, the object is to have these few degrees extended npon as great a length of scale as possible, so as to combine with a convenient length of the instrument the nicest delicacy, whereby we may be able to discover the slightest change that takes place in the temperature of the liquids, either by the introduction of foreign substances into them, or by varying their circumstances.

This object I have endeavoured in some degree to attain by the following construction, which, by a very simple contrivance, is made to contain the portion of mercury which is expelled from the ball by expansion, until it arrives at the temperature we wish to observe, when it enters a very fine tube, where the most minute changes of temperature may be discovered.

It consists of a ball A, Plate VII. Fig. 1. fully an inch in diameter, from which rises a short stem CD, about half an inch in length and a quarter in diameter; to its extremity is attached a thermometer tube EF of a very fine bore. A portion of mercury is then introduced into the ball, so as to fill it, and just rise into the tube CD at a natural temperature. This tube CD is formed so as to contain the quantity of mercury which expands in the ball between the natural temperature and the point, which, in the present instance, we are supposing to be 212°. When the liquid has attained this degree of heat, the mercury begins to ascend in the small tube EF, which, on account of the fine bore and the largeness of the ball, gives nearly four inches for each degree of Fahrenheit's scale, and thus the slightest variations of temperature may be discovered.

It will be seen that the principle may be applied to any temperature, all that is necessary is to have the tube CD made so as to contain the quantity of mercury that expands between that of the natural temperature and the point of investigation.

It is obvious that a thermometer, where the ball is so large, cannot be used to ascertain slight differences of temperature unless a source of caloric is constantly kept up to the liquid, as from its large size it would absorb a great quantity of caloric beforc it began to be affected.

In using this thermometer, it is necessary to immerse it, always to the same depth, in the liquid, so as just to cover the tube CD.

Another thermometer, which is well adapted for investigations of this nature, from its great sensibility, is a modifications of Leslie's differential thermometer. It consists of two balls, A and B, Plate VII. Fig. 2. connected by a tube CDEF, having a very fine bore, and bent in the manner seen in the figure. The tube passes within, and is continued to the bottom of the ball A, where it is terminated in sulphuric acid, a portion of which is to be previously put into the ball. The other extremity of the tube terminates in the ball B, and is bent up within it, as is seen in the figure, to prevent any of the liquid from passing along the tube and flowing into the ball B, when the temperature of the ball A is increased.

The quantity of air at the natural temperature is just sufficient to cause the liquid to stand at the point E; and while the temperature of both balls remains the same the liquid continues stationary, whatever that temperature may be.

If both balls be placed into separate portions of water, and they be made to enter into ebullition, the liquid will still remain at the point E, provided the ebullition goes on in both vessels with equal rapidity.

If the ball A be placed into a glass vessel, and the ball B into a metallic one, we will have the liquid immediately ascending in the stem EF, indicating the increase of temperature which takes place in the glass vessel over that of the metallic one. We may have, by this construction, the two degrees of Fahrenheit's scale made to extend over a very great range.

In proof of the great sensibility which thermometers of this construction possess in indicating minute increments of caloric, I may state, that during the ebullition of a liquid, the mercury in the stem is in a continual vibration, rising and falling slightly at the escape of every bubble into the atmosphere. When ebullition is carried on with considerable rapidity, a slight accumulation of caloric takes place in the liquid, which is immediately indicated by a rise in the stem of the thermometer.

When this thermometer is used care must be taken to immerse both balls into the boiling liquid, very gradually, so as to raise the temperature to an equal degree, or they may be placed into cold water, and the temperature gradually raised, which prevents derangement of the instrument.

SCIENTIFIC REVIEWS.

Historical Account of Discoveries and Travels in North America, &c. 2 vols. 8vo. By Hugh Murray, Esq. F. R. S. E. Longman & Co. London. Oliver & Boyd, Edinburgh. 1829.

No subject is so extensive, no field so fertile, as the geographical description (in the ordinary acceptation of the word) of a large and fertile country; and when this is applied to an immense continental tract, presenting different physical features, inhabited by different nations of men, with the whole range of diversity from barrens and virgin forests to all the improvements of agriculture,—from barbarous uncouth Indians to the most civilized colonist,—and when we have to contemplate " a people destined to become the greatest on earth, whose population will ultimately surpass that of all Europe, and is fast covering the whole of the western world," an almost boundless knowledge of nature, a deep acquaintance with the springs of social order and the fountains of political economy, and a correctness of judgment which shall render each generalization a glimpse at futurity, are among the least of the intellectual attributes necessary for the task. The Historical Account of the Discoveries and Travels in North America, independent of those essays on the physical geography, political system, moral and social state, industry and commerce, of the United States,—on the present state of Canada, and on emigration in general, which Mr. Murray has presented to us, is of itself sufficient to constitute a work of exceeding interest. There is connected with it the almost mysterious visits of our own ancestors,—the discovery and gradual exploration of a new world,—the civilization of its southern parts, as ancient as that of the shores and islands of the Titicaca,—the invasion of the Spaniards,—the establishment of the western colonies, and their gradual rise to independence,—the labours of our navigators to steer through the ices of the north, and the exertions of our countrymen treading the shores of the Polar Sea,—labours which may be considered as equal to those of the travellers who suffered under the burning sun of Africa, though there were some advantages connected with the northern voyages and travels that led to much more satisfactory results than the many attempts made to penetrate the interior of the last-mentioned continent, and which are to be sought for in the taste and excellent judgment of the individuals engaged in these meritorious researches, and the impulse given to natural science by the march of intellect at home.

We never perhaps saw a more superficial attempt than that of Mr. Murray to condense so great a variety of materials,—a result still more astonishing, as the catalogue of works which he states himself to have consulted, includes the very best authorities; and as our knowledge of these countries is so rapidly increasing, from the labours of intelligent inhabitants, and from the progressive advance of free institutions, which now permit the researches of travellers in countries to which near approach was a short time ago denied. The difficulty of obtaining correct statistical information, renders every author liable to errors on that subject. An inaccurate knowledge of natural history, will always show itself in the defective details appertaining to physical geography; and the demonstration of these facts, must be accomplished by a strict analysis of the work. An inattention in laying before the reader the general facts which modern discoveries have led to, whether in a geographical or in a commercial point of view,—an incapability to grapple with those prejudices that cloud the true political condition of trans-atlantic nations,—and a failure in accomplishing the task which the author has imposed upon himself,—can at once be shown by an appeal to the subject, or by a comparison of what is known upon North America, and what the author has said about it. We are aware that "among the most remarkable changes which literary pursuits have undergone of late, one is, that writing for the public has ceased to be in general the best manner of disseminating truths useful to our fellow-creatures, and tending to the common good, for which an honest and honourable remuneration was to be expected. Now-a-days the *remuneration* is the sole end in view. Truth is not spoken out fearlessly and honestly, lest the book should not sell. The prejudices and passions of the public are flattered, and that is the best work which sells best."—*For. Rev. Sept.* 1829. The vice engendered by such proceeding gained new strength in Edinburgh, from the blow which its literature received a few years ago, as if the mental vigour of the author was to become paralyzed by the fears of his bookseller,—as if the northern spirit of literature, the glow of science or of poetry, the genius and industry of this fair city, from the author of Waverly down to Mr. Murray, was to be shackled and tortured by an inquisitorial censorship, as hurtful and injurious as that generated by a narrow polity. This state of things will not be allowed to last. The Literary Journal has, in its own department, shown the way, and we will never sit in our critical chair to sacrifice our independence of principle, and our right to condemn that which is bad, to prejudices which are based on authority, or to a compliance which is enforced by fear.

To commence, then, with the southern part of North America, the conquest of most part of which by the Spaniards, under the ambitious Cortes, forms one of the interesting epochs in the History of the Discoveries in North America. Three centuries this country remained under the dominion of a nation pre-eminently distinguished for its restricted colonial policy. Foreigners were prohibited from traversing its fertile plains and rugged hills, and we were almost entirely ignorant of its actual condition, till the first appearance of Baron Humboldt's "Essai." Since that time a succession of events lessened the veneration with which the Americans had regarded their European sovereign. Commercial monopoly, and restrictions on the industry of the colony, that their productions might not interfere with those of the present state, produced the fermentation which soon led Mexico to join in the movement which the same causes had impressed on the whole of the Spanish colonies; for a short time she was under the dominion of a despotism entailed by her vices, till she again more firmly sealed her independence. Since that time, we have had " Ward's Mexico" and Hardy's Mexico." Baradére was permitted to collect antiquities, and dig in their research. The works which came between this and De Humboldt's, were mere copyists of the latter, or the trashy productions of unoriginal observers. Indeed, none of the authors subsequent to that great naturalist's journey, have been daring enough to expose the mistakes, which, from the multiplicity of objects to which he directed his attention, he could not avoid; but increase of statistical information, and the new facts daily brought forward in contemporary journals, have been daily paving the way to more accurate details on this interesting subject. Mr. Murray has, without any apology to his readers, omitted the whole subject; and, while he has given a picture of the physical geography of the United States, of which a much better might be found by turning over the pages of " Malte-Brun," he has given no details of a country, part of which lies under the temperate and part under the torrid zone, a land of mountains and mountain plains, (plateaux,) attaining an almost unequalled elevation, and peopled and cultivated at a heigh of more than 7000 feet.

It was the conquest of Mexico that led to the discovery of California, and to some expeditions along the north-west coast, unproductive of any very important results. But it is to the celebrated voyage of Captains Cook and Clerk that we are most indebted for any knowledge of these coasts, and to these names are joined, in the annals of discovery, those of Behring, Meare, Vancouver, and Kotzebue. It is well known that Caboto, like Columbus, navigated the Atlantic, with the supposition of finding a western passage to the East Indies, the practicability of which, on the discovery of North and South America, became still farther removed. Magellan sailed through the straits that now bear his name in 1520. In 1577, Frobisher discovered a passage north of Hudson's Bay. In 1585, Davis sailed across the bay that now bears his name, and which, with Hudson's Bay, discovered so shortly afterwards, were both to become the theatre of the exertions of a navy which could boast of the experience of centuries, and which held an undisputed sway on the ocean. Mr. Murray's account of these voyages, and of the Arctic land expeditions, which should have constituted the principal feature of the work, is restrained to mere historical narratives of the proceedings, while certainly an equal quantity of satisfactory results, at least in the physical sciences, were never perhaps obtained in so short a space of time, or on so large an extent of land; and for a proof of what we assert, we appeal to those works which are at present publishing under the authority of Government, and which promise to make us most minutely acquainted with the natural productions of these little frequented regions. The observations on the pendulum, on magnetism, on solar radiation, on optics, and on meteorology, were fraught with the greatest interest, and productive of some most satisfactory results. The territory of the British American fur countries, is artificially divided into the rocky mountains, the barren grounds, the eastern district, the limestone tract, and the prairie land, and the lists now furnished of the quadrupeds found in each, present a most valuable table of their geographical distribution, and form a clue to the observations on that most difficult of all questions in zoological science, the discrimination between species, and mere varieties produced by difference in climate and in food. The specific differences of all animals, however closely they may resemble, which, as inhabitants of the great continents of the world, are separated by intervening oceans, is established beyond any doubt, and the newly acquired information on the former habits and manners of the animals of North America, has thrown much light on the history of the same animals in other countries,—of the bears, the shrews, the wolverene, the beaver, which Mr. Murray calls an *amphibia*, of the fur-bearing animals, of the wolves, squirrels, and deer. The study of the vegetation of the northern regions, has led to the most interesting results, and established some striking facts in the physical distribution of plants, and not among the least curious, stands the comparison of the vegetation of the Pic de Midi (Pyrenees) and that of Melville Island. In summing up his account of these voyages, Mr. Murray states the result of the first expedition to have been quite decisive as to the hope of any regular passage being found by any of the channels in the northern parts of Hudson's Bay. We have no right to condemn an opinion without proving the contrary, which our space will not allow us to do at the present moment; but we would ask, whether there are any facts developed by the attempts of that gallant band of adventurers that would lead to such a conclusion; or whether, after the failure of the last expedition, it became a general opinion that success was impossible?

Notwithstanding that we have gone so far, the most important part of the work lies before us,—we allude to the account of the United States; and while it is pretty well known, that in considering the social and political condition of the inhabitants, a line may be drawn between the apologies of a "Travelling Bachelor," or the too rapid generalizations of Captain Basil Hall, yet in regard to physical geography, we can only draw from those sources of information, whether derived from observation, or from the study of other men's works, that may lead to the best delineation of the characters of a country. From the eastern crest of the Alleghany there is a succession of geological zones, including a primitive, transition, secondary, and alluvial, this latter divided in two bands of different elevation and character. But the country is better characterized by its vegetation, from which Michaux divided it into four regions,—the region of the evergreens of Canada; of the

Alleghany, or red and black oak; the region of eastern hills, the country of red and black ash trees, of sycamores, acacias, and chestnuts, and in the south, of laurel and orange trees; the region of maritime fir trees, cedars, and cypresses; the region of the west, whose principal trees are the Juglans Hickeri, white oak, cherry tree, tulip tree, &c. &c. Those portions of the calcareous band which are entirely deprived of trees, are called barrens, and appear to be caused by the subterranean passage of water, which should go to fertilize the soil. The origin of the prairies is often similar; and "purgatory swamps, or devil's holes," mentioned by our author as a species of quagmire, are holes occasioned by the surface falling in, and he has been led quite into error in supposing them rendered unfit for the growth of trees, from "too copious moisture." The remainder of the work is occupied by a short account of Canada, which we cannot enter upon at present, and three chapters on the Americans of the United States. The eye of the world is upon America. Her government and her civil institutions are regarded as experiments in legislation, as a grand trial of the possibility of the permanency of natural liberty; and we will not discuss how far we may be penetrated with the picture of a noble and irresistible progress to moral happiness and universal empire, or whether the chain that was linked in a common cause, will constantly bind together provinces wide apart—with different manners and customs. The possession of Cuba, or a port in the Mediterranean, so anxiously sought for by their statesmen, would, it has been stated, lead in ten years to the dissolution of the union, and Canada would remain the great outwork of the British empire. America is a great and happy country: without the heat and deserts of Africa in its tropics; traversed by large navigable rivers; its shores washed on all sides by an almost boundless ocean: from the moment of its colonization to the present distinguished era, has been one continued progress of improvement. The passions and interests of man have caused blood to be shed on its virgin soil, and independence has been only gained by the sword; but that blood has sealed it powerfully and securely, and eyes that watched her first attempt to fly, now gaze in glorious admiration on her present proud career.

On the present state of Science in Great Britain.

No. I. *Edinburgh College Museum.*

Tune impunè hæc facias?—Ter.

When, in our earliest conception of this Periodical, we proposed to ourselves the novel object of occasionally glancing at the state of science in Britain and abroad, we had been lulled into a confident security in the vigorous condition of our own land, and little dreamt how soon a viper, which was hidden in our very bosom, would be warmed to life. A sort of patriotic vanity led us to hope that, in speaking of the modern Briton, we could hold up a model to the world of the rapidity of the mind's course; we looked to our country as an elysium of perfection where all was freedom of thought and action, and where in an especial manner the talismanic name of "scientific student" was an universal passport; and we declared in our enthusiasm, that in this favourite isle the mere atmosphere of philosophy, though unbreathed by the men whom it surrounded, was incompatible with the existence of that overbearing arrogance which ignorance wears as a cloak to conceal her incapacity. But the visions which flit along the study soon lose their indistinctness in the open world, and all the pleasing semblance of perfection is reduced to the harsh outline of an odious reality.

It will be unnecessary, after the statement which was made in onr last number, (p. 169, *Note,*) and after what has taken place in Edinburgh since its publication, to delineate more precisely, to those who are interested, the immediate cause of these desponding reflexions.

If it be the right of any man to complain of disappointment at the perverted condition of domestic affairs, it is undoubtedly ours; for we have not only had to submit to a sense of degradation from an unmannnerly refusal to our polite request to a Professor for rightful aid in our scientific studies, but we have had to listen, during the past month, to the unanimous wail which was bruited in echo to our cry. The voice of the multitude is raised high against the oppressor; and when we hinted at the dissolution of monopoly, we had little foresight how signal it might be.

Convinced, as we were, of the propriety and necessity of the measure, we felt the greatest reluctance in admitting into our last number, that simple statement of facts which has attracted the attention of our fellow townsmen more suddenly and seriously than we had reason to expect, after their long resignation to those unexampled abuses against which we have exclaimed. For we could not avoid the painful sensation of mortified pride when our own beloved science was dragged into contumely by conduct and language from her Professor, which, would it not have been an unpardonable breach of duty in an unshackled man to submit to in quiet, had better have been buried in oblivion than put into the mouth of scoffers for an everlasting byeword. We do most sincerely ask the indulgence of all men of delicate and honourable minds for the imperative line of conduct which they will be convinced that our independence has obliged us to pursue. But now that we have excited, by our personal wrongs, the smothered indignation of an injured public, we shall step unconditionally forward, and not bate one iota of exertion till we see the demon of intolerance cast down, and sacrificed on his own altars, a victim to the tyrannical abuse of power.

In commencing our strictures on the management of the Edinburgh College Museum, we do not hesitate to declare that Professor Jameson, if no other meritorious quality could be detected in his public life, (with which we have at present no concern, except in reference to his office as Keeper of the Museum,) deserves the highest esteem and gratitude from his countrymen, for the unremitting exertions which he has made towards the formation of the Museum of Natural History in this University. He has strained every effort, and had recourse to almost every device, (as Dr. Brewster could relate,) in the furtherance of this great object of his life. And supported by a liberal Government, and assisted by a host of scientific friends, not to mention the extent in which he has been the passive organ through whom Scotchmen have evinced their *amor patriæ,* his endeavours have been crowned with a success which has seldom been equalled in the labours of a single individual. There is in the University of Edinburgh, a collection which is the city's pride and the country's boast.

It may thus more easily be conceived, how, by slow degrees, the growing pride of the successful collector, fostered by the uncontrolled sway, which, for obvious reasons, he was permitted to maintain, has ripened into an unsufferable insolence, which must certainly find destruction in its overgrowth. And additional authority has been gained by the Professor, by depositing within the Museum his own private collection, principally composed, as we believe, of minerals, to which his initial will be found attached.

It is but a small portion, however, of the great bulk of the Museum over which the Professor can have any sort of personal claim. Dufresne's valuable collection of birds, purchased by the University with money borrowed on the expectancy of General Reid's munificent bequest, the stuffed specimens of quadrupeds, the shells, the insects, which may never again see the light of day, "lest the beauty of their colours be destroyed," the collection of British birds, &c. belong undoubtedly to the public; and, notwithstanding the Professor's declaration, we have reason to believe that the skeletons of animals, which are arranged in an apartment separate from the rooms of public exhibition, are not his "private property," but equally a parcel of the public wealth. However, be this as it may turn out,—and the question will be sifted,—do not the public permit these specimens to be deposited in their rooms, on the understanding that they are for public use? and is a servant of the public to be spurned when he respectfully requests permission to see his master's goods? *

After the high terms in which we have spoken of this Museum, it will naturally occur to our readers to inquire, "Why a name so

* Government admits all specimens directed to Professor Jameson, or to the College Museum, to be imported exempt from duty, expressly for the public good; and whatever is so obtained, becomes the absolute property of the public by the purchase which is thus made out of the revenue of the customs. Thus, though the specimens be sent home by the friends of the Professor, and directed particularly to him, he relinquishes his right to them immediately on taking advantage of this regulation.

eminent is not constantly in the mouths of scientific men? Why do we find Dr. Fleming (in his Preface to 'British Animals') singling out for neglect a collection so near his own hearth? We certainly see the figure of this building on the front of Wilson's Illustrations of Zoology; but is this the only work which so redoubted a collection can produce? We see, too, a similar engraving on the cover of the Edinburgh New Philosophical Journal; but we in vain turn over its pages of translations in search of any 'descriptions of new or rare animals,' which this collection may contain." The truth is, discriminating readers, and we will tell it to you in plain terms, that the doors of the Edinburgh College Museum are sealed against the admission of all those who wish to employ the materials therein contained for the purpose of publication; and why? because the Professor, as he stated to the commissioners we believe, considers that "he has a right to a censorship over every publication that is connected with the College Museum, as the descriptions may be inaccurate, and *(proh vanitas!) his* character may thereby be injuriously affected;" or, as on another occasion he excused himself from compliance with the request of a gentleman for permission to make drawings of some specimens, because "he had previously given unlimited permission to Mr. James Wilson for that purpose, and it consequently could not be accorded to another." We will tell you that we have great doubts whether Dr. Fleming himself has free admission. We will tell you that the only use which is made of that Museum, is as a decoy to the class of Natural History, to which it is made entirely subservient, or as "a sight" for the people, at half-a-crown a head, a tax which even those liberal men who have contributed to the collection are obliged to pay! * We will tell you, finally, that there may be other motives, which we do not seek to penetrate, for deterring scientific men from entering a Museum where the teeth of a horse grace the jaws of a dugong, and where the painted pelvis of a cow adorns the skeleton of a fossil elk.

* It is necessary for an individual who wishes to obtain admission to the Museum, either to pay 2s. 6d. for every visit, or to become a pupil of the class of Natural History, (the Professor of which chair, our distant readers must remember, is also Keeper of the Museum.) Two courses of lectures, at L. 4, 5s. each, make a pupil perpetual to the class, and every successive year, by the payment of L. 1, 1s. the Museum ticket may be renewed. By this means *free* admission is obtained twice a-week to a room where the delighted pupil may sate his eyes with gazing, but no other organ must be employed. Some mistaken people say that science cannot be turned to pecuniary account! Others, again, equally in error, believe that money is omnipotent! But though we have made ourselves perpetual to the class of Natural History,—though of the L. 8, 10s. which we have had great pleasure in contributing to the support of a chair which might be made of the greatest service to science, one-half was paid, without reluctance, merely to see one specimen, the blank and forbidding door still opposes its impassable front against our attempts at ingress. We might have been born with teeth in our mouth, a very monster come to devour all knowledge in the world, such care is taken to obstruct our innocent and unpretending studies.

But this condition of things cannot be of long duration. We are aware that it has not been submitted to till now without complaint; but the authorities have avoided an unpleasant duty by continual delay. The Senatus Acadamicus have acted in a manner which can only be explained by observing that a brother Professor is the aggressor; the Town Council could not bring themselves to believe that any difficulties were thrown in the way of the admission of scientific men; and the Royal Commissioners have felt a natural delicacy in such an extreme and obstinate case. The Commissioners were, however, obliged, in one particular instance, to exert their authority, and they then proved their full power to order the doors to be thrown open when their will dictated. But, after all, the gentleman, to whom they gave the unlimited use of the Museum, was driven from his occupations by all the vexatious trifling which determined opposition knows so well how to devise. The crisis, however, is now approaching; the sittings of the Commission are about to terminate; and, if the abuses are not soon removed, a permanent monopoly and prevention will ensue.

We appear, therefore, in the name of the public, and in the name of scientific men, since the ties which arise from local connexion are too powerful to permit others who have been equally injured from advancing openly in the general cause; and we appeal to those who have the power to remove the abuses which so heavily oppress us, to establish an open and liberal system, which may not be perverted by the interest or caprice of the individual in immediate authority.

We know not in whom the control of the Museum is vested, nor to whom the property belongs; but we address ourselves equally to his Majesty's Commissioners, to the Senatus Academicus, and to the Town-Council, in making the following remarks and suggestions on the past and future regulation of the College Museum.

It will at all times be necessary that a distinction be made between those gentlemen who may have to visit the Collection for purposes of scientific labour, and the public at large, whose object does not extend beyond the pleasure to be derived from gratified curiosity.

And first, with respect to the latter: We have not been able to discover any other assignable reason for the heavy exaction which is levied on the people of half-a-crown for every visit to the Museum, which they themselves have in a great measure contributed to form, than that the unassisted funds of the institution are not sufficient for its support. Government allows to the Museum L. 100 a-year, and this, we believe, is the sole income, exclusive of the sums collected at the door. We are unable to say whether any share of the fees which the class of Natural History derives, as, in our instance, from those who are only induced to take out the ticket as a means of admission to the Museum, is appropriated to the aid of that establishment; but we presume, as a matter of course, that the annual guineas which are paid by the perpetual pupils are at least added to its funds. But as it is probable that even with these additions the restricted allowance from Government would ill suffice for the maintenance of so respectable an institution, we are far from desirous of depriving it of those contributions which a liberal public would at all times gladly afford. And we contend, that as in this particular instance there is an excuse for a requisition which no public Museum should be allowed by Government to be obliged to enforce, it would be true policy in the guardians not to permit the extortion of any sum which thoughtlessness may suggest, but to consider what would be most likely to attract the greatest numbers. And it is our firm opinion, supported by the sentiments of all with whom we converse, or whose remarks on this subject are constantly appearing in the public papers, and, moreover, practically formed upon observation of the crowds that flock to see the Hunterian Museum of Glasgow, that if the admission were at a lower rate, the receipts would far exceed their present amount. "Often would I go there with my half dozen of children," says a writer in the Caledonian Mercury, "but I cannot afford for such an object to be leaving 7-8ths of a pound sterling behind me,—although at the expense of a shilling a-head, I would often be tempted to give them a holiday and a treat." Though this gentleman was not aware that, by a recent stretch of generosity, children under twelve years of age are admitted *gratis,* the reasonableness of this remark is equally applicable on the large scale. We have long since been obliged to relinquish our office of *cicisbeo* to our stranger friends from the heavy penalty which our politeness entailed. It would, at the least, be worth the experiment to see whether the reduction of the admission money to one shilling would not be productive of increased revenue to the Museum. It would certainly remove from the people that dissatisfaction which must eventually have a most injurious effect on the collection.

But we do not stop here. *We wish the accounts to be examined:* and if it be found compatible with the support of the establishment, we would have every shadow of restriction removed. We would have the rank of the Edinburgh College Museum raised in this respect to an equality with that of the British Museum, of the Museum of the Royal Dublin Society, and with that of the *Jardin des Plantes.* In short, we would have the public admitted *scot free* on particular days.

Secondly, As to the students of the university: We have stated, that those only who are pupils of Professor Jameson can enter the Museum without the payment of half-a-crown. By whose authority is this singular provision enforced? By whom but the Keeper of the Museum? Now this appears to be one of the most unjust and illiberal proceedings which could be imagined. Not satisfied with the use of the specimens to elucidate *(a non lucendo)* his lectures, the Professor will allow no man who thinks it sufficient to read Scoresby's Arctic Regions at home, or who does not believe the discrimination of mineral varieties to be the summit of natural science, to pursue the study of Natural History in our Museum. We certainly think that those 500 pupils who crowd the benches of Dr. Hope's class have as much right to examine at leisure, in the Museum, the minerals of which they obtain a glimpse at the chemical lectures, as those whose tastes direct them to the class of Natural History, or whose appreciation of the Museum induces them, rather than lose its advantages, to pay the fees. We think that no peculiar privileges of admission should be attached to the class of Natural History,—that the students of all classes should be admitted *gratis* on appointed days,—and that perpetual pupils of all classes should have an equality of access, and this, by the payment of an annual guinea *to the Museum* for general admission to the rooms of exhibition.

Thus much for the purposes of public exhibition. We come now to a far more important subject—the privileges which ought to be granted to men engaged in immediate scientific pursuits. And it is here "the galled jade winces." We do not hesitate to say, that it was the practical instance of prevention which we personally experienced, that stimulated us to an undertaking which is called "public-spirited." We wish that a spirited public, had by prior exertion, relieved us of the unpleasant duty. Alluding to the statement published in our last number, a gentleman, who writes in the Edinburgh Evening Courant, makes the following accurate remark: "Judging from the reports in circulation, and from my own observation, the Museum of the Edinburgh University is truly accessible to certain individuals only, and even to these only by favour." This is the great burden of our complaint. By an unwarrantable allowance, which is at present involved in mystery, Professor Jameson has exerted an autocratic sway over the keys so long, that, from custom, he dreams it has become a right. A few harmless unoffending men, who will never cause the world to say that it is a shame to see the sources of scientific labour glide by the Professor into other hands, are alone, with only one exception that we know, in sufficient *favour* to gain free admission to those rooms. Thus is science retarded by her Professor; and a school of Natural History, which has all the conditions of excellence, made a mockery on the name of Academe, whose spirit is not there.

The regulations which, from much consideration, appear to us desirable with respect to men of science, may be briefly expressed. We think that all men, with stated scientific objects, whether they have already formed their reputation, or whether they have hitherto been debarred from exercising their mind in its favourite bent, should have unreserved admission, on all lawful days, to any part of the collection, as well that which is not adapted for public exhibition, as that which is arranged for show;—that the drawers, which imprison the insects, should be thrown open;—that the collection of specimens and preparations from the Frith of Forth, presented by Dr. Grant, should be applied to the use for which he intended them;—that the Museum of skeletons should be no longer closed;—and, in fine, that the Professor, being permitted to deposit his own collections in the Museum of the public, if he have not the courtesy to allow men of science to examine them, should be directed not to occupy, with useless things, those apartments which might be made the depository of so much treasure yet unexposed on the excuse of want of room.

But we are aware that certain alterations in the present arrangements would be necessary before this object of utility could be carried into effect. For instance, study would be impracticable in the rooms of public show; and a greater number of assistants would be required for giving out the specimens from the cases, taking the receipts, and other contingent duties. But would that the Commissioners may find no other difficulty, in making that Museum serviceable, than these little impediments. Let these, however, be removed, by providing a room where specimens may be examined with convenience, and well lighted to facilitate the labours of the artist. Let an assistant-keeper be appointed by Government, to give out the specimens on application, with a salary,* out of which he may hire two or three under-assistants, for removing them to the apartment appropriated to the purposes of study. If the Museum be deserving of the attention of the Royal Commissioners, it will certainly be worth their while to obtain an increase of the grant from Government, in such a small degree as would be necessary to provide a fixed salary for the assistant-keeper.

By carrying out and establishing these regulations, even in a modified form, we venture to predict lasting honour to the Royal Commission, founded on the satisfaction of the people, and the advancement of knowledge. Men will look back to the period of their authority as a commonwealth where the interests of science were supreme, and where sufficient skill was evinced to provide against those times of exigence, which may otherwise return after their duties are performed, when the office of absolute Dictator will again be assumed.

Thus do we, for the present, terminate our remarks on the influence which the present state of the Edinburgh College Museum must possess over science in Scotland. We repeat our regret at being obliged to take upon ourselves the odious and dangerous duty of pleading on our own complaint, because we are aware that our natural incautiousness, and our Utopian desire and expectation of the perfectibility of things may betray us into a warmth of language and an intemperate display of indignation which ill befits the man of science, even when most grossly injured. We are aware that a comparative estimate of our rank, our labours, and our public name, with those of a Professor of Natural History, would be to our infinite disadvantage. And we know that, if our case were unpre-

* For want of funds to give an adequate salary, the Museum has been obliged to relinquish the valuable services of Mr. Macgillivray, the late assistant-keeper, of whose loss we do not venture to predict the consequence. We wish the Royal Commissioners may see fit to restore him to his office permanently, with a stipend equivalent to his talents for the situation.

cedented,—if, when the public ear was unprepared for such a tale, we were to declare the insult we have received, however frank our terms, we should not be believed. But the people know that any means would be resorted to for the purpose of shutting the Museum against a man anxious to learn and to communicate, and they will be the less surprised when a mistaken security led the Keeper to use language which was unworthy of him. Though we have a personal respect for the Professor, we shall not be thereby led to brook treatment, which must always be destructive of social harmony; but shall ever assert the freedom of the mind, and the competence of all.

A Flora of Berwick-upon-Tweed. By George Johnston, M. D. &c. Vol. I. Phænogamous Plants. J. Carfrae & Son. Edinburgh, 1829.

It might, *a priori*, have been deduced from the anxiety which we have testified for the promotion of Natural History, joined to our habit of associating facts in that science with their geographical relations, that any work presenting a local interest would be considered an acceptable offering to the shrine of our periodical labours; and, independent of any errors the author may have fallen into, or any faults which we may have to correct, we shall always hold the example of such productions as worthy of imitation. Local Floras have long had an extensive circulation, and perhaps no branch of natural science is more worthy of possessing such; but it is only till very lately that the actual utility of labours of this kind has been felt in its fullest extent. That knowledge was destined to progress with the gradual developement of physical geography, and the advance of natural systems towards perfection. Unfortunately in the present work, the most prominent of the practical results are debarred from easy access, from the tenacity with which the author (unable to break the shell of prejudice which confines his countrymen) has adhered to a system of little use but to decypher the names of plants. The utility of a local Flora lies, then, in its being adapted to promote the study of botany in that part of the country which it describes, and in ascertaining, with minuteness, the vegetation of a particular district.

The highest generality to which we can arrive in botany is to ascertain the primitive centres of vegetation: these are generally high uplands or mountain chains. The next point of interest is the *distribution* or the predominance of species, genera, or families, in different zones or climates. This is now completely accomplished by means of what has been called the arithmetic of plants, or their numerical quantities. It is true that, in Dr. Johnston's work, we might ascertain this point by bringing all his species into their natural arrangement, and comparing the numerical product of each family; but we protest against the student having the laborious task of compiling a new work from such an original. The particulars to which we descend, after these considerations, appertain to the plants themselves, which belong to particular creations, special and local, or which, possessing none, are vagabond, propagating from place to place, or separated by immense intervals or spaces. The Flora of Berwick-upon Tweed possesses an additional advantage in its remarkable situation, including the Cheviot hills, Holy and Farn islands, and a varied coast. On the first our author found the lost Cornus Suecica, Festuca vivipara, Rubus chamæmorus, &c. Most of the Farn islands are almost entirely covered with crops of Glyceria maritima, G. procumbens, and Cochlearia officinalis, among whose bushy roots numerous gulls, terns, and ducks build their nests; and on the Pinnacle, one of the Farn islands, occurs the Cochlearia Danica; the Statice armeria, and the S. Limonium, are only found on St. Cuthberts' and Holy island. The latter island, which, at low water, is only separated from the main land by a reach of sand, is terminated to the south by abrupt greenstone rocks, and to the north by sandstones and hills of sand; there is scarcely a tree on the island, and the Rosa spinosissima is the only one of its genus. The castle rock and the promontory of greenstone, on which the ruins of Lindisfarne Abbey stand crumbling, present some distinct vagabond species, as the Sedum anglicum, Sagina maritima, Trifolium scabrum, and T. striatum. There is also on the island a small pond, which presents a rich harvest both to the conchologist and the botanist. The latter may find there the Potamogeton pusillum, P. pectinatum, Alisma ranunculoides, &c. The vegetation of the downs, connected with such important physical changes, is of remarkable interest, on these shores; it consists almost entirely of the Arundo arenaria, and occasional crops of the Phleum arenarium, dispersed among which are the Ononis arvensis, Echium vulgare, Festuca rubra, Glyceria rigida, &c. The Scirpus caricinus grows on the sandstone rocks; the Rhodiola rosea, Eriophorum pubescens, and Scilla verna, are met with on the sea coast; and the Veronica filiformis, figured as the frontispiece of this little work, is said by our author to constitute a part of the Flora of Berwick-upon-Tweed. We understand that a specimen of this plant was sent to the Plinian Society of this city, that the species might be identified; but, notwithstanding the wisdom accumulated within its walls, we never heard of any decided opinion having been given on the characteristic distinctions of the plant. We cannot carry this analysis any further, though we have not pointed out one half of the interesting features which the vegetation of this district presents. Dr. Johnston's work is meritoriously preceded by an outline of the geognostic structure of the tract of country included in the Flora, and which does too much justice to the author, the Rev. A. Baird, that his name should not be mentioned with it. Further, this work is not a dry detail of scientific names, but contains short remarks on the uses or history of occasional species, and is interspersed with tasteful literary decorations; the chapters being generally introduced by pieces of poetry, as the meetings of the Parisian Academy of Beaux Arts are preceded by the harmonious sounds of music. The work is, by these means, equally adapted for the companionship of a fair florist, or the analytical eye of the more earnest student.

The Library of Entertaining Knowledge. Vol. III. Part I.—The Pursuit of Knowledge under Difficulties.—August 1829. Lond. Charles Knight.

We speak not now of the general character of this work. The important subject of which this Part treats, claims our first attention. On the influence which the productions of the Society of Useful Knowledge must exercise over this country, we may afterwards be inclined to give our opinion.

Next to stimulating in a people a desire for emancipation from the slavery of ignorance, and putting within their reach the means by which it may be effected, no object is more calculated to favour their progress in improvement than that of supplying them with instances of perseverance and success. For the mind needs constant support under the trials which always attend its direction in a particular path, and the spirit of emulation will often lead men to overcome difficulties which would have appeared insuperable, but for the previous examples of their fellow men.

The impulse of genius is unfortunately but too vacillating, throbbing with victorious energy during the consciousness of power, but sunk to despair in unfavourable circumstances. The contemplation of a standard then, though it be of mere plodding talent, where no unpropitious fortune could cast down the mind, will often rouse to activity the disappointed and weary student. Let the pride of superiority be excited, and the same organization which can produce that sentiment, will also give the qualifications which shall lead their possessor to success. Determination is half the deed.

This little book illustrates, by anecdotes, the strength of that passion for knowledge which animated Archimedes, Leibnitz, and the persecuted Galileo; the little effect a humble station and obscure origin had on Epictetus, Haüy, Winckleman, Duval, or Metastasio, Linnæus, Ben Jonson, or J. Hunter; the late periods of life at which Cromwell, Cato Censor, Alfred, and Moliere began to learn; the early age and short lives of Newton, Gregory, Torricelli, Pascal, Mozart, Raphael, Correggio; and the discovery of those immortal truths which have been displayed by a host of self-educated men. Of self education the author writes thus practically, (pp. 16, 17.)

"Every thing that is actually known has been found out and learned by some person or other, without the aid of an instructor. This is the first consideration for all those who aspire, in the present day, to be their own instructors in any branch of science or literature. Furnished as society now is, in all its departments, with accommodations in aid of intellectual exertion, such as, in some respects, even the highest station and the greatest wealth in former times could not command, it may be safely asserted, that hardly any unassisted student can have at present difficulties to encounter, equal to those which have been a thousand times already triumphantly overcome by others. Above all, books, and especially elementary books, have, in our day, been multiplied to an extent that puts them within the reach almost of the poorest student; and books, after all, are, at least to the more mature understanding, and in regard to such subjects as they are fitted to explain, the best teachers. He who can read, and is possessed of a good elementary treatise on the science he wishes to learn, hardly, in truth, needs a master. With only this assistance, and sometimes with hardly this, some of the greatest scholars and philosophers that ever appeared have formed themselves, as the following pages will shew. And let him who, smitten by the love of knowledge, may yet conceive himself to be on any account unfortunately circumstanced for the business of mental cultivation, bethink him how often the eager student has triumphed over a host of impediments, much more formidable in all probability than any by which he is surrounded. Want of leisure, want of instructors, want of books, poverty, ill health, imprisonment, uncongenial or distracting occupations, the force of opposing example, the discouragement of friends or relations, the depressing consideration that the better part of life was already spent and gone,—these have all, separately or in various combinations, exerted their influence either to check the pursuit of knowledge, or to prevent the very desire of it from springing up. But they exerted this influence in vain. Here then is enough both of encouragement and of direction for all. To the illustrious vanquishers of fortune, whose triumphs we are about to record, we would point as guides for all who, similarly circumstanced, may aspire to follow in the same honourable path. Their lives are lessons that cannot be read without profit; nor are they lessons for the perusal of one class of society only. All, even those who are seemingly the most happily situated for the cultivation of their minds, may derive a stimulus from such anecdotes. No situation, in truth, is altogether without its unfavourable influences. If there be not poverty to crush, there may be wealth and ease to relax, the spirit. He who is left to educate himself in every thing, may have many difficulties to struggle with; but he who is saved every struggle is perhaps still more unfortunate. If one mind be in danger of starving for want of books, another may be surfeited by too many. If, again, a laborious occupation leave to some but little time for study, there are temptations, it should be remembered, attendant upon rank and affluence, which are to the full as hard to escape from as any occupation. If, however, there be any one who stands free, or comparatively free, from every kind of impediment to the cultivation of his intellectual faculties, surely he must peruse with peculiar interest the account of what the love of knowledge has achieved in circumstances so opposite to his own."

The anecdotes which have been selected are of that encouraging kind with which the history of human knowledge so much abounds; and we feel, from their effect on our own mind, the important influence which they must necessarily work on others. We rise from the perusal of this volume, able to laugh at disappointment in the face, and struggle on in hopes of more prosperous fortune. And we recommend to the attention of all classes, a collection of facts so well calculated to support the flagging energies of the recognised philosopher, and to draw from seclusion those talents which are too often lost from the mere accident of privacy, or from an unworthy fear.

GEOGRAPHICAL COLLECTIONS.

Recent North-West Voyages.

We are indebted principally to Murray's North America, and Captain Sabine's account of the north-west voyages, for the following attempt at briefly chronicling the bold and skilful efforts of those navigators whom Britain sent, in the hour of peace, to cull more noble laurels than those of war, and that can only be gained by extending the boundary of human knowledge. And if perseverance does not, at its first endeavours, overcome all obstacles,—if the eye of knowledge cannot at once penetrate the mists and ices which surround the shores of the northern archipelago,—and if the practical results do not, in the first moment, answer the hasty and sanguine expectations of the multitude, still none of these considerations can detract from the credit which must ever be attached to these meritorious researches. America itself was not discovered in a day. How far has the Ultima Thule of the Romans been removed ? And what an extent the Erythræan Sea has gained ? How large a continent, and what innumerable isles have been found stretched over its surface ?

In the history of geographical discovery, we always find that the difficulties vanish as our acquaintance with them becomes more familiar. Thus the Blue Mountains of New South Wales, considered by the first settlers as an insurmountable barrier, are now passed with ease, and civilization extends to the plains beyond, as once dreaded seas are now covered with the vessels of many nations.

The influence of civilization on climate is immense. The cold impenetrable forests of North America, were clothed with one continued mist ; but as they were gradually felled by the European axe, the sun-beams came to gladden the soil, and a rich vegetation sprung forth. Years of an undisturbed possession of seas, apparently strewed with islands and peninsulas, have allowed the icebergs to cement together in fearful array, and the ice of still bays has extended into the sea, and now binds down the restless wave. But were this union once broken, the loosened ice would float to melt in more southerly latitudes,—the ravenous bear would be borne on the tall *berg* to the shores of Iceland, to meet with merited destruction ; and were this navigation to be continued, the same changes would comparatively be produced in the polar seas, as have ever resulted from the progress of civilized man in unexplored lands and seas.

The obstacles which lie in the way of diseovery, are then, according to our opinion, connected with the physical existence of a state of things, which, if once removed, would themselves furnish the means of further explorations ; but it would be as ridiculous to suppose that two or three journies, undertaken by however experienced navigators, could lay open a passage blocked by the accumulated ice of ages, ascertain the existence and boundaries of the continent and adjacent islands, or prepare them for the partial colonization of northern nations, as to suppose that the plantation of forests would at once bring moisture and cultivation into the deserts of Africa, and that, in a few years, Timbuctoo might be the capital of a flourishing and civilized empire.

The end of all expeditions can only, at the present, be to determine the existence of the eastern outlets of the Polar Sea, the direction of the currents, the depth of water, and extent of land and coasts ; and finally, to ascertain the revolution of seasons, the actual temperature and the variations of climate ; and then the energies of man might be directed with success in seconding the efforts of nature, and then it would not be at all visionary to come to conclusions pretty nearly similar to those we have hinted at.

By making these general statements, our readers will be able to perceive an importance in the labours of our enterprizing countrymen, and a foresight and ability in that government which directed their efforts, which would be lost upon them did they keep only in mind the simple passage of a ship from Baffin's or

Hudson's Bays to Behring's Straits.—a point at which the increased activity of the Russian empire is already beginning to exert a great influence; and a country which, in Captain Cook's time, was a land of snow and ice, now presents a materially improved aspect, as the seas are gradually getting clearer, and less covered with ice.

Of two expeditions which were fitted out in 1818, the Dorothea and Trent, under the command of Captain Buchan, appointed to endeavour to reach and penetrate across the North Pole, and the ships under the command of Captain Ross, we have only records of any length of the latter. Of Captain Buchan's expedition, we only know of the difficulties he encountered, and of the ultimate failure of the plan. But Captain Ross's expedition was destined to lay the foundation of a series of navigations and researches, which were carried on with more spirit and enthusiasm than had hitherto been recorded in the annals of maritime or geographical discovery.

On the 18th of April, the expedition, consisting of the Isabella, on which Captain Ross had hoisted his flag, and the Alexander, under the command of Lieutenant Parry, dropped down the river, and about the 30th arrived off Shetland. On the 26th of May, Cape Farewell and icebergs came together into view. On entering Davis' Straits, they found its centre occupied, as usual, by an unbroken barrier of ice, and were obliged to work their way through a narrow and precarious channel along the coast, so that it was the 5th or 7th of August before the higher latitudes of Baffin's Bay were attained. Captain Ross sailed up by the north-eastern shores of this bay, and passed consecutively, and, according to some statements, cursorily and hastily, Worsenholme and Whale Sound, Sir Thomas Smith's Sound at the head of Baffin's Bay, Ross's Sound, and Alderman Jones' Sound, till, navigating in a southerly direction, they arrived at Lancaster Sound: it seemed to be 40 or 50 miles wide, and bordered by magnificent ranges of mountains. Its breadth, extraordinary depth, and increased temperature of the water, tended to inspire the most sanguine hopes. After proceeding 30 miles, however, thinking that the land approached, and being led to consider it as a mere inlet, the commander gave up the exploration, and stood out of the bay. In proceeding to the south, Captain Ross came upon Cumberland Straits; but it being now in the month of October, he considered himself bound by his instructions not to remain longer in the ice. On his return to England, it became a subject of much discussion, how far, in quitting Lancaster Sound, he might have been led astray by the appearance presented by all winding streams of terminating abruptly. Mr. Barrow instanced many cases of these deceptive appearances, and Lieutenant Parry, in particular, describes himself "as full of the most sanguine hopes at the very moment when, for reasons to him unaccountable, he saw the head of the Isabella turned out of the sound—a movement which his duty bound him to follow."

The Admiralty determined to fit out a new expedition, consisting of two vessels, giving the command to Lieutenant now Captain Parry. The largest was the Hecla of 375 tons, carrying a crew of 58 men, in which he himself sailed, the other was the Griper, a 12 gun-brig of 186 tons, commanded by Lieutenant Liddon, with a ship's company of 36. They were provided with coals and provisions for two years.

The two vessels left the Nore on the 8th May 1819, and arrived by the 18th of June in the middle of Davis's Straits. The barrier of ice was still close, but Captain Parry made his way round by Sanderson's Slope and the Woman's Islands, and at lat. 73° crossed this formidable barrier. On the 2d of August the expedition had a full view of Lancaster Sound: there was no appearance of ice or land, and a violent pitching of the sea from the westward. After passing various headlands, and two large openings, (Navy Board Inlet, south, and Croker's Bay, north,) they came, in long. 86° 30′, to two inlets, which they called Burnet and Sratton, and afterwards a cape, which they named Fellfoot. They gave the name of Prince Leopold to two islands which they shortly after came in view of. They discovered to the northward a large space of open sea, over which was a dark water sky, and turning their course in this direction, they entered a great inlet (Regent's Inlet) ten leagues broad: to two capes at its western extremity, they gave the name of Clarence and Seppings. Along this they ran about one hundred and twenty miles to the southward, when they were forced to return by the extensive floes of ice which inclosed them on every side: the extreme point of land in view, they named Cape Kater. In their way northward they discovered a small bay, forming a fine and secure harbour called Port Bowen. The vessels were now brought back to Prince Leopold's Islands, to watch for an opening in the great western barrier of ice. This occurred on the 21st. The expedition had afterwards an almost uninterrupted run; and before the end of August they had passed a range of coasts, which they had reason to believe were large islands, and which were called in their order, Beechey Island, Cornwallis Island, Bathurst Island, and Byam Martin Island, and in the middle of the channel was a smaller one called Lowther Island. West of Cornwallis was a fine inlet opening to the north, to which they gave the name of Wellington, while the whole of the great channel from thence to the opening of Lancaster Sound, received the name of Barrow's Straits, to whose exertion and influence this expedition had been so deeply indebted. A little beyond the 105th degree, they made an island much larger than any of those they had hitherto reached, and which they called Melville Island. On the 8th of September the advance of the vessels became impeded by a fixed barrier of ice, through which they were finally obliged to saw their way into *Winter Harbour*. Here they had to pass their first winter, and it was not until the middle of June 1820, that the ice appeared in a state of rapid dissolution.

It was not till the 20th of August that the entire ice drifted out, and left them an open channel in which to proceed. After many useless endeavours to force through this passage, and after reaching the meridian of 113° 48′ 29″, and the extreme western point of Melville Island, (Cape Dundas,) they came to the resolution of retracing their steps, and endeavour to find some channel leading northward, or to return to England. Their attempts to find this channel proved fruitless, and they returned, after encountering very rough weather in Baffin's Bay and on the voyage home.

On the return of this expedition, Government proposed to send out another in a new direction, and accordingly the Fury (Captain Parry) and Hecla (Captain Lyon) were prepared during winter for a second expedition. Captain Parry sailed from the Nore on the 8th of May 1821, on the 10th was off Buchanness, on the 7th June came a-breast of Cape Farewell, and on the 2d of July came in view of Bluff Point in Resolution Island, at the entrance of Hudson's Bay. At Savage Island they were met with by a host of Esquimaux, and early in August they reached the interior of the bay, and came in sight of Southampton Island.

Captain Parry now made for the Frozen Strait of Middleton, (Fox's Channel,) and on the 15th came to what was apparently the extremity of Southampton Island, separated by a narrow strait from land to the north. Considering this to be the Frozen Strait, he passed through it, and entered an immense basin and excellent harbour, to which they gave the name of the Duke of York. From this they penetrated into another strait, and gained the Channel of the Welcome. They examined and ascertained the existence of Repulse Bay, and verified many of Middleton's observations, besides noticing many new islands, and searching several deep inlets and openings. While exploring Lyon's Inlet, the winter set in, and Captain Parry had again to make his preparations for passing that severe season under such extraordinary circumstances.

On the morning of the 20th July, after being nine months imprisoned in the ice, the expedition set sail in search of the strait which was to lead them into the grand basin of the Polar Ocean. Previous to their departure, an Esquimaux woman, by name Iligliuk, had drawn for them a map of the distribution of land in these seas, and they proceeded in an unobstructed course, verifying this map, coming to high land delineated in the Esquimaux charts, and finally arriving at an inhabited island called Igloolik. The strait was here blocked up by a level and continuous floe of ice, near which Captain Parry spent nearly a month in endeavouring to work forward the ships against this formidable obstacle. In an excursion made on foot over the island, they saw the shores separate beyond the narrowed point of the strait, and no land could be seen to the utmost limits of a clear horizon. Captain Parry gave to this strait the name of the Fury and Hecla. They succeeded in gaining the narrowest part of the strait, but could get no further, and at length, after much deliberation, took up their winter station at Igloolik. Captain Parry had matured a very bold plan. The Hecla was to have been sent home, the greater part of the stores put on board the Fury, with which he was to have adventured another winter, and taken the chance of what he might effect in this and the following summer; but serious symptoms of scurvy began to show themselves,—the medical men were unfavourable to such an exposure of the sailors, and there was no alternative left but to make for England with all speed. On the 17th September, a westerly breeze carried them into the open sea, and, shaping their course across the Atlantic, they arrived on the 10th of October in Bressay Sound, Shetland.

Under the impression that the situation of Prince Regent's Inlet, south of Barrow's Straits, might preserve it from the action of those westerly currents which blocked up the straits of the Fury and Hecla with floes of ice, Captain Parry was fitted out for a third voyage, to penetrate through this inlet into the Polar Sea, and Captain Hoppner was made his companion in the Hecla. He sailed from North Fleet on the 18th of May 1824, and in the middle of June had made his entry into Davis' Straits, and found the season peculiarly rigorous: the barrier of ice was immoveable, which obliged them to go as high as 74°, to get round this barrier. The 9th of September had arrived before they had succeeded in reaching its termination. On the 26th, they found themselves at the entrance of Prince Regent's Inlet, and on the 27th at Port Bowen, and here they once more were doomed to pass a polar winter. The spring was more favourable than they had found it in Hudson's Bay. On the 19th July 1825, the floe which extended across the harbour separated, and on the 20th they were out at sea. They stood across the inlet, passed Leopold Islands, touched the continent near Cape Seppings, and thence proceeded down the strait, till on the 30th, a hard gale blowing from the northward, brought in the ice upon them; and so disastrous were the consequences, that it became necessary to abandon the Hecla, and her men and part of her stores were removed on board the Fury. After so dreadful a disaster, every idea of prosecuting farther the objects of the voyage was of necessity abandoned; and it being now the end of August, there was just time to regain their native coast before winter. After an easy passage across the Atlantic, they made their way round the northern border of the Orkney Islands, to Peterhead, and thence to the Thames. The existence of a Polar Sea, the separation of Greenland from the continent of America, the dispersion of numerous groups of islands between these two territories, the final junction of Hudson and Baffin's Bay, are among the more striking geographical results of these voyages; but connected with future researches, and those changes to which we have before turned the reader's attention, we have learnt the existence of currents constantly moving to the west,—we have seen Captain Parry navigate up Baffin's Bay, to arrive *above* the great floes of ice brought down by these currents,—we have seen the deposition of these ices intimately connected with the situation of the straits and inlets, that when not impelled by contrary winds, or local and occasional currents, the ice moves constantly to the west,—that the western sides of seas and inlets, having a tendency at all approaching to north and south, are, at a given season of the year, generally more encumbered with ice than those shores which have an opposite aspect,—and finally, we have seen, as might *a priori* have been supposed, that the temperature of the water coming from the Polar Seas is higher than that of the frozen bays and inlets. Upon the constancy of some of these phenomena, we have further seen an expedition planned, and we must remain convinced, that instead of this current, as advanced by some writers, bringing the masses of ice so closely along as to render the navigation of these channels for ever impracticable, that when once broken up, they might, more especially in narrow straits as those of the Fury and Hecla, never unite again with such strength, but that the passage would, with the return of spring, be opened again at a much earlier season than when visited by the first navigators of these inhospitable seas.

Results of the Geographical and Geognostical Labours of MR. PENTLAND *in Southern Peru; by* MR. ALEXANDER DE HUMBOLDT. (HERTHA, T. XVIII. Cah. 1.)

"THE results which I communicate to geographers and to natural philosophers, (says Mr. de Humboldt,) may be ranked amongst the most remarkable with which science has been enriched for some time. Mr. Pentland, a traveller whose labours, though not numerous, are full of merit, and have been published in the memoirs of the Geological Society of London, is personally known to me for several years back, and I look upon him as a distinguished naturalist. He has studied several years at Paris with Mr. Cuvier, and profited by all the instruction which that excellent school can furnish. To an extended knowledge of zoology and comparative anatomy, he added, shortly before my departure for America, the practice of geological research, which he put into exercise in a journey to the south of France, and in parts of Italy. He was preparing himself for a scientific expedition to the East Indies, when he was joined to the British embassy to Peru.

I immediately foresaw the excellent results of the mission, and I begged the illustrious minister of state, Mr. Canning, to send Mr. Pentland, provided with instruments, on the elevated and unknown plateau of Titicaca. Mr. Pentland obtained all the astronomical and hyposometrical instruments that he desired. I do not know if he had occupied himself in Europe with geographical and astronomical observations; but I can attest that he had made in Italy several very exact barometrical measurements for the outline of his geognostic profiles. It must have been easy for him, in a long voyage round Cape Horn, to accustom himself to the use of chronometers, and of instruments of reflexion; and we may judge of the degree of exactness of his measurements, if, as we have every reason to hope, he publishes the details.

If it is true, as Mr. Pentland assures us, that the limits of eternal snow are more elevated by 260 toises in the plateau which he has explored, than in the chain of the Andes of Quito, it is easily understood why to the eye the summits of the Illimani and the Sorata do not appear to surpass the Chimborazo.

In the absence of direct measurements, the only means of judging are relative: they are, at the same time, the elevation of the summits above the limits of eternal snow, and the distance at which this summit remains visible in the plain. The mountains in the south-west of La Paz, and in the province of Larecaja, have always been considered as very lofty; but as they had never been measured, we had not even any idea of the height of the plateau which serves them as a basis. It had been hitherto impossible to establish any relation between the Chimborazo and the Sorata.

In point of fact, the height of mountains is not a geological phenomenon of so much importance, that we must feel surprized if culminating points are discovered in an unexplored chain more elevated than those anteriorly known, and the number of summits measured from Cape Horn to the peak of Tolima, and to the Sierra Nevada of St. Marta, is very small."

This introduction of Mr. de Humboldt suffices to establish the degree of confidence which may be given to the observations of Mr. Pentland, and already indicates the regions which he has explored. We shall now extract the positive documents, which he communicated to his illustrious predecessor in two letters, of which one was meant to rectify some mistakes which had crept into the too hasty publication of his principal observations in the French journals.

"Shortly after my arrival at Lima in 1826, (says Mr. Pentland,) I received from my Government an order to explore the provinces of High Peru, I in consequence went by Arequipa to Puno, traversing the western chain of the Andes. I coursed through the provinces of Lampa and of Puno, and the banks of the celebrated lake of Titicaca, whose surface includes more than 6000 square miles. I visited the islands of Titicaca and of Coata, which are covered with the ruins of edifices of the ancient civilization of Peru. I saw the more recent, but still more surprising remains of Tia Huanaxo. I passed a few weeks in the rich town of La Paz, and from thence I went by Oruro and the valley of Desaguadero, to Potosi, Tupisa, and Tarija. I afterwards came back to the north, to Chuquisaca. After remaining two months in this latter town, and after having explored the provinces of Chayantes, Yauriparaes, &c. I went to Cochabamba, and from there, by crossing the eastern Cordillera in the neighbourhood of Paria, I came back to the province of Pacajes and to La Paz. It was my wish to have explored the districts of Apolabamba and of Larecaja; but having received from the British Government orders to depart for Europe, I a second time crossed the western branch of the Andes, between La Paz and Tacua. I quitted Peru in the month of May 1827, and touched on my return at Rio Janeiro."

Mr. Pentland made at Lima and at Callao a considerable series of observations, to determine the diurnal and horary variations of the barometer at these two stations. These observations have been sent to Mr. de Humboldt. The mean height of the barometer at Callao, reduced to the level of the sea and to the temperature of 0, and corrected for the effects of cappilarity, is of 761 millimetres. That which was observed at Lima is of 749.52 millimetres, at a temperature of 15.6° cent. which gives for that town an elevation of 79.75 toises above the southern ocean. The instruments employed were two excellent barometers of Fortin. Mr. Pentland had the good luck, during all his excursions into the mountains, to preserve them in the best condition. He has in consequence made, by means of the barometer, the measurement of several hundred points of elevation, on which the greatest confidence can be placed. Lastly, he has taken trigonometrical measurements of the height of several peaks whose elevation surpasses that of Chimborazo by several hundred toises, though to the present day it has been considered as the most elevated point of the new continent.

The great chain of the Peruvian Andes divides itself, between the 14th and 20th degree of south latitude, into two longitudinal branches. These two branches are separated from one another by a great valley, or rather by a plateau, whose surface is elevated 2033 toises above the level of the sea, and whose northern extremity comprises the lake of Titicaca. The shores and the islands of this lake are remarkable as for having been the seat of the ancient civilization of Peru, and the central point of the empire of the Incas. The western chain separates the bed of the lake of Titicaca, and the valley of Desaguadero forms the coast of the southern ocean, and presents a great number of volcanoes in actual activity. Its geognostic constitution is essentially volcanic, whilst the eastern chain is entirely formed of secondary and transition mountains of mica slate, of syenite, of porphyry, of red sandstone, of red marle containing rock-salt, of gypsum, and small formations of oolitic limestone.

I. *Eastern chain of the Andes.*—The eastern chain separates the elevated plateau or the valley which incloses the lake of Titicaca from the immense plains or steps of Chiquitos and Moxos. It thus forms the line of separation between the course of the Rio Beni, of the Madeira, and of Paraguay, and the streams of water which flow into the lake of Titicaca and into the Desaguadero. A great number of torrents which are poured into the Rio Beni bring with them auriferous sand. One of these rivulets deposited so great a quantity of this sediment, that it gave to the little valley of Tipiani, in the district of Larecaja, the name, which became so celebrated, of Dorado, or of El Dorado. From the 14th to the 17th degree of latitude, the chain attains, without interruption, the inferior limits of eternal snow. Many of its peaks surpass the height of 20,000 feet, (3127.5 toises,) and it contains the most elevated summits of the Cordilleras which have hitherto been attempted to be measured. Those of Illimani and of Sorata, which are covered with eternal snow, surpass all the gigantic peaks of Columbia, of Chimborazo, of Antisana, and Cayamba.

The Illimani is situated in the Bolivian province of La Paz, twenty leagues E. S. E. of the town of that name, (Lat. S. 16° 29′ 30″, Lon. W. 48° 32′.) Like the Chimborazo in another chain, it forms the southern extremity of the eastern chain of the Andes, to which it belongs. By astronomical observation, it is between 16° 35′ and 16° 39′ south lat. and between 67° and 68° west long. of Greenwich. Its summit is divided into four peaks, arranged in a direction pretty nearly from north to south, or in that of the entire chain. Mr. Pentland only succeeded in measuring the most northerly of these peaks : he found its elevation to be 24,000 feet above the level of the sea, or of 12,000 feet above the town of La Paz. But one of its more southerly peaks appeared to Mr. P. more elevated by 250 feet, judging from the place on which he stood. The bad weather prevented him ascertaining the actual difference of height.

The determination of the height of the Illimani was accomplished by a trigonometrical operation, executed on the borders of a little lake at the foot of the mountain. The observation of the barometer gave for the elevation of the plain where this lake occurred, 15,951 feet above the level of the sea. The length of the lake was, in the first place, trigonometrically determined by a good theodolite, and the angle of the mountain was then taken at the two extremities of the lake, with one of Troughton's sextants and an artificial horizon. The operation was easy to execute, and the angles of elevation, measured at the extremities of the base, comprehended more than 22°. Mr. P. has supposed in his calculation, that the effects of refraction equalled 1-25th of the arc measured. He has nevertheless reason to think, that in so rare an atmosphere, with a temperature of 6° cent. at mid-day, and under a barometric pressure of 431.65 millimetres, this element has been considered too high. In this case, the height of the mountain would be still greater than has been indicated. The highest point to which Mr. Pentland arrived himself, in climbing the Illimani, was 19,000 feet. He could not reach a greater height, not so much on account of the rarefaction of the atmosphere, as on account of the number of rents which occur in the glaciers which must be crossed, for glaciers occur in this part of the Andes. There came on besides a violent storm, which threw clouds of snow into his face, so that he was obliged to relinquish the hopes he had conceived, of carrying his barometer to the summit of the Illimani.

That point of the coast of the southern sea which lies on the same parallel as the Illimani, occurs between Quilca (lat. 16° 41′) and Morro (16° 30′,) and between 72° 41′ and 73° 20′ west longitude, by a mean of the observations of Captain Hall and of Al. Malaspina. Now the summit of the mountain in question is between 67 and 68°. It therefore results that the point of the coast which is due east of the Illimani, is at an horizontal distance of 5° 30′ of an arc, or, in round numbers, 330 nautical miles, which explains why this lofty mountain is concealed from navigators by the western chain of the Cordillera, which is between it and the sea.

With respect to geognostic constitution, the Illimani is composed of secondary rocks, of transition slates, and of mica slates, altogether similar to those of the Alps of Maurienne and Tarentaise in Europe. These beds are traversed by numerous quartzose veins, containing auriferous pyrites and native gold. Some of these veins, though at an elevation of 17,000 feet, have been worked by the ancient Peruvians long before the arrival of European colonists.

In the northern region of the eastern chain of the Cordillera, almost in the centre of that part of its crest which is covered with snow, and from the centre of a group of nevados, rises the mountain of Sorata, under 15° 30′ south latitude. This peak belongs, like the Illimani, to the Bolivian province of La Paz, and is situated to the east of the village of Sorata, the most remarkable place of the district of Larecaja. Its height is 25,000 feet. It results from a trigonometrical measurement made on the borders of Titicaca, at the height of 12,760 feet: it also results from the determinations obtained at a less distance, of the portion of the mountain which rises above the line of eternal snow. Between the 13th and 17th degrees, Mr. P. seldom found this line lower than 17,000 feet on the flanks of the eastern chain of the Peruvian Andes.*

Between the parallel of the Illimani and that of 21°, the eastern Cordillera does not offer a single summit which attains the limits of eternal snow, though several rise to 16,000 feet, and even higher, since the Cerro de Potosi, which belongs to this portion of the eastern chain, has 16,080 feet. At 21° 15′ occurs the Nevado de Chosolque, at 12 leagues N.W. of Tupica. But south of that latitude, Mr. P. met with several peaks covered with eternal snow.

The snow-clad mountains which are seen to the north of Cochabamba, under the latitude of 17° 23′, do not belong precisely to the eastern chain of the Cordillera, but to a transverse chain which detaches itself from the preceding, and prolongs itself to the east, across the fertile province of Cochabamba, lowering more and more. The Indian race of Yuracaraes inhabits the lower parts of this chain, which terminates in the immense plains of Chiquitos. The natives give it the name of Cordillera of Cochobamba: it separates the valley of Gupai-el-Grande from the beds of the Rio Beni and the Mamoré.

(To be continued.)

Anomalous Rise in the Waters of Lake Leman, (Lake Geneva,) and the Rhone, in August and September 1829. Bib. Univ. T. xlii. p. 86.—The singularity of the season which has just terminated, has given rise to a remarkable anomaly in the rise of the waters of Lake Leman, and of the Rhone, at its issue from the lake. These waters being essentially fed by the melting of the snows and ices of the mountains of Valais, ordinarily increase and decrease regularly with the temperature; so that their maximum of height takes place almost always in August, and their minimum in February, without the rains having any remarkable influence upon this periodicity. This year the summer has not been very hot, and, at the same time, the months of August and September have offered a greater quantity of rain than has been known to fall at that season for the last twenty-three years. It resulted from this, that the waters, after having attained their regular maximum on the 1st, 2d, and 3d of August, amounting only to $11\frac{1}{2}$ inches above the mean height of the twenty-three preceding years, lowered in their regular course to $2\frac{3}{4}$ feet below that height on the 6th and 7th September, and then, on the 29th of September, re-ascended 14 inches above the mean, thus giving in this month an oscillation of $16\frac{3}{4}$ inches, in a direction opposed to that of their annual course.

Out of twenty-three years of observations made by Mr. Messaz, director of the hydraulic machine of Geneva, we only find one example of that anomaly, and that in a much less marked degree. In 1822, the waters attained their regular maximum the 6th and 7th of August, which was 23 inches above the mean: they descended the 29th of August to $16\frac{3}{4}$ inches above that same mean, and then re-ascended rapidly to the 3d and 4th of September, when they attained 26 inches. The oscillation was then only of $9\frac{1}{4}$ inches. It is true that it was very rapid.

That we may be able to form a more correct idea of the value of these quantities, we will mention, that in the twenty-three years of observations, the mean of the low and high water deviates 29 inches from the general mean; that the max-

* A singular result; for at Quito, under the equator, the limit of snow is at 2460 toises. Probably that, as in the interior of Asia, there is a radiation of caloric, arising from the elevated plains which surround the mountains.—*Note of Mr. de Humboldt.*

imum of high water, in that space of time, has been 51 inches above that mean, (10th July 1817,) and the minimum of low water 26 inches below, (17th February 1826.)

Expedition in Southern Africa.—We have already had occasion to express our opinion of the importance of explorations in the different parts of those extensive territorial acquisitions which Great Britain has obtained, either by her valour, or, in former days, by the wide career engendered by the fearlessless of the privateer, or the more peaceable spirit of commerce—in latter times by the more honourable ambition of adding to our knowledge of the globe which we inhabit, and of spreading a benign philosophy among ignorant savages.

Often have we, in common with most men of cultivated understandings, been at once surprized and grieved at the apathy and indifference shown in regard to the natural riches of districts perhaps long colonized by our countrymen, and of the want of knowledge of possessions whose resources we were oftentimes at length made acquainted with by the labours of a foreigner.

These reflections are now, however, gradually becoming more inapplicable. The spirit of individuals is now meeting with the support of Government, and expeditions for geographical research are planned with rapidity, and as liberally executed.

Dr. Smith, well known for his zoological researches at the Cape of Good Hope, on his return from an expedition made at his own expense into the interior, has been so fully convinced of the possibility of penetrating to, and reaching that part of the country situated under the line, that he has made application to the colonial secretary, Sir George Murray, to permit an expedition to start under his care, at Government's expense, with the view of carrying this plan into effect. The application has been forwarded with the support of the present governor, Sir Lowry Cole, who is much disposed to encourage all kinds of inquiry, and anxious to promote the cause of knowledge. We heartily wish that such a proposal will meet with approbation, as from our knowledge of Dr. Smith's abilities as a naturalist, we are certain that it would be accompanied with much benefit to science, and because we think that, in times of peace, the attention of our colonial government cannot be turned to any thing of more importance, and of more interest, than the furtherance of geographical knowledge. We understand that, by the same gentleman's exertions, a society has been established at Cape Town, for the purpose of promoting the study of natural history. Sir William Jardine, Dr. Brewster, and Professor Jameson, have already been named honorary members, and we wish it every success.

Austrian Travellers.—Professor Riepel intended exploring this year a part of the Austrian Alps. This naturalist already possesses a superb collection in geology, which fills several of the apartments of the Polytechnic School. At the present moment, the two dealers in entomological objects, Dahl and Parreis, are exploring countries little visited till the present time by entomologists; the first is in Sicily, the latter in the Crimea. A young naturalist, Dr. Lhotsky, is preparing himself for a journey of natural history in New Holland. The magnificent work of Dr. Pohl on the plants of Brazil, accompanied with an entomology of that country by Mr. Kollar, is nearly published, and the narrative of his journey is ready for the press.

Hansteen's Journey.—Dr. Erman is now on his return to Europe through Kamtschatka, China, and round the Cape. Dr. E. has made two very singular discoveries: first, that the whole of Siberia from the European frontier up to the Bay of Ochotsk is intersected by good roads: secondly, that in as far as the geological structure of mountains can lead to conclusions relative to their contents, it is highly probable that the northern descent of the chain of the Ural may contain gold and platina, in the same quantity as lately discovered on the western and southern declivity of the same mountain ridge. Should this latter conjecture prove well founded, Russia will be abundantly supplied with the sinews of war.

Expedition to the Antartic Pole.—The American brig Anwann is to sail from New York on a voyage of discovery, which is to last three years. This vessel is fitted for a commercial expedition, and for a voyage of discovery. She is destined to explore the ice-clad regions of the Antartic Pole. Her equipment is admirably calculated to struggle against the dangers of this species of navigation. Mr. Palmer is the captain of the vessel. The choice of this experienced navigator, whose name is already known by the discovery of a continent, or great group of islands, near the Antartic Pole, inspires the greatest confidence in this expedition. Captain Pendleton forms likewise a part of this expedition, and commands the Seraph, a vessel of the same size. This officer was chosen by the late Secretary of the Navy as first pilot, to make a national voyage of discovery, but, after many negociations, this voyage was not carried into effect. He ts commander-in-chief of the present expedition. The crews of these two vessels consist of fifty young, strong, and robust fellows. Amongst the singularities of the equipment, we are astonished to remark a simple, elegant, and useful invention of two new piroques, constructed of whalebone, which can be changed at pleasure into commodious sledges, to pass the mountains of ice. Dr. James Eightly is engaged as naturalist to the expedition. Many advantages may be expected from the zeal and geographical knowledge which Mr. Pendleton has acquired under the late Secretary of the Navy, during his investigations of this suhject. A numerous library, and a great many nautical and astronomical instruments, have been generously lent to the expedition.—*Ed. Lit. Gaz.*

Climate of Montreal.—From a series of tables which were presented to the Natural History Society at its last meeting, we learn that there fell during the year ending 30th September last, 28,94 inches of rain during 98 days of rain; there were 36 days on which snow fell, but of the actual quantity no measurements had yet been made; the greatest degree of heat was 95 on the 6th June 3 P.M.; the greatest cold occurred on the 4th January, being —22°; the greatest quantity of rain in one month was in June, when there fell 7,42 inches, and in one day, on the 28th June, when there fell 1,70 inches; the mean of the thermometer in October was 49, May 68, June 68, July 70, Aug. 68, Sept. 56, the mean for the year was therefore 44½; the winds duriug 242 days were westerly, of which 54 were between N. and W.—*Montreal Gazette.*

Chinese Colonists.—The Singapore *Commercial Register* of June 13, contains the following curious intelligence: "The *Frances Charlotte*, and *Guardian*, have been chartered to convey about 400 China-men from this port to the Mauritius, to be employed there as free labourers on the sugar plantations."

Australasia.—Mr. Frazer, the colonial botanist, gives the most flattering account of the river Brisbane and the country in the neighbourhood of Moreton Bay, the rivers, plains, creeks, forests, mountains, and vallies, assuming an appearance of extent and grandeur unknown in any other part of the coast as yet discovered. Hitherto all our colonial rivers, and rich alluvial countries, have been found merely on a small scale; but every thing at Moreton Bay assumes a vastness and importance quite unrivalled; and we are glad to hear that Mr. Frazer, who is well entitled to an opinion on the subject, gives Moreton Bay a decided preference over the boasted Swan River.—*Australian.*

Van Dieman's Land.—Some experiments have been made to determine the quality of the coal found in Van Dieman's land, in order to determine its fitness for use on board of steam-vessels. It is found to resemble most nearly a Scotch coal called Elgin Wall-End, which has long been held in high estimation for purposes of steam navigation.—*Asiatic Journal, Dec.* 1829.

Japan.—A recent attempt, on the part of the Dutch government, to procure statistical information respecting this country, has turned out most disastrously.

Baron van Sieboldt, a distinguished naturalist, was sent to Japan, and was so zealous and industrious, that sixty-two chests of rare natural productions have been received from him at Leyden. He subsequently continued to obtain a chart of the island, which coming to the knowledge of the Government, they caused the chart and other documents to be seized, and, determined to make a terrible example, condemned the baron to prison for life, and from the strong prejudices of the Japanese, they feared that no European influence can procure his release. —*Continental Paper.*

Cape Town.—At a meeting in March last of the clergy and others at Cape Town, it was resolved to take measures for the establishment of a college at the colony, for the instruction of youth in the ancient and modern languages, and the liberal branches of education.

Mountains of Thibet.—Doctor Gerard, the brother of M. G. who has traversed the Himmaleh mountains, has just visited the valley of Sulej, and made some curious observations at that place, which is the highest inhabited spot on the globe. The principal object of his journey was the introduction of vaccination into Thibet; but it appears that the prejudices of the Rajah prevented him from succeeding in that humane enterprise. One of the villages where he stopped was proved to be 14,709 feet above the level of the sea. At this place, in the month of October, the thermometer, in the morning, marked 8° 33′ centrigade below zero; and during the day the rays of the sun were so hot as to be inconvenient, and yet the waters in the lakes and rivers were frozen during the night, but were free from ice at two o'clock in the afternoon. By means of artificial irrigation, and the action of solar heat, large quantities of rye were raised at this immense height, some of the fields being at 14,900 feet. Dr. Gerard gives his opinion, that cultivation might be carried as high as from 16 to 17,000 feet. The goats bred in this region are the finest in the country, and are of that species whose wool is used for the manufacture of shawls.

At a height of 15,500 feet, quantities of fossil shells are found on calcareous rocks, upon strata of granite and pulverized schist: they consist of muscle, and others of various forms and dimensions. To the north of the frontier of Konnaour, Dr. Gerard attained a height of more than 20,000 feet, without crossing the perpetual snow. At one o'clock in the afternoon the thermometer was at 2° 78′ centigrade below zero. Notwithstanding this extreme elevation, the action of the sun had an unpleasant effect, thongh in the shade the air was freezing. The aspect of the surrounding regions was sublime and terrible; and on the frontier a ridge of snow was perceptible. In these regions, which for a long time were inaccessible, M. Gerard met with one of the most intrepid philologists known in Hungaria, named Csoma de Koros. This traveller, after advancing towards the centre of Asia, arrived at Konnaour, in Thibet, where he fixed himself in the monastery of Kanum, and lived amidst the monks of the Lamaic religion. Aided by a learned Lama, he made great progress in the study of the literature of Thibet, and discovered an encyclopædia in forty-four volumes, which treated of the arts and sciences. The medical part of this large work forms five volumes. The art of lithography has been practised at the principal city of Thibet from time immemorial, and it has been used to display the anatomy of the different parts of the human body. It appears that science and letters, flying from the tyranny of the *caste* of the Brahmins, abandoned the plains of Hindostan, and took refuge on the mountains of Thibet, where, until the present time, they remained totally unknown to the rest of the world.—*Lit. Gaz.*

Notice on the province of Texas.—The political and commercial relations which have existed for some years past between the United States and the province of Texas, have tended to improve our knowledge of this fine province, of which we had hitherto a very imperfect notion. Situated between Louisiana, the Gulf of Mexico, the Rio del Norte, and the Red River, it is, according to the Spanish geographers, more than 220 leagues in length, and more than 60 in breadth. This province has been united by the Mexican congress to that of Coahiula, under the name of State of Coahiula y Texas, whose seat of government is at Saltillo. Before Louisiana was ceded to the Americans by the first consul of the French republic, the Sabine River was not the western limit of the province of Texas. It occurred three leagues and a half west of Natchitoches, upon the Red River, near a creek called the Rio Hondo. Upon its borders was a stone bearing on one side the arms of France, and on the other those of Spain ; and the registers of the Capilla de los Adayes, (situated 30 miles west of the Rio Hondo,) prove that when Louisiana belonged to the French, a long time before the family treaty of 1763, the bishop of Monte Rey extended his jurisdiction as far as that limit. The account of the visit of this prelate to the Adayes, has recently been discovered by Mr. Anduze, rector of Natchitoches. When the Americans took possession of Louisiana, the troops of the United States established themselves at Natchitoches, and the Spaniards kept a garrison at the Adayes. This neighbourhood was disadvantageous to the Spaniards, who received all their provisions from Natchitoches. The meetings of the soldiers often gave rise to fatal quarrels, till the general of the United States, Wilkinson, ordered the Spaniards to retire beyond the Sabine ; that is to say, 50 miles west of the limit line which they claimed. On their refusing to obey, the Americans forced them to comply. Colonel Herrera, who commanded at Nacogdoches in the province of Texas, 70 miles west of the Sabine River, learning what had occurred, hastened forward with 200 men, to make the rights of the king of Spain respected. General Wilkinson marched against him with about 800 soldiers and 300 militia ; but an arrangement taking place between these commanders, it was agreed that the Spaniards should cross the Sabine,—that the Americans should not go beyond the Adayes,—and that the country comprised between the Rio Hondo and the Sabine ; that is to say, a line of about 50 miles in width, should be declared neuter. Some time afterwards, the Americans built a fort upon an eminence between the Sabine River and the Red River, 25 miles from one another, and the Sabine was declared the limit.

The country comprised between the Red River and the Sabine is hilly, and produces only knotty oak trees, (Black Jack,) and some pines scattered here and there. There are nevertheless some good lands on the side of Bayou-Pierre, and it is there that the best tobacco of Natchitoches is gathered. On traversing the Sabine we enter the province of Texas : the soil is rich without being low, and the land, to a distance of 12 miles west, is covered with magnificent pines. Beyond this border of pine trees, is one of the finest and most fertile countries in the world. It is diversified by rich hill and dale, and divided into natural meadows and shrubberies, in so admirable an order, that one would be inclined to recognize the work of art. The soil is red, friable, and contains a great quantity of iron. It is as fertile on the hills as on the plains. The climate is delightful : neither too great heat, nor too rigorous cold, is experienced. Water is abundant, and as good as that of the Mississipi. The country is occupied as far as Brassos by 2500 families, who have emigrated from the United States, and who cultivate cotton, maize, tobacco, rice, and sugar cane. Besides these American families, there are nearly from 5 to 600 Spanish families congregated around the Nacogdoches. They inhabit the *Ranchos*, where they bring up cattle. The principal establishment, beyond the band of pines previously alluded to, is the *Aix Bayou*, entirely inhabited by the Americans.

There are already in this quarter seven or eight cotton mills, and the products are transported to Natchitoches without duty, because the consumption comes entirely from that place. The second considerable establishment is upon the River Brassos at Dios, nearly 150 miles from Nacogdoches ; the banks of this river are sometimes unhealthy on account of its overflow. There is a town built by the Americans called San *Philipe* de Austin, because the grant of this land was made to an American, Philip Austin, who promised to establish there 500 to 600 families. At Nacogdoches another grant was made to a man of the name of Edwards, who resided at Mexico. This grant borders that of Austin, and contains more than 2000 square miles. To the north of this grant is another made to Mr. Froth Thorn, son-in-law of Edwards; and on the other side of this a third made to General Weavill.

The colony known by the name of Fredonia, in the province of Texas, was established in 1824 by Mr Austin, a lot of 640 acres, and an habitation, on the borders of the Gulf of Mexico, were offered to every colonist. The government was a federal republic, and the constitution was literally copied from that of the United states; but the Catholic religion was alone to be tolerated.

In 1825, Captain Seftwick, of Russelville in Kentucky, obtained from the Mexican government a portion of territory of from six to eight millions of acres, in the province of Texas, along the borders of Louisiana. One of the principal conditions of this grant was, that a certain number of colonists should be free from all taxes during five years.

The province of Texas is well watered. After the Sabine, which is navigable, many other rivers are met with which can bear small craft; as the Brasse, by which a commerce is carried on with New Orleans, by the Gulf of Mexico; the Rio Trinite Colorado, and lastly, the Rio del Norte.

The most important town in the province of Texas is San Antonio de Bejar, upon a branch of the river of the same name. This part is entirely inhabited by Spaniards; the soil is excellent, and all the habitations watered by artificial canals, which cause the waters of the Rio and of neighbouring springs to irrigate the gardens and fields. The principal commerce of this province is in mules, which are taken into the United States, and sold principally in Louisiana, Georgia, and Virginia.

These countries, not having hitherto been visited by any scientific traveller, are almost entirely unknown.

NATURAL-HISTORICAL COLLECTIONS.

Extract from the Analysis of the Labours of the Academy of Sciences during the year 1828; *by* BARON CUVIER. *(Continued from the last Number.)*

Zoology.—The natural history of animals has given rise, this year, to works as important as numerous: there is scarcely a class, and scarcely a function, to which the observations of naturalists have not been directed.

M. Geoffroy St. Hilaire, in his lectures on the mammalia, which have been published by means of short hand, has treated with detail on the history of the mole, and has communicated to the Academy many of the articles from these lectures which relate to it.

We have long known that, notwithstanding the extraordinary small size of its eye, the mole is not insensible to the stimulus of light, and from recent observations, it even appears that its vision is extremely delicate; nevertheless some anatomists think that it has no optic nerve, and thence conclude that the sense of sight is removed to the fifth pair; but other anatomists think that they can detect the optic nerve, excessively minute, it is true, but passing from the same part of the brain, uniting with the nerve of the fifth pair, and distributing itself on the eye.

However this may be, M. Geoffroy has sought for the causes which have been able to reduce the eye of the mole to such small dimensions, and to destroy or diminish to this degree its optic nerve. He discovered them in the exceeding developement of the olfactory apparatus, in the size of the nasal fossæ, in the magnitude of the superior maxillary nerve, and especially in the extraordinary volume of the olfactory lobes of the brain. The extent which is required in the ethmoid, is the occasion, according to M. Geoffroy, of the restricted size of the anterior sphenoid, rendering it, at the same time, smaller, and more dense, and preventing the frontal bones, both from contributing to form the arch of the orbit, and from extending over the cerebral lobes.

M. Geoffroy, who adopts the opinion that the optic nerve is not in the cranium, thinks, nevertheless, that this nerve exists at the side of the eye; but that not being able to penetrate the cranium by the ordinary passage, obstructed by the compression of the sphenoid, it is obliged, to use the words of the author, to take the nearest road, and this nearest road is by the trunk of the fifth pair. It is, he adds, a disposition, which although propagable by generation, is not the less to be considered as monstrous: a sort of analogy is observable between it and those monsters, in which the hypertrophy of an organ produces atrophy in the neighbouring parts.

Besides, it is a remarkable fact, and directly contrary to more than one theory on the speeial functions of the different lobes of the encephalon, that the lobes which have been lately called the *optic lobes*, are in the mole rather above than below the proportional size, which they attain in those animals, whose vision is most perfect.

Naturalists have been embarassed by another difficulty no less serious in the organization of the mole, namely, how it brings forth its young; for the fœtus, very large in proportion, considerably exceeds the dimensions of the pelvis, and its passage would be so much the more impracticable as the ossa innominata are united most intimately to the sacrum; but these bones are not joined to each other at the symphysis pubis, so that the rectum, the vagina, and the urethra, (which, in the female mole, has an external orifice independent of that of generation), have not to traverse the pelvis, but are placed below, or rather in that kind of groove which is left by the separation of the pubic bones. The pelvis does not then, in any degree impede the progress of the fœtus, which, passing as usual through the vagina, obtains egress by dilating the vulva, there being no osseous apparatus to prevent it. This explanation, advanced some years since by M. Breton, a skilful naturalist of Grenoble, was sufficiently satisfactory, and M. Geoffroy takes advantage of it in explaining the disproportion which is found in the mole between the organ of vision and that of smell. In ordinary gestations, the former is developed; the latter, on the contrary, is less than in the adult state. A prolonged gestation must therefore favour the organ of smell; and those fœtuses which remain a sufficiently long time in the uterus to acquire a size proportionate to that of the mole, should have large nostrils and small eyes.

The author has discovered, under the lumbar vertebræ of this animal, eight little supplementary bones, which prevent this region from bending, and give to the loins the necessary strength for raising and removing the soil under which it lives. He has remarked an equally curious fact, that till the age of six months, the mole has its vagina closed by a sort of hymen, but complete and without opening, so that, prior to this period, there is great difficulty in distinguishing the males from the females. A little conical and sharply pointed bone, with which the penis is provided at its extremity, seems destined to overcome this obstacle. The urethra of the female passes through the clitoris exactly as it passes through the penis in the male; and in the latter the bladder opens into a pouch where the vasa deferentia also terminate, in a sort of vesicula seminalis.

On the habits of the mole, our author enters into details no less interesting than on its anatomy. A mole-catcher, named Lecourt, already well known ton aturalists by his observaiions published by the late M. Cadet Devaux, had contrived the most ingenious means of following with the eye the motions which the mole makes under the soil, and he states, that when it is frightened, it moves with a surprising rapidity from one point of its burrow to another. He goes so far as to say that this animal, which crawls with so much difficulty upon the surface, runs below with a gteater speed than a galloping horse. This great muscular force suggests the necessity of a powerful respiration : and indeed, the mole takes care to provide at intervals openings to aërate its burrow.

It is a very voracious and ferocious animal ; M. Flourens has observed that hunger destroys it very quickly, and nothing but animal food can satisfy it. No individual can pass more than twelve hours without eating ; even after six hours abstinence it becomes extremely weak. It generally nourishes itself on worms and insects ; but if an occasion is presented of seizing a more important prey, as a bird, a little quadruped, or a frog, it jumps upon it with fury, attacks it by the belly, devours its entrails, tearing open the wound with its fore paws, and always advancing anteriorly in the body, without being stopped either by the presence of man or by any noise which may be made to frighten it ; it does not even spare its own species ; if two be put together without food, the weakest will be devoured between night and morning ; its very bones will have disappeared, and nothing will be found but the skin, slit along the belly.

Of all the families of mammalia, that of which naturalists have of late discovered the greatest number of new species, and in which they have determined the most differences calculated to form generic and sub-generic divisions, is certainly the Cheiroptera or Bats. Almost as many species have been distinguished herein as in the rest of the class. The genera of which the first outline was proposed by MM. Geoffroy and Cuvier in 1796, have, since that time, been perfected and multiplied, especially by M. Geoffroy St. Hilaire *senior*. MM. Temminck, Desmarest, Paul Savi, Fred. Cuvier, Leach, and others, have been equally laborious, enriching this family with their contributions.

Very recently, M. Isidore Geoffroy has presented a memoir upon the frugivorous cheiroptera, which may at present be all comprised under the genus Pteropus.

Every one knows that organized beings, torn by man from their natural abodes, and submitted by him to new conditions of existence, undergo very considerable modifications in their size, their colours, and in some details of their form, especially in the integuments,—modifications, however, which are limited, and which, at least in the present state of the globe, are confined within very narrow bounds. Analogous modifications are also found in those beings, which, though not under the subjection of man, have been transported into circumstances different from those of their first abode, and yet are not sufficiently dissimilar to destroy the race. But modifications of this kind are much less marked than those which spring from the agency of man ; and no savage species, to whatever distance it may extend itself, indicates any approach to what we see in domesticated animals, in dogs, for instance, in oxen, or in sheep. We have been much occupied with these variations in animals, produced by domesticity, and naturalists have attempted to trace the different degrees, as far as the history of the species has enabled them ; but there is another kind of modifications, not less interesting to study,—those which domestic races undergo, when, abandoned by man and restored to their primitive liberty, they betake themselves again to their savage mode of life, and sustain themselves, conformably to their natural tastes, as far as the country, in which they were placed, will permit of the return.

These are subjects which Dr. Roulin has investigated in the animals which the Spaniards have transported to South America, and which live there a savage life.*

M. G. Cuvier has obtained from the noble collection of Latin classics of M. Lemaire, some explanations of the books of Pliny, where there is doubt as to the animals ; his object has been to determine the species of which Pliny has in-

* As the Memoir of Dr. Roulin has already been translated into our language, and may be found in the Edin. New Phil. Journ. Oct. 1829, p. 326, we abstain from presenting it to our readers.

tended to speak, and with this view he has connected with each article in Pliny every thing that has been said by other ancient writers on the same animal; he has estimated whatever might be supposed to be fabulous in the traditions and narratives of travellers on the animals of distant countries, especially at a period when the best informed travellers would be considered at this day very ignorant of natural history; and he has sought thus to obtain an idea of the animal, and to discover it amongst those which modern naturalists have inscribed in their catalogues. By this method he has arrived at new results, which cannot fail to be interesting.

The *Leoncrocottus* and the *Catablepas* appear to him to be the *Gnu.* The *Aspicus* is the *Coluber haje;* the name of dolphin was given also to the sharks; the *Tragelaphus* is a species of stag lately discovered in the Indies, which has horns similar to those of the roebuck, and whose tail is furnished with long hairs; the *Lycaon* is the hunting leopard (*Felis jubata*;) the *Platanista* is the Gangetic dolphin of Roxburgh; the *Acipenser,* so famous at certain periods amongst the Romans, was the little sturgeon (*A. ruthenus,* Lin.) The *Coracin* of Egypt is the *Labrus niloticus,* Lin. The fishes of India, which crawl upon the ground, are the *Aphicephali.* The *Phycis,* the only fish which constructs a nest, is a species of Mediterranean *Gobius,* which, according to the observations of Olivi, makes for itself a habitation of very complicated structure. The *Chenalopex* is the *Anas Ægyptiaca,* and not the *A. tadorna;* and the *Cherenotes* is the *Anas Clypeata;* the *Attagen* is the *Tetrao Alchata,* Lin. The three kinds of *Blatta,* mentioned by the ancients, are the *Dermestes, Tenebrio,* and *Blaps* of the moderns, &c.

Amongst the magnificent works which have been devoted in different countries to the representation of the productions of nature, there is none which surpasses, in point of finished engraving and colouring, that which M. Audubon is publishing on the birds of South America, and there is none which equals the size of the plates. The eagles and the grouse are of the natural size, and when the bird is not sufficiently large to fill the whole plate, it is repeated in the most accustomed attitudes. The Academy has looked with interest on this work, and it is a source of great pleasure for its members, as for all friends of science, to observe in this day the naturalists of the new world repay with interest to Europe the equivalent of instruction which they have received from her.

MM. Audouin and Milne Edwards, who have associated their efforts to enrich with new observations the anatomy and physiology of the crustacea, and with whose researches upon the organs of the circulation in these animals we were already acquainted, have presented this year to the Academy, memoirs on their respiration and their nervous system.

M. Milne Edwards has described four little crustacea, which, amongst a great number of these animals discovered by him upon the western coasts of France, appear to him to be peculiarly interesting, as affording new links between the generic forms of this class, already entered in the works of naturalists.

There is also a crustaceous animal which M. Guerin has described under the name of *Eurypoda,* but of great size, and belonging to the family of crabs, and very closely allied to the *Inachus,* commonly called the sea spider. Its principal character is that the last joint but one of the feet is dilated and compressed towards the middle of its inferior margin. The same author has described a crustacea of the family of *Gammari,* remarkable for the extremely large eyes which occupy nearly the whole surface of its head. He has named it *Themisto.*

M. de Blainville has also, during a journey along the shores of the Mediterranean, made a great number of new and important observations upon animals, and has communicated to the Academy those which concern the *Physalus,* that singular production composed of an oval bladder, surmounted by a crest, and from whence hang an infinite number of filaments, not less varied in length than in structure, to which zoologists have attributed different uses. This animal has been considered a zoophyte, and M. Cuvier has made it the type of an order of that section, which he has named *Free Acalepha.* M. de Blainville, observing in its conformation a sort of symmetry, is of opinion that it ought to be placed higher in the scale: and, by examination, having found, like M. Silesius, at each end of the bladder a very small orifice surrounded by radiating fibres, he regards one as the mouth and the other as the anus; the internal sac furnished with cœcums, already described by M. Cuvier, appears to him to be the intestine; the crest, entirely of a muscular nature, answers to the foot, which, in the ordinary movements of the animal, is directed upwards, like those of many of the swimming gasteropoda. Two little openings pierced in the right side anteriorly, which seem to have been observed by M. Oken, but which are not always found, will be the orifices of the generative organs; in conclusion, M. de Blainville considers the innumerable and varied filaments, which depend from the body, to be branchiæ. The author concludes from this arrangement of the external parts, that the Physalus is a mollusca, or, according to his terminology, a Malacozoa, and ought to be referred to those which he names Polybranchiata, and Nucleobranchiata, that is to say, Tritoniacea and Pterotrachea. To confirm this classification, it would be necessary that the Physalus should possess a nervous system, a heart, a vascular system, a liver, male and female organs of generation with their appendages,—parts which M. Cuvier has sought for in vain. M. de Blainville has not yet treated of its anatomy, but he announces that he is immediately about to occupy himself therewith.

During the same journey, M. de Blainville observed many important facts, of which he has given a summary to the Academy, and from which we shall only extract some general observations, in expectation that the author will publish them with the necessary details. The animal of the Miliolites presents no appearance of tentacula, and cannot, consequently, belong to the cephalopoda, as one would suspect, from the examination of its shell. In the gasteropoda, which have separate sexes, the shell of the females often differs so much from that of the males, as to lead authors to consider them as distinct species. The eggs of many of these mollusca contain each a number of germs, as is also observable in the Loligo. Very often the shell in the egg is very different from that of the adult animal. Those organs in the Terebratulæ, which have been regarded as arms, are only branchiæ. The Acephala with shells, Ostracea, Camacea, &c. &c. have absolutely only a female sex, and each genus has a peculiar termination of the oviducts. The simple Ascidiæ have, during some time, the faculty of locomotion. The animals of the Eschara, as MM. Audouin and Milne Edwards have also observed, are not polypi, but approximate rather to the ascidiæ, &c.

On the Primitive Vegetation of the Earth; by Henry Witham, Esq. F. G. S. &c. &c.—We are indebted to Mr. Witham, for permission to make the following extracts from an interesting paper on the Vegetation of the First Period of an Ancient World, which he lately read before the Wernerian Society, and which we are prevented from presenting to our readers in an entire state, from its being already communicated to the Annals of Philosophy by its zealous author. The time and attention which this gentleman has devoted to geological and mineralogical studies, the highly valuable museum which he has formed, and the general success which has attended his labours, prove how much may be effected by individuals, particularly when they are thrown upon their own resources by the inaccessible privacy of our *public* collections.

Scientific men know what constant exertions Mr. Witham is making towards the practical elucidation of the history of primitive vegetation; and his museum will always be found a deposit for illustrations of the earth's early history, and his house a rendezvous for lovers of natural science. We earnestly wish that his endeavours may be seconded by our countrymen, and that his personal ardour in the cause may meet with the merited success.

Kettle bottoms ; foot bottom, or *cauldron bottom.*—" In some of the high main seam in the great Newcastle coal-field, when the coal is worked away by the miners, the roof often falls. This is, to a considerable degree, owing to the number of vegetable impressions breaking the coherence of the stratum, and bringing these fossils along with it. It must be observed, that in almost every instance they are surrounded by a coating of very fine coal of about one-half or three-fourths of an inch thick, having a polished surface with very little attachment to the surrounding matter. This I doubt not is the cause of the fall; the fossil dropping out sometimes as much as three feet in length, leaving a hole in the roof almostp erfectly circular. Often it falls in these large pieces, but sometimes the nature of the shale, of which its substance is composed, causes it to fall in portions of different thickness. It is to these falling pieces that the miner's expressive term (kettle bottoms) applies.

These fossil plants run from two to eight feet in circumference. The occurrence of numerous impressions which you may observe in the specimens of parts of different plants in the shale, forming the substance of these fossils, is to me, I must confess, very difficult of explanation. Some years ago a friend of mine found a kettle bottom at Old Kenton colliery, eighteen inches in diameter, coated with fine coal, the substance of which was entirely mineral, carbon, or charcoal, with a mixture of earthy matter and pyrites. A portion of this specimen is in the collection of the Geological Society.

It is much to be regretted that hitherto none of these interesting fossils have been followed into the strata. We do not know how far they extend, or to what height they are standing.

Again, in the coal districts of Scotland, amongst the troubles which affect the roofs of coal, there is one of a very singular form, known by the name of *pot bottom* or *cauldron bottom,* and are from the size of a foot to five feet in diameter.

In working the bed of coal, the miner generally knows that he is approaching one of these, by the coal becoming twisted, and more difficult to work, and this continues till this trouble in the roof is passed. The general form is that of a cauldron with the brim dilated, the mouth of the pot being always inverted. The sides of it are generally lined with coal from one-eighth of an inch to an inch in thickness, and the pot or cavity is filled up with stone of the argillaceous kind, or fire clay, having generally less mixture of sand than is in the roof stone around. The under surface of the stone which fills the pot is irregular and waving, not smooth like the roof adjoining. Although the coal which lines the pot is connected with the main bed of coal, it is of a texture altogether different, having a bright appearance like jet, and breaks into very minute cubical pieces. Sometimes it has no bitumen in it, and is of the nature of glance coal. The sides of the pot are generally as smooth as glass, with small furrows or grooves in a vertical direction, so that there is very little tenacity between the sides of the pot and the stone which fills it up ; this circumstance renders these troubles very dangerous, particularly when they are of a large size, as they fall without giving any warning. The peculiar singularity attending this trouble is the twisted texture and alteration which are found in the bed of coal immediately under and adjoining it, without any mixture of the stone in it which fills up the pot. There is sometimes no lining of coal, and it generally happens that a piece of the stone which fills up the pot adheres to the upper part of the cavity, so that the trouble may go farther up into the strata than is emerged. This trouble requires to be minutely investigated, and the pavement upon which the coal rests should be examined under the trouble, to ascertain if it is in any way altered in its structure, as is the case with the coal. I am indebted to my much respected friend, Mr. Bald, for this latter information. I am happy to say that it is his intention, at an early period, to devote his attention to these singularly curious objects."

Notice of a Fossil Plant discovered in Craigleith Quarry near Edinburgh.—"The length of time which has been allowed to elapse since the discovery of that fossil member of early vegetation, which was obtained in the year 1826 from the quarry of Craigleith, without attempting to obtain the necessary information respecting this singular plant, added to which, the peculiarity of its structure and composition, has induced me to take much pains upon this point. I therefore laid a well cut transverse, and also longitudinal section of this fossil tree before Mr. Hincks, Botanical Curator to the Philosophical Society of York. His opinion is, that it is a monocotyledonous plant, as a pithy substance fills up the interstices between the vessels; and that there has been no bark or concentric arrangement of layers. He also observes a striking resemblance to *certainly* monocotyledonous stems, which he has before examined. On the whole, Mr. Hincks says, "having made the examination of this curious specimen, submitted to me with the greatest care, I can scarcely admit of a doubt upon the subject.*

The internal structure, its singular colour, when contrasted with the block of sandstone in which it was found, induced me to request my friend Mr. Nicol to analyze it; the following was the result:—

60 per cent. of carbonate lime.
18 per cent. of oxide of iron.
10 per cent. of alumine.
9 per cent. of carbonaceous matter.

The height of this gigantic plant was 36 feet, 3 feet diameter at its base, and lying in nearly a horizontal position, corresponding with the dip. No branches were found."

On the Rice Paper of China.—The article of commerce known in this country by the name of Rice Paper, is generally reckoned a composition of rice, from which circumstance it derives its common name. This, however, is an erroneous notion, as this beautiful paper, so well adapted from its softness, &c. for painting upon, is in reality the medulla or pith of a plant. It is not yet known, I believe, from what particular plant it is procured, nor have I ever been able to meet with any attempt to clear up the doubt which hangs over the subject. Whilst in Canton in Oct. 1828, I procured a specimen of the raw material from a native merchant in New China Street, which presents the following appearances:—It is about an inch in circumference, and I was told that the plant grew to the height of 10 or 12 feet; externally it is of a white shining appearance, and very smooth on its surface; internally it is fistulous, the canal being divided, by membranous expansions, into numerous partitions. In general aspect it is not much unlike the pith of some of our rushes, though much more compact in texture, and seems undoubtedly to belong to the monocotyledonous class, and in all probability to the natural family of Junceæ. Its substance is composed entirely of numerous cells, each being round, and connected by six loops to six surrounding cells.

The process of preparing this article for use, and forming it into the substance we see in this country, was described to me as very simple. The substance is first steeped for some time in water till softened; a sharp narrow knife is then thrust through the centre, and it is then rolled out upon the knife, after which it is submitted to considerable pressure.——W. BAIRD.

Jealousies and Animosities of Naturalists.—It might be imagined by a person who has not had opportunity of observing the characters of men in different circumstances, that naturalists, united by the bonds of one general interest, and having their labours directed towards the accomplishment of one general object, the examination of nature in all her aspects, could not but live together in peace and harmony. But how far is this from being the case! The geologist, big with

* Mr. Ad. Brongniart has communicated to Mr. Witham that he believes this fossil to be a section of a monocotyledonous plant; but that he is at present only able to give a conditional opinion respecting it.

the importance of granite and greywacke, and elevated by the mighty conceptions of cataclysms and catastrophes, fancies that no science is like his science. The mineralogist, or oryctognost, as he pedantically calls himself, thinks that he only is in the path of science, and that the forms of molecules and crystals constitute all that is worth knowing, or all that can be truly known of the solid constituents of the globe. The meteorologist is in the clouds, or higher, and looks down with contempt upon the grovellers upon earth. The botanist, with his tin box under his arm, and his head stored with Latin names and terms, wanders, delighted, among the frail but beautiful forms of vegetative nature, and thinks that of all pursuits, his is that which is the most innocent, the most healthful, the most invigorating to soul and body. The zoologist, with his gun, joyously strides over mountain and moor, penetrates the dark recesses of the forest, and picks his wary steps among the marshes, and thinks the while that the mineralogist may clink away at his phonolite, the botanist may cull his sweet primroses, the meteorologist expatiate among his vapours, or lose himself in a bog in chase of a will-o'-the-wisp ; but as for him, the conversion of life into death is that only in which he can take delight. Every one of these worthies looks with more or less contempt on the other. The botanists are generally more despised by other naturalists than the cultivators of any other department, excepting the insect-men. And even among the botanists, the cryptogamists, meet with little sympathy from their brethren. Of the botanists we have this much to say, that they are generally more social, more communicating, and more amiable, than the mineralogists or zoologists. There is something in the study of botany so inconsistent with turbulence, pride, or selfishness, that we generally find its most enthusiastic admirers to be persons of a happy temperament. Nevertheless, this science has its pettish and cankered devotees. When shall we see science pursued for its own sake ? when will men cease to scrape to themselves little heaps of eulogies and flatteries raked out of the sloth of worldly interest ? when human reason shall be more powerful than human passion. Show me the man who perverts the holy passion of examining the works of God, to the base purpose of gaining the applause of his fellow men, who professes to admire nature, but who aims at getting himself to be admired ; who in his phrases seems all wrapt in absorbing zeal for the interest of science, but who in his secret actions evinces a mind bent solely upon his own aggrandizement. That man is an object of contempt and abhorrence, be his talents what they may. We have seen men of this character, and they were unhappy men. We have seen men of another character, who devoted themselves to the cultivation of science in plain simpleness of heart, and they were happy men.—*Ed. Lit. Gaz.*

The Black Swan, (Cygnus atratus.)—When the classical writers of antiquity spoke of the black swan as a proverbial rarity, so improbable as almost to be deemed impossible, little did they imagine that in these latter days a region would be discovered, nearly equal in extent to the Roman empire even at the proudest period of its greatness, in which their "rara avis" would be found in as great abundance as the common wild swan upon the lakes of Europe. Such, however, has been one of the least singular among the many strange and unexpected results of the discovery of the great southern continent of New Holland. Scarcely a traveller who has visited its shores omits to mention this remarkable bird. An early notice of its transmission to Europe occurs in a letter from Witsen to Dr. Martin Lister, printed in the twentieth volume of the Philosophical Transactions ; and Valentyn published in 1726 an account of two living specimens brought to Batavia. Cook, Vancouver, Phillip, and White, mention it incidentally in their voyages ; and Labillardière, in his Narrative of the Expedition of D'Entrecasteaux in search of La Pérouse, has given a more particular description, together with a tolerable figure. Another figure, of no great value, has also been given by Dr. Shaw in his Zoological Miscellany.

Since this period many living individuals have been brought to England, where they thrive equally well with the Emeus, the Kanguroos, and other Australian animals, insomuch that they can now scarcely be regarded as rarities even in this country. They are precisely similar in form and somewhat inferior in size to the wild and tame swans of the old world; but are perfectly black in every part of their plumage, with the exception of the primary and a few of the secondary quill-feathers, which are white. Their bill is of a bright red above, and is surmounted at the base in the male by a slight protuberance, which is wanting in the female. Towards its anterior part it is crossed by a whitish band. The under part of the bill is of a grayish white; and the legs and feet are of a dull-ash colour. In every other respect, except in the mode of convolution of its trachea, this bird so perfectly corresponds with its well known congeners, that it is only necessary to refer to the articles in which we shall hereafter describe those beautiful species for an account of the characters which are common to them all.

The black swans are found as well in Van Diemen's Land as in New South Wales and on the western coast of New Holland. They are generally seen in flocks of eight or nine together, floating on a lake; and when disturbed, flying off like wild geese in a direct line one after the other. They are said to be extremely shy, so as to render it difficult to approach within gunshot of them.—*Gardens and Menagerie of the Zoological Society, No. III.*

Influence of Soil on Roots.—"If a cucumber," says Sir James Smith in his Lectures, of which MS. notes are now before me, "is planted; and after the branches shoot there is placed a stone in the way of either of them, the branch will turn off and avoid it without *touching* the stone, but describing a circle around it. When it has passed the stone, however, it will go on in a straight line." Sir James explains this by the well-known law of plants always approaching the light, the cucumber turning round to get out of the shadow of the stone.

Roots follow a very different law, always endeavouring to get away from the light; and, accordingly, so far from avoiding a stone or other obstacle, they often cling closely around it, and sometimes even mould their forms upon the hard substances with which they meet. This is well exemplified in the root of an alder tree (Alnus glutinosa, Betula Alnus, *Linn.*), which my little boy found in his searches after fresh-water shells for his collection. The root was embedded among the gravel formed by the Ravensbourne river which passes the bottom of my garden; and it has exactly moulded itself on every stone which it met with in its course. In the same manner roots are much influenced in their forms by the soils in which they grow. Of this I lately gave the following illustration in the *Athenœum,* from the familiar instance of fibrous and bulbous roots:—When plants with fibrous roots are placed in certain situations, they are apt to change their fibrous structure for a bulbous one, in the same way as the water crowfoot (Ranunculus aquatilis) has scolloped leaves above, and minutely winged leaves below water. The change from fibrous to bulbous roots, and the contrary, is markedly exemplified in some of the grasses, particularly in Timothy grass (Phleum) and fox-tail grass (Alopecurus). Before this change of form was discovered, botanists frequently described the same grass under different names; a circumstance which occurred with regard to Alopecurus geniculatus, and Phleum pratense. Leers seems to have been the first to discover that transplanting into a light rich soil tends to change the bulbous into the fibrous structure.—J. RENNIE, *Loudon's Mag. No. X.*

Habits of the Cayman or Alligator of Guiana.—Dr. Hancock, who has identified himself with the natural history of Guiana, has communicated to Professor Jameson the following interesting observations on the habits of the cayman or alligator, which abounds in most of the great rivers of Guiana, excepting the Cassiquiari and Rio Negro.*

* Dr. H. supposes their absence in these rivers to be owing to the prevalence of the porpess, "the natural enemy" of the cayman.

"The cayman is in length eleven feet three and a half inches, and in girth four feet. Teeth, thirty-six in the upper jaw, and the same in the under, not corresponding, but alternate; fore legs, fifteen inches long, with five toes, the two outer without nails; hind legs twenty-two inches, with four toes, three with strong nails, the outer ones without any. The belly and under jaw are white; the rest of the body black. Many caymans are killed for the sake of their teeth and fat, which lies in a deep oblong mass on each side the tail, or along the posterior part of the spine. The cayman runs fast in a straight direction, but cannot turn quickly. It travels far over land at night, to remove to other waters, for which it instinctively directs its course from great distances. In procuring its food, the cayman has the sagacity to lay the Tortuga on its back to prevent its escape, if not hungry. The large tigers (jaguar) fall sometimes a prey to the cayman in the water, but generally conquer on the land. The strength of the tiger is so great, that he lacerates and lays open the side of the neck where the cayman is most vulnerable. The battle between them when they meet on the land is said to be tremendous. There the jaguar makes the attack; and the contrary if they meet in the water. As the cayman lies basking his scaly carcase in the sun, his enemy often encounters him; on the contrary, if the tiger is seen swimming, the cayman plunges in after him, and pulls him under the water. The caymans, however, usually watch their prey in the water, submersing the whole body except the snout and eyes, which are prominent.

A terrible encounter ensues when the cayman and camaiduor, or great water serpent, meet. Their tumbling and splashing may be heard at a great distance. The serpent, when they meet on the brink of the water, avoiding the enormous jaws of the cayman, rapidly throws itself about his body, is often untwisted in the struggle, lashing the water with tremendous violence, and returns like lightning to the *gripe*, till he completely squeezes his antagonist to death, unless the cayman succeeds in getting his jaws to bear upon him, in which case the battle is quickly decided. Mr. James Frazer, being in the river Waieny, on a tour to the Orinooko, in 1826, heard some loud noises, seemingly like the discharge of great guns at a distance; and all his Indian attendants said it was caused by the tail of a camudi thrashing the water in a battle with the cayman.

The porpess is the natural enemy and entire master of the cayman, so much so, indeed, that the natives enter the water withont fear when the tonina (porpess) is in sight. It attacks the cayman wherever they meet. The cayman is driven into the water by other enemies, as the tiger; but it is made to scamper ashore by the porpess. The ideas of the ancients respecting the dolphin's attachment to man, seem to be in some measure realized in this species of delphinus. It is well known that they accompany ships to considerable distances, as does the shark, but with different motives. This is doubtless a distinct species from the common porpess or the D. Phocæna of naturalists, Phokaina of Aristotle. We even saw them in the Rio Maou and the Parima, whence they must make a journey of many hundred miles to reach the ocean.

Two caymans in combat make a dreadful noise, standing up chopping together their jaws, tumbling down, and thrashing the water with great violence.

An instance is related of an Indian caught by a cayman at the Lake of Marawareta, procuring his release by having the presence of mind to stab the cayman in the eyes with a knife, the water being shoal. This manœuvre is inculcated from their infancy. This, or a similar occurrence, is related by Humboldt while at Angostura.

At Metanza, the caymans are more shy than those of the Essequibo, and take to the water before one can approach them. These animals have become incomparably more bold and ravenous than formerly in the Orinooko, since the feasting they have had on human flesh during the carnage of the late war. Before that time, they were scarcely dreaded, and up the Essequibo they would rarely attack a man, or endeavour to shun him, being, in those solitary retreats, quite unmolested. They were so numerous, that my travelling companion, Mr. Sertema, at the same time, and without changing place, stood and counted thirty caymans at a stagnant pool or lagune on the Repoononie, the animals lying just below the water, and their snouts projecting above it. Travelling, in 1811, in the vicinity of the Takotu with some Portuguese, we had several times occasion to swim across the smaller rivers and pools. To frighten away the caymans, we had only to throw ourselves into the water with violence, beat and cause a great splashing. Such experiment in the Oronooko would now be a very dangerous one, as they overthrow small corials, and instantly seize any person in the water.

The cayman, it is said, does not strike, as generally supposed, with its tail, but with its head, and that suddenly and with tremendous force. The alligators do the same.

The cayman of Orinooko takes its prey both on land and in the water indifferently; but it can devour it only on land, as it cannot swallow under water without letting it in, such is the formation of the glottis. The larynx is provided with a valve which excludes the water by shutting over the orifices both of the œsophagus and trachea. It cannot, however, bear long exposure to the sun.

The cayman swallows stones in considerable quantities. Some think this is to satisfy hunger; others, to assist digestion; while others believe it arises from an instinctive faculty to render the body specifically heavier, and to enable the animal to sink in the water. I found, in a young cayman, two pieces of lead as well as stones. The harder pebble stones, of the agate and crystal kinds, are frequently found in the stomach.

As to the incubation of the cayman, if any one stoops over the nest, places his ear close, and strikes over it,—if ready to come out, the young fry will be heard croaking. It is said the cayman takes this method of trial. The cayman waits about its eggs laid in the sand, places itself to the landward, and when the little ones are rising from the ground, it devours all that run that way: the others go clear, and find their way to the water.

It is asserted that the animal buries itself in the mud, to pass the summer or dry weather, when the water of the lakes is drying up. Jose Yustre, however, says that the cayman and great serpents do not inter themselves in the ground, as represented by Humboldt; that they do not roar; and that the tiger always kills the cayman in combat, the latter being so inflexible that he cannot get a grasp of the tiger, who springs upon his back and gores the neck. He confirms the story that the cayman ever avoids the porpess."

The Barberry, (Berberis vulgaris.)—This tree is a native originally of the eastern countries, though it is now found in most parts of Europe, where it thrives best upon light and chalky soils. It grew formerly wild, in great quantities, in the hedgerows of England, but has been universally banished, from a general belief that its presence is injurious to the growth of corn. Duhamel, Broussonet, and other scientific writers, treat this belief as a vulgar prejudice. It should, however, be remarked, that the fructification of the barberry is incomplete, unless the stamens be irritated by insects when the filaments suddenly contract in a most remarkable manner towards the germ. The flowers are, therefore, by a beautiful arrangement of nature, peculiarly attractive to insects; and thus the barberry may become injurious to neighbouring plants.—*Library of Ent. Knowledge*, Vol. II.

Insects of Java.—M. Payen has lately found in Java, species of insects which appear to belong to genera hitherto supposed to be exclusively proper to America. He has discovered, amongst others, a new species of *Megalopus*, and what is more extraordinary, a species of *Sphærotus*, which appears to differ little from the *Sphær. curvipes* of Kirby, which is from Brazil.

On the different colours of the Eggs of Birds; by M. Gloger.—It is a remarkable fact in nature, that those birds, whose nests are most uncovered, and whose eggs are most exposed to the sight of their enemies, lay eggs of a colour as little different as possible from the surrounding objects, so as to deceive the eyes of destructive animals; whilst, on the contrary, those birds whose eggs are of a deep and vivid colour, and consequently very liable to strike the eye, either hide their nests in hollow trees, or elsewhere, or do not quit their eggs except at night, or commence their incubation immediately after laying. It must, moreover, be remarked, that in the species whose nests are exposed, and of which the females alone sit on the eggs, without being relieved by the male, these females have generally a different colour from that of the male, and more in unison with neighbouring objects.

All-providing nature, says M. Gloger, has thus sought for the preservation of the species, whose nests are altogether exposed, by giving to their eggs a colour incapable of betraying their presence to a distance, whilst she has been able, without inconvenience, to give the most brilliant colours in those circumstances where they are hidden from the sight. It would have been more exact, in my opinion, says a French writer, if M. Gloger had said, that a certain number of birds are able to deposit their eggs in accessible places, because their colours confound them with surrounding things, whilst others have been obliged to conceal their eggs, because the marked colours they possess would attract their enemies. But however it may be explained, the fact exists; and M. Gloger has accumulated illustrations with much detail.

Eggs are to be distributed into two series, according as their colour is simple or mixed. The simple colours, such as white, blue, green, yellow, are the most vivid, and consequently the most dangerous for eggs.

Pure white, the most treacherous of colours, is found in the eggs of birds which build in holes, as the woodpeckers, (*Picus*), the wrynecks, (*Yunx*) the rollers, (*Coracias*), the bee-eaters, (*Merops*), the king-fishers, (*Alcedo*), the snow-finches, (*Fringilla nivalis*), the dippers, (*Cinclus*), the rock and water swallows, (*Hirundo*), and the swifts, (*Cypselus*). It is of these birds alone that the eggs are of a deep white colour.

The eggs, again, are white in some species which, as the common swallow, some titmouses, (*Parus*), the wren, (*Troglodytes*), &c. construct their nests with openings so small, that their enemies are unable to see into them.

Moreover, we find the eggs white in birds which do not quit their nests except at night, or at most for a very short time during the day, as the owls, (*Strix*), the falcons, (*Falco*).

Finally, this colour is found in those which only lay one or two eggs, and which immediately begin to sit, as the pigeons, (*Columba*), the gannets, (*Sula*), the petrels, (*Procellaria*).

As to the *clear green* or *clear blue* colour, we find that it is proper to the eggs of many species which build in holes, as the starlings, (*Sturnus*), the stone-chat, (*Saxicola*), the flycatchers, (*Muscicapa*), &c.

In the second place, this colour is common to the eggs of birds whose nests are constructed of green moss, or situated in the midst of grass, but always well hidden; for instance, the hedge-accentors, (*Accentor modularis*), the blue-throated warbler, (*Sylvia suecica*), &c.

Lastly, green eggs are found in many powerful birds, able to defend themselves against the attacks of robbers, as the herons, (*Ardea*).

A faint green colour, approaching to a yellowish tint, is observed in the eggs of many *gallinacea*, which lay in the grass, without preparing a regular nest, which soon disappears under the quantity of eggs; thus, the hoopoe, (*Upupa*), the common partridge, (*Perdix cinerea*), the pheasant, (*Phasianus.*)

The same colour is also remarked in many of the *palmipedes* which cover their eggs when they quit them, and which watch them carefully; as the swans, the geese, the ducks, (*Anas*), the divers, (*Colymbus*), &c. The eggs of certain large birds which build openly in the air, but which are well calculated to defend their nests, are of a dusky white, as is observable in the vultures, (*Vultur*), the eagles, (*Falco*), the storks, (*Ciconia*).

Amongst the eggs of a mixed colour, we must distinguish those which have a white ground from those whose ground is of a different tint. The eggs with a white ground are those of the golden oriole, (*Oriolus galbula*), the long-tailed titmouse, (*Parus caudatus*), the nut-hatch, (*Sitta*), the creeper, (*Certhia*), of the chimney swallow, (*Hirundo rustica*), &c. The most part of these eggs with white grounds are hidden in well-covered nests. The mixed-coloured eggs, whose ground is not white, at least not a pure white, are those of the lark, (*Alauda*), the pipit, (*Anthus*), some wagtails, (*Motacilla*), and buntings, (*Emberiza*) ; then the crows, (*Corvus*), shrikes, (*Lanius*), quails, (*Perdix*), and most of the singing birds, the colour of the interior of whose nests is in harmony with that of the eggs.—*Werhandlungen der Gesellschaft naturforschender Freunde in Berlin, cah.* 6. 1829.

NATURAL-PHILOSOPHICAL COLLECTIONS.

Extract from the Analysis of the Labours of the Imperial Academy of Sciences of Petersburg, for the years 1823-1826 ; *by M. Fuss, perpetual Secretary.*—The academician, Zakharof, has read a memoir on the different degrees of heat and cold, in which he shows that the comparative table of different thermometers, published by the academy, contains some imperfections which he is enabled to correct from the comparison of a number of observations on the degrees of temperature in different places, and of the results of experiments which he has made on many degrees of heat, such as it is customary to use in the Russion baths. This memoir goes further to prove that we cannot depend on the data furnished by different travellers on the winters of Siberia, and that it will be necessary to repeat the experiments with good spirit-of-wine thermometers. The same gentleman has occupied himself with bringing to a high degree of perfection two instruments of his own invention, which he communicated to the academy some years since, and which are, an anemometer and an apparatus for the *ceration* of substances, which are with great difficulty fusible, by means of a certain mixture of hydrogen and oxygen gas. The construction of the anemometer is founded on the simple principle of forcing a solid into a liquid ; and one may, with the assistance of this instrument, measure exactly the force of the wind acting on any surface. This force is equal to the weight of the column of mercury which a cylindrical or parallelopipedical body, plunged into this liquid, would cause to escape. By his second invention, M. Zakharof has sought to prevent the accidents which the mixture of the two gases often occasions, from its extreme inflammability. For this purpose, he has applied to his apparatus two valves, one of which shuts itself by its own weight, and the other by the pressure of the water, so that any communication between the condensed gas and the external air becomes impossible. This same apparatus would also serve for the preparation of chemical extracts, either in the large or small way, without any necessity on that account to change the scale of the apparatus.

M. Wisniewsky having observed and calculated, during his astronomical voyage, some oocultations of the stars by the moon, has been able to furnish a more precise determination than we previously possessed of the geographical longitude of Moscow, Kasan, and Vologda. This labour was the subject of three of his memoirs—a fourth contained a proposal of a particular way of observing comets with the thread micrometer ; this method, which permits of more exact observations, will be useful for the more precise determination of the orbits of comets. A fifth memoir, by our astronomer, was occupied by a new method of calculating the reduction of distance of the moon from the sun and the stars ; a method which, requiring only theo perations of simple arithmetic, will essentially facilitate and abridge the calculation.

M. Tarkhanoff has presented eight memoirs, in which he details his practical labours, as well in the observatory of the academy, as during his voyage. He has observed and calculated the oppositions of Saturn in 1817, 1818, 1822, 1823, and 1825, as well as those of Jupiter in 1818 and 1826. The object of these observations is to perfect the astronomical tables by the comparison of the places calculated from observation, with the places of the planets calculated after the tables. The memoirs of M. Tarkhanoff furnish data worthy of attention, as they rectify many errors in the table with relation to the centre of the sun. During a voyage round the world with the expedition commanded by Captain Wassilief, during the years 1819—1822, our astronomer observed at Rio Janeiro, five occultations of stars by the moon. For want of corresponding observations to render the determination of the longitude of Rio Janeiro independent of the errors of the lunar tables, he has chosen, with this view, the occultation of Antares, as appearing to promise the most exact result, seeing that the star has passed almost by the centre of the moon. During the same voyage, M. Tarkhanoff determined the longitude of the port of Honorouro, in the island of Wagou, and corrected that of the port of Petropaulosk.

On the action of the Solar Rays on the Nitrate of Silver, when dissolved in common Water; by M. Vogel.—M. Hermbstædt was the first who attributed to a gaseous principle which is found in water, the property of causing the nitrate of silver, when in contact with it, to become red; an opinion admitted by MM. Krüger, Pfaff, and other chemists.

M. Zimmermann of Giessen, attributed the peculiarity to a vegeto-animal matter, to which he gave the name of Pyrrhine. These different opinions led M. Vogel to make some experiments. He took two tubes of glass, in which he placed two cylinders of beech-wood, one with the bark and the other without. In six months, they had become black and were covered with a gelatinous matter; the liquors did not give any precipitate with the salts of iron, or with gelatine. There was, therefore, neither gallic acid, nor tannin; but with the nitrate of silver they gave a liquid which, on being exposed to the solar rays, became red, and in some days lost its colour and left a deposit of a black powder. Chlorine and iodine entirely destroyed the colour of the solutions. All waters, in which there had been infused wood, soil, pure fibrin or blood, gave a red colour when they were exposed to the sun, and when nitrate of silver was added.

Hence, M. Vogel thinks that *Pyrrhine*, to which this property has been attributed as a distinctive character, ought not to occupy a particular place amongst the principles of the vegetable kingdom.—*Journ. de Pharmacie.*

Observations made by means of a new Telescope.—In a Boston journal it is related that an ingenious artist of Providence has recently constructed a telescope, of seven feet, on a new principle, by means of which he has been able to reflect upon a white screen, placed in a dark chamber, the image of the sun reduced to the size of a globe of eight feet in diameter. He states that his astonishment was exceeding when he perceived that each of the spots, to the number of nine, which exist at this time on the surface of the sun, was found distinctly depicted on the screen, to the degree that he could ascertain all their movements, considered in their diverse and sudden variations. He says that he could clearly perceive that these spots were immense volumes of smoke, which seemed to issue from many volcanoes; and, as they appeared occasionally to pass out forcibly from craters, above which they sometimes formed thick clouds, and were sometimes dissipated, he considers this phenomenon as an explanation of the rapid changes which these spots undergo. He observes, that the emanation of so great a quantity of gas from the interior of the body of the sun, would produce that brilliant and dazzling appearance which its atmosphere possesses. This theory may accord little with the opinion of other learned men who have made observations on the same subject; but the author firmly relies on the solidity of his hypothesis. With the same instrument, which he has constructed, he has also examined the moon, and he seems to be convinced that this planet is covered with snow and perpetual ice. He feels assured that the spots which are observed on its surface are icy seas, and the more clear parts are land covered with snow. He thinks that the places surmounted by a central cone are extinct volcanoes, seeing that no clouds are perceivable above the surface of the moon. The snow and ice with which it is enveloped explain, as he imagines, the cause of the brightness of its atmosphere, or the absence of an atmosphere. He conjectures that this vast accumulation of ice and snow which exists at the surface of the moon may be deduced from the nature of its revolutions. He offers to construct instruments of the same kind as he has used, by means of which numerous phenomena may be observed, at the price of from 50 to 100 dollars, and to furnish, at the same rate, solar microscopes made after a new principle, and so powerful, that, at a distance of twelve feet, they magnify 5,184,000 times.—*(Lond. & Paris Observ. Mars* 1829.*)—Bull. des Sciences Physiques.*

On Maximum and Minimum Thermometers. From the Course of Natural Philosophy and Chemistry, by Mr. Lechevallier, Lieutenant of Artillery, read to the Academy af Mentz, the 4th January 1829.—In a great number of scientific researches, and more especially in those which relate to meteorology, it is often necessary to know the maximum and minimum temperature during a given time. The construction of instruments destined to preserve the indications of mere temperatures, and which are called maximum and minimum thermometers, has exercised the ingenuity of many philosophers, amongst whom we may quote Six, Bellani, Rutherford and Mr. Gay Lussac. Among the maximum and minimum thermometers which they have proposed, and which are all based on the dilatation of liquids, that of Rutherford appears to have obtained a marked preference. It consists of two thermometers laid horizontally, the one with quicksilver and a steel index, the other with spirits of wine with an ivory index, for the minimum temperatures. Nevertheless, it appears that this instrument is not exempt from all inconveniences; it has been found fault with, in as much as the indexes do not always remain in the places where the liquids have brought them to, and that the separation of the column of liquid, which may accidentally result from the necessity in which we are of employing tubes whose diameter is not very small, and which, by leaving air in the interior, may give rise to false indications. Be it as it may, a very exact *minimum* and *maximum* thermometer may be procured, by making a slight addition to the metallic thermometer of Breguet. A circular or concentric hole must be made in the centre of the graduated circle, which marks the course followed by the point of the needle. Two small and light moveable bodies must be placed on each side of the needle, so that they may yield to the slightest effort. It is evident, then, when the needle moves in any direction, that it will push one of these before it, and that this mobile body remaining at the point, where the needle left it, will indicate a maximum or minimumte mperature according to the direction of the needle. To experiment on this instrument, it suffices to approach the two mobile bodies so that they touch the needle.

On the Solidification of Plaster, by M Gay Lussac.—Every one knows the property which plaster possesses, when deprived of its water by heat, of becoming solid with that fluid. The consistency which it acquires is very variable, and the purest plasters are precisely those which acquire least hardness. The cause has been attributed, in Paris plaster, to the presence of a few hundredths of carbonate of lime; but, without doubt, erroneously; for the heat necessary to bake the plaster is, in the small way, not above 300° F., and, in the large way, is never carried to the degree necessary to decompose the carbonate of lime. Besides, calcined plaster rarely contains free lime, and the addition of that base to those plasters, which have but little consistence, does not sensibly improve them. I think that we must search for the difference of consistency, which is acquired by different plasters, when mixed with water, in the hardness which they possess in their natural uncalcined state; a hardness which we cannot explain, but must take as a natural fact. That stated, I suppose that a hard plaster-stone, having lost its water, will acquire greater consistency when returning to its first state than a plaster-stone naturally softer. It is in some degree the primitive molecular arrangement which is reproduced. We find, in the same way, that when good fused steel has its carbon removed by cementation with oxide of iron, it will give, by a new cementation with carbon, a steel much more homogeneous and perfect than that obtained in the same circumstances by the cementation of iron.—*Annales de Chimie*, xl. p. 436.

Electricity of the Solar Rays.—(Letter from Sig. Carlo Mattrucci of Forli, to Professor Gazzeri.) " I hasten, Sir, to communicate to you some experiments which appear to me to deserve the attention of philosophers. Having been for a long time persuaded of the existence of electricity in the solar rays, I wished to ascertain the fact by experiment. Having for this purpose exposed to the sun a delicate condensing electrometer of gold leaf, I soon perceived the leaves diverge and open themselves also on that side of the glass case which was directly exposed to the solar action, as if they had been attracted by it. Being induced from this first fact to suspect glass in this situation electrified, I was anxious to know if this were the case: wherefore, having left some plates of it in the sun, in a few moments I touched them in different places with the ball of the electrometer, when a very perceptible divergence ensued, which, however, was much more apparent when I touched the plates, although lightly, with a flat surface, since the effects of the friction and the pressure did not afford a doubtful result. I concluded, then, that the solar rays had the power of electrifying glass, and it only remained for me to ascertain if this effect were owing to the real existence of electricity in these rays, or rather to the increased temperature of the glass, which I could easily determine by heating a plate of glass, and trying it with the electrometer. This I did several times, but never discovered any signs of electricity. I observed, also, that the glass plate exposed to the rays of the sun never became electric if placed beneath another glass plate, or if the face of the sun was obscured by the intervention of a cloud. These few experiments, which I have been induced to perform, seem to me sufficient to prove electricity in the solar rays. The influence of such a fact on the meteorological phenomena of terrestrial magnetism, and on so many other phenomena of nature, will, I hope, induce yourself and other philosophers to pursue the subject further."—*Antologia*, No. 100. (*Brande's Journal.*)

Crystallization of Sulphated Iron, by A. H. Van der Boon Mesch of Leyden.—These crystals, which are found in the mine of Gieshübel de Silberberg, in Bavaria, surpass in size, transparency, and regularity, all that it is possible to obtain by art, although M. Brongniart says, that they are rarely, if at all, found in nature; they are grouped round quartz flints of different sizes. Some crystals have the forms of oblique rhomboidal prisms, others of the Fer sulfaté basé, of Hauy. In general, the edges are not very angular, and the faces regular and united; their specific gravity is 2.037. They are of a clear green colour, soluble in cold water, and their solution is blackened by gallic acid. When they are exposed to the open air, the crystals alter; they become brown, and decompose into a powder of different colours, so that this mineral must be preserved with care. The first change it undergoes is to pass into the state of sulphate of iron, which perhaps has given rise to the opinion that this salt did not exist in nature. When this salt is heated in a retort, sulphurous acid is disengaged, which may be detected by Brazil wood paper; and when it is exposed to a white flame, it becomes black and magnetic. It is soluble in phosphate of ammonia, which transforms it into a glass sometimes red, sometimes yellow, which passes, after cooling, into a dull green. Melted again in this state with salt of phosphorus, it becomes of a very pure green. The same phenomena takes place with borax. The analysis which Berzelius, Bergmann, and Mitscherlich have made of this substance, gives 23.27 parts of oxide of iron, 28.39 parts of sulphuric acid, 38.45 parts of water. The formation of this mineral is attributed to the natural decomposition of sulphuret of iron in calcareous stone.—*Bydrag. tot. de Nat. Wet.* N. iv. p. 2.

On the mode of Formation of certain Mineral Substances, by M. Becquerel.—The surprising progress which geology has latterly made, has been the means of our arriving at satisfactory knowledge, as well on the respective age of *terrains*, as on the mode of formation of the greatest part of them. But if we were almost agreed upon the question relative to the general mode of formation to which we must refer them, there was still much obscurity upon the processes by which nature has effected the composition of some of them.

Many chemical compounds, indeed, which nature exhibits in the bosom of the earth cannot be reproduced in the laboratories of our chemists. There are others which artificial chemistry has been able to recompose, but which cannot be crystallized as they are found in nature.

A blank, then, existed in this respect in the science, and it was of importance to have it filled. M. Becquerel, known by his numerous and important labours on electricity, seemed bound to supply it, and to furnish to geology the completion of which she had need. It resulted from his researches, that it was the influence of electrical forces, acting with inferior intensity in a continuous manner, which was wanting to the apparatus of our chemists to enable them to imitate the products of nature.

M. Becquerel, in a memoir which he lately read before the Academy of Sciences of Paris, treated first of the crystallized metallic sulphurets, and commenced with the sulphuret of silver.

The apparatus of which he makes use consists of two tubes of glass, open at both extremities, and filled at the inferior part with very fine clay, slightly moistened with a liquid conductor of electricity. In the superior part are poured liquids whose action upon each other, and upon the plate of metal, which is plunged by one of its extremities into each of them, gives rise to the electrical effects necessary to the production of compounds. The two tubes are placed in another which contains a liquid meant to establish a communication between them. To obtain the sulphuret of silver, a saturated solution of the nitrate of silver is poured into one of the tubes, and a solution equally saturated with the hydrosulphate of potass into the other; and then the extremity of a plate of silver is immersed in each of them. That which is in contact with the nitrate becomes quickly coated with silver in a metallic state, whilst that, on the other hand, which is the positive pole, forms water and sulphuret of silver, which combines with the sulphuret of potassium. This double sulphuret is decomposed by degrees by the action of the nitric acid, which only takes place latterly, because, in chemical decompositions produced by electrical forces of low intensity, the oxygen goes at first alone to the positive pole, and the acid not till afterwards. It forms sulphuret of potassa; the sulphuret of silver is separated and crystallizes in beautiful little octahedral crystals, whose aspect is similar to that of the crystals of the same substance as found in the mines of silver.

The crystallization of the sulphuret of silver is owing to a very slow decomposition of the double sulphuret, which gives time to the molecules to effect the oscillatory movement necessary to allow the similar faces to act upon each other, by virtue of the laws of crystallization.

The sulphuret of copper is obtained by the same process, and it is in every respect similar to the native sulphuret.

The oxy-sulphuret of antimony or kermes is produced in the same manner. It is obtained in small octahedral crystals of a deep brown-red colour, or in crystallized plates.

It is probable that the sulphurets of lead, of tin, and of mercury, may be obtained by a similar process.

With the sulphurets of iron and of zinc, which decompose easily by the simultaneous contact of water and air, it is necessary to employ certain precautions to prevent this decomposition. M. Becquerel has obtained very small cubic crystals of sulphuret of iron of a yellow colour, similar to that of pyrites.

He concludes, from the results at which he has arrived, that it is probable he has pursued an analogous plan in the formation of the native sulphurets, and explains how the phenomenon has been produced at the moment of the consolidation of the masses.

The iodurets, the bromurets, the crystallized metallic seleniurets, may be obtained by the same means. The ioduret of lead is in beautiful yellow octahedral crystals of a brilliant aspect: that of copper presents the same form, but the colour is different.

In general, all these products result from a simple principle which nature can easily bring into action.—*Le Globe.*

CATALOGUE RAISONNÉ.

Plantæ Asiaticæ rariores; or, Descriptions and Figures of a select number of unpublished East Indian Plants. By N. Wallich, M. and P. H. D. London. Treuttel & Würtz.

We have seen a part of the first number of Dr. Wallich's magnificent work on the rare East Indian Plants. It is published in elephant folio, which admits of much grandeur of delineation, without rendering the work so bulky as to be unwieldy. It will be completed in twelve numbers, containing twenty-five engravings. The first number contains delineations of the Amherstia nobilis, a splendid leguminous plant, belonging to the tribe of Cassieæ of Decandolle, found in the province of Martaban; tbe Sterculia populifolia; the Hibiscus Lindlei, a handsome species from the banks of the Irawaddi; Anneslea fragrans; Phaseolus fuscus; two elegant species of Caalluma, C. crenulata and C. fimbriata, from the sterile banks of the Irawaddi, found among stones and ruins; two extremely beautiful species of Curcuma, C. Roscoeana aud C. ardata; the interesting tree Melanoorhœa usitata; and an extensive climber, Hiræa hirsuta, from the manuscript *Flora Indica* of the late Dr. Roxburgh, who says it is a native of Chittagong. There may be sometimes some harshness in the colouring; but the subjects are so splendid, and the materials so gorgeous, that the work cannot but be a magnificent repository of the beautiful vegetation of India.

Essai sur les Insectes de Java, et des Iles Voisines. By P.-L. Vander Linden. First Memoir. Hayer. Brussels, 1829.

Mr. M'Leay, in 1825, began a work, entitled "Annulosa Javanica," &c. of which the first part only appeared. Dr. Van Linden proposes, in a series of memoirs, to give descriptions of the new or doubtful species in the Dutch collections, and to add to them a catalogue of the species already described. The method he intends following is that of Latreille. The first memoir comprises the tribe of *Cincindeletes* of Latreille. Out of ten genera of which this tribe is composed in M. Déjean's *Spécies Général,* there are only four, those of Cicindela, Therates, Colliuris, and Tricondyla, amongst which any species have been found in the Dutch East Indian possessions. The three last genera are indeed exclusively proper to the East Indies and to Polynesia; that of Cicindela comprises species from all quarters of the globe.

The collections of Java have offered the following numerical results:—Out of thirteen species of Cicindela, there are but three described as the species of Earl Déjean, and one of them is new. Out of four species of Therates, two are described in the above-mentioned work, and two are new. Out of seven species of Colliuris, three only have been described in the same work, a fourth by Mr. M'Leay, and the three others are new. The collections contain, in addition, only the two Tricondyla already known.

The Gardens and Menagerie of the Zoological Society, &c. No. III. Price 2s. 6d. London. Thomas Tegg.

After some little delay, the third number of this elegant little publication has made its appearance. Though brought out under the superintendance of the secretary and vice-secretary of the Zoological Society, it has no pretension to a display of scientific knowledge, and all details which would not be interesting to the general reader are avoided. We cannot say that this will much favour the dissemination of any real knowledge of the natural sciences; but as a work of art it yields to no contemporary. Its illustrations are indeed the *ne plus ultra* of the art of wood-cutting, and the tail-pieces are so perfect and beautiful in themselves, that both in this and the former numbers, they give the most agreeable surprise, and transport us to a fairy land of natural history.

Recherches sur quelques-unes des Revolutions de la surface du Globe, &c. By M. Elie de Beaumont.—*Annales des Sciences Naturelles, Sept.* 1829.

This paper is an attempt to study the relative age of the dislocations which mineral beds may have undergone, the phenomena of the displacement of strata in mountain chains, and the abrupt variations which occur, at different heights, in the position and inclination of sedimentary rocks. Mr. Cuvier has shown that the surface of the globe has undergone a series of sudden and violent revolutions. Mr. Leopold de Buch has noticed the well-marked differences between the different systems of mountains which can be traced on the map of Europe. The author attempts to bring these two series of considerations into the relation which they bear to one another. The present essay only contains the application of his views to the revolution which occurred between the period of the deposition of the oolitic limestone and that of the green sand and chalk, the elevation of the beds of the Erzgebirge, of the Cote d'Or, and of Mount Pilas.

Geological Essay on the Tertiary Basin of Albenga. By Agostino Sasso.—*Giorn. ligustico di Scienze, &c.* 1828. p. 467.

These formations are very analogous to those which generally compose the whole of the Sub-Appenine hills, and are formed of three distinct parts, which, going from below upwards, are,

1. A micaceous slate, full of shells, analogous to the blue marls of Brocchi.
2. A yellow shale, representing the calcareous sands of Brocchi, containing fewer fossils, and constituted in its middle part of solid arenaceous and calcareous beds, forming a kind of macigno, and known under the name of rock of Finale.
3. Beds of transported rocks, consisting of calcareous boulders in a marly cement, containing no organic remains.

The author gives an enumeration of the fossils, amounting to 174, which have been found in this tertiary deposit, some of which are new. Mr. Sasso has established a new genus, under the name of Limopsis, which contains the Arca aurita of Brocchi.

Tœniæ found in Water, by Baer at Kœnigsberg. (Verhandlungen des Gesellschaft naturforsch Freunde in Berlin, T. I. Cah. 6.)

The observation of Linnæus, that tœniæ have been seen in water has been much doubted. Mr. Baer and his friend Eysenhardt, have, however, just observed the same fact near the mouth of the Pregel, two leagues from Kœnigsberg. There was a spot where the water was full of individuals belonging to the species Botriocephalus solidus, and they obtained four living specimens. But at the same time there was in that spot a considerable quantity of the small fish known by the name of Jack-sharp, (Gasterosteus pungitius.) All these fish had their bellies extremely swollen by the presence of a single Botriocephalus of the above-mentioned species, and it only required to squeeze them a little, to make ths worm issue by the anus, or by a rent which took place in the abdomen. The Botriocephalus solidus can live several hours, and even two days, out of the animal, in water.

On the pretended Venomous Bugs of Miana, (*Argas Persicus*, Fischer.) Extracted from a Letter of Mr. J. Szovits, dated Khoi, June 1828.—*Journal of St. Petersburgh, Sept.* 1828.

It appears, from the observations of Mr. Szovits, a naturalist sent by the Russian government to explore the Caucasus, that the pretended bugs of Miana, whose bite is so much dreaded at that place, and in other countries of the Caucasus, is not at all dangerous.

Some Account of an Ascent and Barometrical Measurement of Wha-ra-rai, a Mountain in the Island of Owhyhee. By Archibald Menzies, Esq. F.L.S.—*Mag. of Nat. Hist. Vol. II. No. IX. p.* 436.

Mr. Menzies passed two days on the top of the Wha-ra-rai, where he gathered the Sophora tetraptera, the Dodonæa viscosa, and a small shrubby geranium. The barometer stood, on the top of the mountain, the first day at 22 in. 40 pts. and the second day at 22 in. 44 pts. The mean of these two observations, deduced from 30 in. 16 pts., the mean of two corresponding observations on board the ship in Karakooa Bay, will render its height 8457 feet above the level of the sea. The thermometer was, at the same time, 65° on the first, and 64° on the second day.

Lessingia novum genus e Familiâ compositarum. Auct. Adelberto de Chamisso.—*Linnœa, Tom. IV. p.* 203. 1829.

This new genus contains only a single species from Port St. Francis, in New California. The author places it in the tribe of the Sagetées of Mr. Cassini.

De insolitâ quâdam mercurialis specie dissert. By Ernestus Meyer, Prof. Regio Montanus.—*Linnœa, Tom. IV. p.* 237. 1829.

This species, from the Cape of Good Hope, has been named by the author Mercurialis triandra. He characterizes it thus :—*M. annua, foliis alternis exstipulatis, floribus monoicis solitariis, masculis triandris, fœmineis absque staminum rudimentis, fructu lævi glabro.* He gives, besides, a detailed description of the plant.

Cruciferarum, Elatinearum, Caryphyllearum, Paronichearum, que Brasiliæ meridionalis synopsis. Auctore J. Cambessides. 8vo. August 1829.

The species of these families are not numerous in Brazil. Nine Cruciferæ, one Elatineæ, twenty-one Caryophylleæ, and nine Paronicheæ, are enumerated in this small work. The characters of some species, and even of some new genera, are established.

On the Magnesite discovered in Anglesey. By William Henry, M.D. F.R.S. &c. In a Letter to Dr. Hibbert.—*Edin. Journ. of Science, Jan.* 1830.

This new locality occurs in Serpentine, at a short distance from Pary's Mountain, in Anglesey. It is of a greenish white colour, a foliated structure, translucent at the edges, rather soapy to the touch, and soft enough to yield, not easily however, to the nail. Its specific gravity (twice taken) is 2,820. On chemical examination, it was found to differ essentially from the Shetland hydrate, (discovered by Dr. Hibbert,) which, according to Dr. Fyfe's analysis, is the proto-hydrate of magnesia. It appears to be constituted of a soluble and insoluble portion : the former consisting almost entirely of an anhydrous carbonate of magnesia, and carbonate of lime, in the proportion of about 28 of the former to 12 of the latter. The insoluble portion appeared to Dr. Henry to resemble common talc.

Rosæ plantarum generis historia succincta, in quâ Rosarum species tum suæ terræ proventu tum in hortis natas suppositicias secundum normas naturales ad stirpium besses tres primitivos revocat inque speciminum ratorum fidem Rhodologorum et Rhodolphilorum captui accommodat, Fred. Guill. Wallroth. In 8vo. 300 p. with a complete Catalogue of Species. Nordhausen, 1828, Kœhn.

In the first chapter, the author examines what has been said to the present day by those who have written on the genus Rosa. The order which he follows is entirely new, as well as the reform which he proposes. The latter, however, appears to be based on a long experience, and on multiplied and careful observations. The second chapter exposes the principles on which the author has established his system. The third and last chapter, the most voluminous of all, describes the species, which are reduced to twenty-four.—*Leipzig Liter. Zeitung, June* 1829, p. 1048.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

LONDON.

Royal Society.—Noc. 23. The President, Mr. Gilbert, in the Chair.—A paper on "the Survey made by Mr. Lloyd across the Isthmus of Panama," was read ; accompanying the paper was a copy of the Survey. Isaac Robinson Esq. was elected a Fellow. Dr. Turner, Capt. Blake, and T. C. Knowles, Esq., were proposed. Capt. Muller presented a set of his newly-invented globes. Six splendid folio plates, illustrative of the lymphatic system, by Professor Meckel, were also presented. These plates were dedicated to Professor Soemmering of Frankfort, by whose very recent death science has lost an ardent supporter. Dr. Crombie's *Natural Philosophy* and *Gymnasia,* and several other works, were also presented.

Linnæan Society.—Dec, 1. A. B. Lambert, Esq. V.P. in the chair. The paper read this evening was an Account of a recent Botanical Excursion from Jalapa to Papantla, by Dr. Scheide and M. Ferdinand Deppe, two German naturalists. The communication embraced a great many curious details. The travellers, in the course of their excursion, discovered three entirely new species of the genus *pinus,* or fir tree ; also a new species of sarsaparilla, possessing similar properties with the *smilax sarsaparilla* of South America. Besides these, a new species of oak was found in the hot regions of Mexico, the only instance on record, perhaps, of the genus *quercus* growing in such a temperature : they saw also an abundance of the scarce parasitical plant *vanilla* on the bark of decayed trees. On the banks of the river Tecoluta the travellers observed great numbers of the white *ibis*, and a variety of the heron tribe. Joseph Neeld, Esq. and E. Jennings, Esq. were balloted for and elected.

Society of Antiquaries.—Nov. 19, 1828. The first meeting of the season was very numerously attended, and an interesting paper was read, from the pen of a clerical member, on the Round Towers which exist in Suffolk and Norfolk. Many new members were proposed.

Nov. 25.—H. Hallam, Esq., V.P. Reginald Bray, Esq., the Rev. T. S. Hughes, and Ralph Watson, Esq., were elected fellows. Signor Juan Barthé communicated, through Lord Aberdeen, fac-similes of several Roman inscriptions. The Rev. H. J. Todd, F.S.A., presented a drawing, with a description, of a richly-ornamented Saxon doorway at Kirkham Abbey, Yorkshire. Some remarks on the coins of the kings of Mercia, by Edward Hawkins, Esq., F.S.A., were read; and also a communication from Mr. Bray respecting the discovery made on Earl Onslow's estate at Worplesden, in Surrey, two miles and a half from Guildford, on the 30th July last, of a pavement sixty-two feet in length, the tesseræ of which his lordship has had removed to Clandon, for an ornamental building.

Dec. 3.—Thomas Aymiot, Esq. in the chair. Three or four short communications were read on subjects of no particular interest.

EDINBURGH.

Society of Antiquaries of Scotland.—The first evening meeting of this society (being their fifteenth session) was held on Monday last, the 14th, in their apartments on the Mound—Sir Henry Jardine, Knt. Vice-President, in the chair. The meeting was very numerously attended by the Fellows, as well as strangers. We are glad to be able to announce, that during the winter we shall be enabled to lay before our readers the proceedings of this body. The Curator noticed shortly a number of the donations which had been presented during the late recess, and among these were exhibited :—

1. A valuable collection of 32 coins of the Spanish Colonies and Municipia—by the Reverend W. J. D. Waddelove of Bracon Grange, along with a full descriptive catalogue.

2. A valuable collection of gold and silver Coins of Assam, presented by George Swinton, Esq. Secretary to the Bengal government; consisting of six gold and 31 silver coins, along with a descriptive catalogue.

3. A curious Brass Gun, taken in 1828 at the fortress of Bhurtpore, and presented by the Governor-General and Council to Captain L. Carmichael of his Majesty's 59th regiment, who has obligingly given it to the Society. It bears the following inscription—*Jacobus Monteith me fecit*, Edinburgh, *Anno Dom.* 1642.—The letter from the Governor-General in Council was read at the same time.

4. A very perfect Quern from the county of Perth, by Mr. Izett, Newington.

5. History and Antiquities of the Town and Minster of Beverley, &c. By the Rev. George Oliver, vicar of Clee.

6. The Siege of Carlaverock Castle, with the arms of Earls, Barons, and Knights, who were present. By the Editor, Nicholas Harris Nicolas, Esq. of the Inner Temple, barrister at law.

7. Papers relative to the Regalia of Scotland, being his contribution to the Bannatyne Club. By William Bell, Esq. W.S.

8. Les Affaires du Conte de Boduel, l'an 1568, being also a contribution to that Club. By Henry Cockburn, and Thomas Maitland, Esquires, advocates.

9. Descrittione del Regno di Scotia, being his contribution to the same Club. By Andrew Coventry, Esq.

10. Genealogical Memoirs of the Royal House of France, printed for private circulation among his friends, by the late Lord Ashburton, with some papers connected with Antiquarian research. By Sir John Sinclair, Bart.

11. Catalogue of the Arundel Manuscripts in the Library of the College of Arms, London. By C. G. Young, Esq. York Herald.

12. Vol. XXII. Part II. of the Archaeologia. By the Royal Society of Antiquaries, London.

13. A Burmese Book. By Lieutenant-Colonel Hunter Blair, Royal Irish Fusileers—and

14. A Flint Arrow Head, found upon the Lomond Hill, Fifeshire, and supposed to have belonged to the army of Galgacus. By Lieutenant-Colonel Miller, C.B. and F.R.S.

There was then read a portion of an Inquiry concerning the site of the Battle of Mons Grampius, (announced, but not read, last session,) by Lieutenant-Colonel Miller, F.R.S. London, &c. This Essay is illustrated by a Plan, on an ample scale, of the presumed field of action. From the great interest excited by the reading of this very able dissertation, a very full attendance of the Society at their next extraordinary meeting is expected, to hear this paper concluded.

There were exhibited by Mr. Macdonald some massive Ornaments of Silver, conjectured to have formed the fastening of an Ancient Dress, found lately in the neighbourhood of Penrith, and sent to him by John Piper, Esq. for that purpose; and a very fine ancient Brass Spear Head, sent by Sir Patrick Walker.

The thanks of the Society were voted to all the donors, and the meeting adjourned.

Wernerian Natural History Society.—A general meeting of this Society was held on Saturday the 5th December, in the College, when the following office-bearers were elected for the ensuing year:—President, Robert Jameson, Esq. Vice-Presidents—Henry Witham, Esq., Dr. Walter Adam, David Falconar, Esq., of Carlowrie, Dr. R. K. Greville. Secretary, Patrick Neill, Esq.—Treasurer, A. G. Ellis, Esq.—Librarian, James Wilson, Esq.—Painter, P. Syme, Esq.—Council, Dr. John Boggie, Rev. Dr. Brunton, John Stark, Esq., Dr. John Aitken, Sir Arthur Nicolson, Bart., Dr. John Gillies, Rev. Dr. Scot, Dr. Charles Anderson.

The following communications were then read:—

1. On the Vegetation of the first period of an Ancient World. By Henry Witham, Esq. F.R.S.

2. On the Roads or Highways of the ancient Peruvians. By Dr. John Gillies.

3. On the Okrub of the ancient Hebrews, and Scorpion of the English Bible. By the Rev. Dr. Scot of Corstorphine.

Of the first of these papers we have been enabled, through the kindness of the author, to give some account in the present number; the second is soon to be published, when we shall notice it at further length. On the subject of the fossil vegetation of the coal-fields of England and Scotland, several very interesting observations were made by Dr. Graham, Dr. Greville, and Mr. Bald.

Dr. Scot's paper on the scorpion was exceedingly curious. He first discussed the etymology of the word *okrub*, and then gave a general description of the scorpion, which he represented as having, some species six, others eight eyes. It varies in colour, some being black, brown, yellow, &c. The common length is six or eight inches, although certain authors speak of scorpions several feet in length. It lays from 26 to 40 eggs. The young, when hatched, get upon the back of the female, where they are protected and defended by the tail, at the extremity of which is the sting. Scorpions have frequent battles with ants, which may sometimes be seen dragging from the field one of their vanquished foes. Scorpions live among stones, &c. hate the light, feed upon flies, and other insects, and destroy one another. When covered with oil, they perish, their respiration being thus prevented. The effects of the sting were described from Dioscorides. They are not always fatal. Maupertuis put a hundred scorpions into a glass vessel, and at the end of fourteen days found only four of them alive, they having killed and devoured each other. The subject was illustrated by numerous references to Scripture.

The Secretary then laid upon the table several books presented during the vacation.

Royal Physical Society.—Nov. 25, 1829. Mr. K. T. Kemp read an essay on several modes of exciting Galvanic Electricity. (*Vide* Edin. Journ. of Nat. and Geog. Science, Vol. I. No. iii. p. 183.)

Mr. William Macdonald, A.M., read an exegesis on the Probable Sources of Rivers and Springs.

Dec. 2, 1829.—Reflexions on some of the Principles of Mechanics and the Theory of Machinery in general; by Charles Slee, Esq., was read by Mr. Thomas Aitken.

Mr. Dick, Lecturer on Veterinary Surgery, communicated a notice regarding the Fetlock Pad in the legs of horses, demonstrating by dissections and preparations the similarity of its structure to the frog of the foot; and deducing from thence its utility and importance as a pad and support to the fetlock, particularly in leaping and galloping on soft and yielding ground.

Dec. 9.—Mr. K. T. Kemp gave a description of two newly constructed Thermometers for ascertaining minute differences in the Boiling Points of Liquids. (*Vide* Edin. Journ. of Nat. and Geog. Science, Vol. I. No. iv. p. 262.)

Mr. William Ainsworth communicated some notes on the Geognostical Structure of the High Peak of Derbyshire, with an exhibition of illustrative specimens.

Dec. 10.—Mr. W. Ainsworth exhibited portraits of the Siamese Youths now exhibiting in London, and an ornithological monstrosity in which there were two heads and one body.

Mr Hargreaves made a communication on the Steam-Engine, which he illustrated by a very little beautiful working model.

A notice of three remarkable Hybrids was given by A. T. Holroyd, Esq., F.L.S. F.Z.S. &c.

Mr Cheek's communication on the Progress of Zoology in France during the last year, was postponed to the next evening.

Plinian Society.—Dec. 1, 1829. Mr. Bushnan read a paper on the Tyrian Dye.

Mr. Wilson communicated some remarks on the Flora of Ayrshire.

Dec. 8.—Mr. Maclagan read a paper on the Antiquities of Ayrshire.

Dec. 15.—Mr. Dyett presented a specimen of the *Boa Constrictor.*

Mr. Balfour read a paper on the Fuci, in which he alluded to their botanical character and to their geographical distribution. Mr. B. also read a paper on Fecula or Starch, as obtained in various forms from the vegetable kingdom.

Dec. 22.—Mr. Bushnan continued his paper on the Tyrian Dye.

Mr. Stebles communicated some facts regarding the Migration of Birds.

PROVINCIAL.

Northern Institution.—Nov. 27, 1829. The members of this society held their first evening meeting for proceeding with the business of the session, John Ross, Esq., banker, in the chair. A valuable donation was presented from Mr Duncan Forbes, consisting of preserved specimens of Highland game and wild fowl, and a young but well stuffed specimen of the Egyptian Ichneumon. A copy of the French Protestant New Testament, published at Geneva in the year 1560, was presented from the Rev. W. Findlater of Durness. When the letters received during the previous month, and routine business were disposed of, the secretary read a notice from Sir Francis Mackenzie of Gairloch Bart., on a curious *hillfort* on his property of Conon, and a list of rare birds still inhabiting the fastnesses of the estate of Gairloch, on the west coast of Ross-shire. The principal communication appointed for the evening was then read, and excited much interest. It was an essay by John Johnson, Esq. Forres, on the antiquities of Burghead, the well-known seaport and promontory which both in ancient and modern times has been regarded as marking the termination on the south of the Moray Firth. From a review of General Roy's Military Antiquities in North Britain, and of other authors who have touched on the subject of the Roman stations to the north of the great wall which traversed from sea to sea between the Firths of Forth and Clyde, and especially of the Itinerary of the Monk Richard of Cirencester, and the relics recently brought to light by excavation, the author shewed it to be extremely probable that Burghead was the *Ultima Ptoroton* of the Romans, and one of the " aræ finis Imperii Romani." A copy of Richard's Chart, founded on the Geographer Ptolemy's descriptions, with various drawings and sections exhibiting the modern appearance of this station, and the positions of the ancient walls and ditches, and of the Roman well, were adduced to illustrate the essay. Mr. Johnston did not enter much into the history of Burghead as a Danish strength, into which it was converted by the northern rovers after it had been relinquished by the Roman soldiery; but we trust that the Institution will still have it in its power to elucidate this part of its now obscure but interesting annals.

FOREIGN.

Acts of the Geographical Society.—August 7, 1829. Dr. Richardson thanked the society for the honourable mention they had made of the part which he took in the late Expedition of Capt. Franklin towards the Polar Sea.

Mr. Noël Champoiseau called the attention of the society to the labours of Mr. Diard, and presented a notice of the travels of this naturalist.

Mr. Bruguiere gave in the remaining part of his manuscript on the Orography of Europe, comprising the systems Sardo-corsic, Tauric, Sarmatic, and Brittanic.

Mr. Alex. Barbie du Bocage read for Mr. Warden an Analysis of the work of Lieut. Maw, entitled, Passage from the Pacific to the Atlantic, &c.

Meeting of the 21*st August* 1829.—The Abbé Manet sent the society a copy of his Memoirs on the Ancient and Present State of the Bay of Mount St. Michael.

Mr. Cadet of Metz read some notices of the remarkable events in the Voyage of Capt. Parry in 1827.

A letter from Mr. Gauttier d'Arc was read, containing some curious details on new excavations made at Pompeii.

Mr. Chodzko offered a Map of Italy, engraved on stone, to serve for the history of the history of the Polish Legions in Italy; and the drawing of the Standard of Mahomet, obtained near Vienna, by Sobieski.

Mr. C. Moreau gave in copies of his Memoirs on England, Ireland, and Scotland.

The same gentleman renewed the proposition which he had already made to invite the return of correspondence to ascertain several series of questions upon the different Points of the Globe, and announced that the Royal Asiatic and Medico-Botanical Societies of London had authorized him, in their name, to address these different questions to their numerous correspondents established on the different Points of the Globe.

Mr. De la Roquette proposed that Mr. Moreau's suggestion should be acted upon, and that copies of these questions should be transmitted to the learned societies mentioned by this gentleman.

Academy of Sciences.—October 26, 1829. M. Cuvier made, in the name of the Section of Natural History, a very favourable report upon the Zoological Collections made by Messrs. Quoy and Gaimard in the Expedition commanded by Capt. d'Urville.

Mr. Dumeril made a favourable report on the work of Mr. Larrey, entitled, Military Clinical Surgery.

Mr. Becquerel read a memoir on the probable Mode of Formation of several Minerals, which enter into the Composition of the Mineral Crust of the Terrestrial Globe. (See notice, at p. 309 of the present No.)

Messrs. Audouin and Milne Edwards wrote to the Academy, that in the expectation of not being able to address that body verbally for a length of time, they havə sent a memoir, in which they have staed the results of their third journey along the coasts of France.

Mr. Chevreul reported very favourably on Mr. Robiquet's Analysis of the *Sorrel.* This substance furnishes a colour of a beautiful red, to be compared in point of brilliancy with carmine, but much less solid. Mr. Robiquet has extracted the colouring principle of this substance, to which he has given the name of *Orsine.*

Meeting of the German Naturalists.—Heidelberg having been fixed upon for the eight annual meeting of the German Naturalists and Physicians, every exertion had been making for months beforehand for the due accommodation of the guests. The government, which is always ready to promote the interests of science, caused particular attention to be paid to the necessary preparations; the inhabitants took a very warm interest in the event; and the members of the Museum Club very kindly offered their handsome and spacious apartments for the meetings. Previous to the day fixed for opening the sittings, several celebrated men arrived, not only from Germany, but from almost every country in Europe. On the 18th of September, Professor Tiedemann, chosen as first manager, opened the public assembly in the great lecture-room of the Academy, with a discourse on the progress of the Natural Sciences, their present state, and their influence on civil society. Professor Gmelin, the second manager, then read a list of the names of the members present, who were very numerous. Among them were Count von Sternberg from Prague, Dr. von Speez from Ofen, Robert Brown and Dr. Weeks from London, Coddington and Whewell from Cambridge, Ferussac from Paris, Rehmann from St. Petersburg, Eschholz from Dorpat, Quetelet from Brussels, Lichtenstein and Ritter from Berlin, Treviranus from Breslaw, Treviranus from Bremen, Goldfuss, Harless and Nees von Esenbeck from Bonn, Oken and Vogel from Munich, Rüpell from Francfort, &c. &c.

The second sitting was on the 20th, and the third on the 22d. In this third sitting it was decided by a great majority, that Hamburgh should be the place of meeting for the year 1830. The first Burgo-master, Dr. Bartels, and Dr. Fricke, were chosen managers. Professor Gmelin read a note addressed to the meeting by Baron de Ferussac, in the name of the *Société Anonyme du Bulletin Universel des Sciences et de l'Industrie,* inviting it to take part in that publication. A committee was appointed to consider the proposal. Professor Oken reported the steps that had been taken towards the edition of Pliny, viz. the collation of the MSS. in Italy, Spain, France and England.

In the fourth sitting, on the 23d of September, the question—whether cities situated out of the German Confederation might be chosen for the meetings—was discussed, and negatived by a great majority. Professor Tiedemann informed the meeting, that the city of Heidelberg, which had been a seat of the muses ever since the fourteenth century, wished to testify the respect for science which it had inherited from ancient times, by having a medal struck in commemoration of those meetings, to be distributed among the members. A burst of applause interrupted the speaker.

The fifth meeting was opened by a report of Professor Lichtenstein, in the name of the committee for considering of Baron Ferussac's proposal, to which it was agreed to accede; and a letter was desired to be written to the Baron, in the name of the assembled German Naturalists and Physicians, acknowledging the utility of his great undertaking, and wishing it every success. Among the additional members present were Professor Duncan from Edinburgh, Betti from Florence, &c.

At the sixth aud last meeting, on the 24th of September, Professor Lichtenstein read a letter addressed to him by the illustrious Goethe, in which that patriarch of German literature expressed the warm interest he took in the proceedings of the association.

In conclusion, Professor Tiedemann laid before the meeting an account of the proceedings, and thanked the meeting for the numerous attendance, and the lively interest that had been manifested. Professor Lichtenstein, as the second manager at the assembly in 1828, delivered the accustomed valedictory oration, and concluded with the following words :—

"We now take leave of you, and of this friendly abode of science, with feelings of the most grateful recollection of the abundant and various information and enjoyment which our meeting has again afforded us on this occasion. Neither the banks of the Elbe, nor those of any greater or smaller stream that we may visit in the sequel, will ever be able to efface or to obscure the lively image which we now carry away with us from the wood and vine-covered hills of the Neckar."—

Natural History Society of Montreal.—The October monthly meeting of this society was held at its rooms on Monday evening 26th Oct. last, the Hon. John Richardson, President, in the chair.

After the minutes of last meeting were read and approved of, the corresponding secretary read a letter from Mrs. Lancaster Lupton of Albany, accompanying a donation aftermentioned ; from Lieut. F. H. Badgeley, R. E. of Kingston, containing a communication relative to minerals in that neighbourhood, and from D. B. Viger, Esquire, in reply to a notice of his election as ordinary member.

It was stated to the meeting that Mr. George Brome, the individual who was last year engaged by the society to prepare specimens in Zoology, had returned from England with a collection of birds of Great Britain, as well as of the Brazils, New South Wales, West Indies, &c. which he valued at about L. 20, and the council requested that they might be vested with a discretionary authority to purchase the collection or such portion of it as might be deemed necessary, which request was unanimously acquiesced in by the meeting, who restricted the expenditure to the sum of L. 20.

The council reported that they had received information that the officers of the St. Maurice expedition, who had lately returned, had made considerable collections, which were intended for the society's collection. The numerous donations to the museum, reported by the council, were from Mrs. Lancaster Lupton of Albany, a bust of the Hon. Enos T. Throop, governor of the State of New York, modelled by herself—from Rev. A. Ansley of Hull, several minerals from Hull, and a brass amulet or medal from Italy, found in the earth at that place—from the Rev. G. Bourne of Quebec, several geological specimens from Quebec and Labrador, and a cannon ball taken out of the frame of a house at Quebec, into which it had been shot during its siege—from Mr. Alexander M'Nabb of Bytown, several minerals from the Rideau, and some bones found twenty-four feet below the surface in the excavation of the canal—from Mr. George Bent, nine foreign minerals, a marine animal (the sea horse) from Smyrna, the seeds of an alligator pear, and the under jaw of the horn fish from the Red Sea—ftom D. Thompson, Esquire, Glengarry, a specimen of specular iron ore from Huggewung Bay, Lake Superior—from W. F. Wentzel, Esquire, several minerals collected by him on the Coast of Labrador—from Mrs. Michaels and Miss F. Hays, a large collection of shells, collected by themselves on the sea coast of the United States ; another collection from the West Indies ; a specimen of mica slate from Oyster Bay, Long Island ; and the perfect skeleton of a crab—from J. Valentine, Esq. a Muscovy duck—from Mr. J. P. Kollmyer, two lizards in spirits—from the Rev. Mr. Somerville, two wasp's nests—from Mr. Alexander M'Donald, a live snake from Niagara Falls—from Mrs. Sarah Parker, six centipedes and four scorpions in spirits from the West Indies—from Captain Le Breton of Brittania, the skeleton of an unknown animal found on the banks of the Ottawa—from Dr. E. Moreau of St. Laurent, the eggs and nest of a humming bird—from Count Vitaliano dal Varmé, six gold, silver, aud copper coins of Persia, Prussia, Russia, Austria, and Milan—from Mrs. D. Robertson, two silver coins, from W. L. Metchler, Esquire, a silver coin of Louis XIII. and from D. A. C. G. Lister of Grenville, a stalk of Indian corn comprised of eight ears adhering together. To the Library the donations were from Mr. D. Robertson, Knox's History of the Reformation, one volume, from W. E. Cormack, Esquire, of Newfoundland, now in London, a copy of the Report of his Journey in search of the Red Indians of Newfoundland, and a pamphlet on American and Colonial Steam Navigation, and from Mr. R. Armour, the Report of the Commissioners of the Saguenay Expedition.—*Montreal Gazette.*

LITERARY NOTICES.

Mr. Murray announces Consolations in Travel, or the Last Days of a Philosopher; by Sir Humphrey Davy: Principles of Geology; by C. Lyell, F. R. S. and the Life of Sir Humphry Davy....Folio Illustrations of Indian Zoology, from the Collection of Major-General Hardwicke, selected and arranged by S. E. Gray, are in the press....Dr. Morton is preparing for the press, Travels in Russia, and a Residence in St. Petersburgh and Odessa, in the years 1827, 8, 9....Mr. Warburton, M. P. is engaged in writing a Life of Dr. Wollaston.... Mr. Colburn has in the press, Records of Captain Clapperton's last Expedition to Southern Africa; by Richard Lander, 2 vols. 8vo.: Travels to Timbuctoo, and other parts of Central Africa; by René Caillé: and Travels in Siberia, Kamtschatka, and China; by P. Dobell, Esq....Mr. Jomard is also employed in Paris on Caille's Voyage.

List of New Books.

Repertoire Polyglotte de la Marine; par le Comte de Grandpré, 2 vols. 20 fr. Maltier, Paris....Lettres sur l'Orient; par le Baron Th. Renouard de Bussiére, 2 vols. 8vo. Paris et Strasburgh....Narrative and Successful Result of a Voyage in the South Seas, &c.; by the Chevalier Captain P. Dillon, 2 vols. 8vo....Murray on Atmospherical Electricity, post 8vo. 5s. bds.

Letters and Communications (post paid,) Advertisements, and Books for Review, to be addressed to the Editors, at Mr. Lizars', 5. St. David Street, Edinburgh, or to the Agents in London and Dublin, where Contributions will be thankfully received and acknowledged.

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THE

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OF

NATURAL AND GEOGRAPHICAL SCIENCE.

FEBRUARY 1830.

ORIGINAL COMMUNICATIONS.

ART. I.—*Observations on the Structure of the Stomach of the Peruvian Lama.* By DR. KNOX, F.R.S.E. M.W.S. Lecturer on Comparative Anatomy, &c. *

THE facts and observations contained in this paper were fully made out, and their general correctness ascertained somewhat more than three years ago.

The stomach of the Lama has been declared to be "unlike that of the camel, being unprovided with the peculiar apparatus by which it is enabled to dispense with the necessity of a daily supply of water, even in countries where such supply, from the great heat of climate, is essential to a degree which those who reside in colder and moister regions cannot imagine." The object of the present memoir is to shew that the statements denying to the lama a compensating and peculiar structure as regards the stomach, are without the smallest foundation in truth, and that the errors, for such they assuredly are, have originated in an unwary application of a principle which I had thought all anatomists had known required to be employed with great caution, viz. the assuming the structure of the young or fœtal state to be identical with the adult.†

* We are obliged to our friend Dr. Knox for permission to make this abstract of an important paper which he lately read before the Royal Society of Edinburgh, (4th Jan. 1830,) and which we hope to see, in its extended form, in the Transactions of that learned body. ED.

† Sir Everard Home has inferred, from the examination of the structure of the stomach of the young lama, that "the stomach has a portion of it, as it were, intended to resemble the reservoirs for water in the camel; but they have no depth, are only superficial cells, and have no muscular apparatus to close their mouths, and allow the solid food to pass into the fourth cavity, or truly digesting stomach, without going into those cells."—*Comp. Anat.* Vol. V. p. 249.

The anatomy and natural history of any species of animal, fully observed and clearly understood, may enable us to decide on the anatomy and natural history of an animal unknown to us, provided they accord entirely or nearly so: and more especially in some natural families, such as the strictly carnivorous tribes, a tooth, a fragment of bone, or other remains of structure, may enable us to conjecture, with some show of probability, that the animal, whether fossil or otherwise, may have belonged to a species or genus allied in a certain degree to those with which we are already acquainted; and we may even admit as certain, that a hoof such as that of the horse and ox, never yet were combined with other structures implying carnivorous habits. Neither will it require any great stretch of the imagination to believe, that animals having the bulk of the mammoth, could not possibly subsist amidst the frozen regions of Siberia; nor plants having a seeming resemblance to our present intertropical vegetable kingdom, could possibly grow and flourish in regions doomed to a comparative absolute sterility, and to a dwarfish stunted vegetable growth. To theories of this kind we may fairly object that heat is essential to life; and to theorists of another kind, who venture to declare *a priori*, and without having any knowledge of the animal previously, its anatomy and its natural history,—from the observance of a portion or a fragment of the bones of the foot, a portion of the skull or a tooth,—that they cannot produce a single instance of their having ever done so, as not to admit of refutation, or at least of doubt. The claws and nail-bones of the sloth, indicate nothing of its peaceful and frugivorous habits; and to assimilate its habits and anatomical structure with certain gigantic fossil remains, is it, not to use a harsher style of criticism, eminently imaginative and fantastic? The molar teeth of bears are not carnivorous molar teeth; and it is only by the observation of the living species, that we have become aware of the frugivorous habits of some of the strictly carnivorous polar species. To speculate from such facts as these on the anatomy and natural history of the extinct *Ursus spelæus*, must to every reflecting mind appear exceedingly ridiculous. The strength of the zygomatic arch of the dugong exceeds that of the lion, and yet how opposed these animals are to each other in their habits and general economy. The habits even of genera closely resembling each other, occasionally do not accord. Antelopes live in pairs, in small families, or congregated in thousands: the zebra is seen in groupes only of two or three; whilst the quagga, resembling it so as to be often confounded with it, feeds in flocks on the wide-extended plains of Africa. Lastly, by what fact in the internal or external structure of the hippopotamus, could the anatomist have decided, *a priori*, that the animal was aquatic?

Nor can we decide on the relation of different organs or structures to each other. We cannot predict, for example, that an animal will necessarily ruminate, because we find its upper jaw unprovided with incisive teeth, nor that there is any constant relation between these two circumstances. There is nothing in the anatomy of the skeleton or dentition of the horse, which can lead an anatomist to decide, *a priori*, on the probable form of the stomach of that animal; and I would ask, where are the data by which we could determine the form of the stomach in the quadrumana, the larger pachydermata, including the pig, and in numerous others, unnecessary to be particularized here?

If we now advert to the assigned causes of structure, we shall find them equally untenable, equally unphilosophical. The quadruple stomach of the ox and sheep is said to compensate for the deficiency of the incisive teeth; but the camel has teeth of this kind, and its stomach is quintuple. The causes of nearly all structures are concealed as yet by an impenetrable veil from human sight, leaving only a few great and general laws applicable to nature, but so loosely as greatly to diminish their value.

The animal machine abounds with structures, the reason for whose presence we cannot guess at, neither can we calculate what might be the result of their absence or destruction; and we must be divested of the prejudices of ages, and of false dissections, of popular and necessarily false theories, to enter on the inquiry of the physiological character of the stomach of animals, than which, in many respects, there are none more interesting now inhabiting the globe.

The camel, known to all antiquity,—the ship of the desert, as it has been styled by poets and by poetical writers,—the medium of communication betwixt countries separated by deserts which man nor animal could traverse in safety without their aid,—patient under suffering and fatigue, and temperate in regions where universal aridity, eternal drought, and an almost insupportable heat, demand of every thing living an excess in the use of liquid nourishment. These are the qualities known through all ages as characteristic of this animal. On the other hand, the lama, performing in miniature, as it were, to the ancient Peruvians those services rendered in a much more efficient manner by the congenerous animal of the old world, but still a kind of camel, if I may so express myself,—a camel of the new world,—a miniature of the camel of the desert, as the puma is of the lion,—possessing similar qualities, patient under fatigue, temperate beyond what we are told, even in exaggeration, of the ancient camel of the Arabian desert. This is the knowledge, the previous knowledge drawn from history and observation, with which the anatomist proceeds to search for the structure of the animal, the reasons for its temperance. His first essay is to discover the sac or bag in which the animal was supposed to deposit the water drank in large quantities, at long intervening periods, as if really laid up in store for future use. The fluid passes into the stomach, and to this organ, therefore, the anatomist first directs his researches, delighted no doubt that there should exist in it a structure seemingly explanatory of this theory, seemingly conforming with the habits of the animal, unlike to what exists in other animals, and referrible therefore in his view to this cause alone.

It seems to have been forgotten, in this hurry to explain function from structure, that it was first to be proved that a liquid could remain for several days in a living organ, adapted apparently for absorption, without being removed or absorbed, according to the laws of mucous membranes. This difficulty, however, was readily overlooked; and yet there are only two real experiments recorded, in which it is pretended that any water was found after the lapse of a few days in the stomach of the camel. The first by Bruce, I fear a questionable authority: the second by Daubenton, who found water in the stomach of the camel ten days after the death of the animal: another, too rude I fear to figure as a philosophical experiment, was made in the apartments of the Royal College of Surgeons of London, and is thus detailed:—

"A camel in a dying state was purchased by the College of Surgeons. The animal gradually grew weaker, and was at length killed, after being incited to drink three gallons of water, having taken none for three days previously: its death was immediate, for it was pithed, or instantly deprived of sensibility, by passing a poniard between the skull and first vertebra of the neck: its head was fixed to a beam, to prevent the body falling to the ground after it was dead. The animal was kept suspended, that the viscera might remain in their natural state, and in two hours the cavities of the chest and abdomen were laid open."

It seems hardly necessary to add, that a good deal of water was found in the animal's stomach, just as would have happened in any other animal treated in a similar way, whatever might be the structure of the organ. Fluids often disappear from the stomach, in some animals, with great rapidity; but they also occasionally remain for some time nearly unaltered as to quantity and quality, and all this takes place in so capricious a manner, that no anatomist would venture to predict the actual condition of the contents of the stomach in any case.

It is obvious, then, that the function of the camel's stomach, if it really be a function appertaining to it, by which the animal is enabled to maintain such abstinence from drink amidst the arid wastes of Africa and Arabia, was not a discovery which flowed from the examination of structure, but that the structure being peculiar, it was inferred that such must be its function, for the only reason I can discover, that no other function could be assigned to it.

Having got rid of these errors, and traced the hypothesis to its source, we shall proceed to examine that structure, *first* in the camel, *secondly* in the lama, proving I trust, beyond all doubt, that they essentially and exactly resemble each other, and that whatever faculty the one posseses the other must also enjoy, if there be the smallest truth in the law, that similar and analogous parts must perform similar functions.

1. *Stomach of the Camel.*

The peculiar anatomy of the camel's stomach, is by no means a discovery of modern times. Perrault, in the Memoirs of the French Academy, describes the stomach of the camel with great care; but it was reserved for Daubenton to finish a monograph, which, for accuracy of detail and shrewdness of observation, cannot be excelled.

The facts discovered by Daubenton, were re-examined very lately by Sir E. Home, and found to be strictly accordant with nature. The learned and modest assistant of Buffon, had absolutely omitted nothing. M. Cuvier, however, has not deemed it necessary to quote Daubenton's description in his great work on comparative anatomy, and has given us, in its place, the dissection of the stomach of the fœtus of a lama.

But first with regard to the dissections of Perrault, and of his *collaborateurs*, the Parisian dissectors, as they are sometimes called.

" The ventricle (say they) which was very large, and divided into four, as in the other animals which ruminate, had not that different structure which is observed in the stomachs of the strictly ruminants, or oxen and sheep; the divisions were only distinguished by some contractions which made that the first ventricle, which is large and vast, produced another very small one, which was followed by a third, which was somewhat less than the first, but much longer, and this was followed by a fourth like to the second.

" At the top of the second ventricle, there were several square holes, which were the orifices of about twenty cavities, made like sacs placed between the two membranes which compose the substance of this ventricle. The view of these sacs made us think that they might be the reservoirs where Pliny says that camels keep a long time the water, which they drink in great abundance when they meet with it, to supply the wants which they may have thereof in the dry deserts, where they are used to travel, and where, it is said, that those who guide them are sometimes forced, by extremity of thirst, to open their belly, in which they find water."

We do not find, in this description, that remarkable accuracy and minuteness which so generally characterizes these Memoirs. They have not stated, as they ought to have done, what was afterwards discovered and perfectly described by Daubenton, that the distended stomach presents an appearance of four stomachs, but when opened there are found to be five: that the paunch abounds with large cells as well as the second stomach, (which Daubenton called the reservoir:) that the third stomach, which also was described by Daubenton, is exceedingly small, and forms a kind of rudiment of the king's hood.

Moreover, he explained very beautifully the structure of those deep square cells in the apertures, surrounded by bundles of muscular fibres, in which he says he found abundance of fluid, a structure which seems to retain the water like a sponge: two or three pints of clear, and almost insipid water, were found in the cells of the second stomach ten days after the death of the animal. He concludes, then, that the second stomach is added to the others in the camel for the express purpose of a reservoir. To these descriptions of the stomach of the camel, Daubenton added drawings of inimitable accuracy. The ingenious and elegant popular writer of the article "Menagerie," in the Library of Entertaining Knowledge, has fallen into a great error by not consulting what Daubenton has said, and by trusting to the remarks of those whose interest and vanity seemed to be gratified by an ill-judged and totally erroneous criticism upon the works of that eminent observer.

The transverse contraction of the fourth cavity, whereby it is obviously divided into two stomachs,—distinguished by this circumstance, which alone, according to the more generally received views, would entitle us to consider this elongated cavity as divided into a fourth and fifth stomach,—was discovered by Daubenton, and particularly dwelt on by him; and when he offered it, as his opinion, that there exist five stomachs in the camel, he founded that opinion on views which no real anatomist can possibly call in question.

2. *Stomach of the Lama.*

In his anatomical account of the stomach of the lama, Dr. Knox gave to the Society a detailed description of the nerves and of the muscular fibres in the first stomach or paunch, developing afterwards the succession of tunics and the composition of the cells, and alluding more particularly to the slight but obvious differences in the mucous membrane lining the cells, from that found in other parts of the stomach. The arrangement and number of cells were the next objects of his examination. He stated that the paunch had two divisions, and was perfectly full of food when dissected. In the smaller portion there were 16 rows of cells, occupying a surface which varies from an inch to $1\frac{1}{4}$ inch in breadth, and is about 12 inches in length. In the greater division there are about the same number of cells, but they are much larger and deeper, and they occupy a surface of somewhat more than 4 inches in breadth, and 17 inches in length.

Dr. Knox, by a drawing, represented to the Society the course of the nerves to the muscular fibres, which shut in the cells like the strings of a purse. The cells are cavities which have openings towards the cavity of the stomach, which openings are narrower than their capacity within. In the cells of the larger division, the mucous membrane is still softer in appearance, and more and more unlike what it is in other parts of the stomach. In short, in so far as regards apparent structure, the author concluded that it must obviously perform a separate function.

The muscular fibres follow different directions, but are chiefly of two kinds or arrangements; in the one, the fibres are arranged in planes or membranes; in the other, they are disposed in large bundles, and are very strong: a lymphatic vessel was seen, of a great size, in the peritoneal tunic of the stomach.

The second stomach is almost entirely composed of cells, but they differ a good deal from those in the first stomach. They are deep and extensive, but lie, as it were, *imbricated,* and in layers. The mucous membrane differs still more and more. It is soft and papillose; and, upon the whole, this stomach bears a certain resemblance to the maniplus of the ruminantia in the nature of its surface, but it is quite peculiar as to the arrangement of the cells.

This stomach is of considerable magnitude, and is generally very fleshy. The muscular bands exist, but are not quite so regular as in the first stomach.

There is a marked division between the second and third stomachs. The surface in the contraction, which constitutes the division or the neck of the third stomach, is quite smooth, whilst there is no separation whatever between the third and fourth stomachs, but the surfaces are perfectly distinct. Both the fourth and fifth stomachs are characterized by longitudinal folds; but there is a slight change of surface, and a positive contraction between the two stomachs.

It will not, I trust, then, added Dr. Knox, be ever repeated by any one, "that the stomach of the lama has a portion of it, as it were, intended to resemble the reservoirs for water in the camel; but they have no depth, are only superficial cells, and have no muscular apparatus to close their mouths, and allow the solid food to pass into the fourth cavity, or truly digesting stomach, without going into these cells."

It may now be asked, what proofs have we that the lama possesses the same cause as the camel for its power of abstinence from drink? To this it may be answered, that a similar structure ought to produce a similar result; and although I do not myself consider it as satisfactorily made out, that the mechanism by which the camel and lama can each refrain from drinking for so long a period, depends altogether on the structure of the stomach, yet it is not improbable that it may in part be connected therewith. Many travellers report that the lama never drinks, and a foreign writer (Father Feuillée) is quoted as describing the stomach to be not only provided with a large reservoir for carrying water, but that, like the stomach of the camel, it has the same machinery for allowing the separation of solid from liquid aliment.

I have hitherto, in conformity with the language used by anatomists, spoken of single, double, triple, quadruple, and quintuple stomachs, as if there were such distinctions in nature; but I do not believe they exist. The stomach of all animals is a single organ: it may be divided, as in the ruminants, the camels, and the cetacea, into various compartments, and these may have their specific uses; one may be intended slightly to affect the alimentary mass first received into it; a second to alter it still further by its juices; a third may be intended merely to prolong its residence within the canal; and a fourth finally to convert it into that semi-fluid condition into which it is presumed finally to be changed, previous to its passage into the intestinal tube; but still it is one organ, nor have I ever heard it affirmed by any one, that the complex quadruple stomach did more than the simple stomach in affecting the *materiel* of our nourishment, or bringing it nearer to perfection. I presume, therefore, that the organ is single, in every important sense of the word, and that the phraseology of two, three, or four stomachs, is altogether incorrect. We have seen that no anatomist of ancient or modern times, could ever predict what kind of stomach would necessarily be found in any animal previous to its having actually been examined. The stomach of the elephant presents one large cavity; the elephant has no cutting incisor teeth in either jaw. The stomach of the horse is single, as the phrase goes, if we require that a stomach, to be considered double, must be divided by a permanently contracted interval into two cavities, communicating with each other by an aperture smaller in diameter than either; but if to constitute a double stomach it be merely necessary that its interior should present differently organized surfaces, then the stomach of the horse is double. The hippopotamus has, if I remember right, as it were, three cavities, or stomachs as they are called, judging by the number of *culs de sac* or compartments; but I could not observe, in the interior of these cavities, any great difference as to structure. But it seems to me impossible to say how many stomachs the seal or the pig may be considered as entitled to; externally, indeed, they seem to have but one, internally they present valvular projections and a diversified structure, setting at defiance all the usual anatomical nomenclature as to this organ.

Man is considered as having a single stomach; but this is not unfrequently found contracted about the middle, so as to divide the cavity, as it were, into two, by means of a narrow contracted portion. If this be constant during the digestion of the food, as some have supposed, we might almost venture to call the human stomach double; but in truth it is not so, and is a phenomenon which takes place only occasionally, and in certain individuals: it is a deviation from the ordinary human structure, but of the simplest kind, an irregularity in man, a regular structure in certain of the lower animals, that structure being, as it is so often, persistent in them, whilst in him it is only fugacious.

Till anatomists have determined what is to constitute a double, what a single stomach, or until they have corrected their nomenclature, let us consider the stomach in all animals as a single organ, varying with the species, performing a single function, and not to be judged of, *a priori*, by any doctrine, anatomical or physiological, nor by any pretended necessary relation of dependence upon any other co-existing anatomical structures.

ART. II. *On the growing power of Russia, and her late Acquisitions, especially those in Asia.* By JAMES BELL, ESQ.

(Continued from p. 262.)

BY means of such a naval intercourse, Russia will no longer be under the necessity of marching her vast armies into Western Asia by the circuitous route of the Don, and across the vast steppe that extends to the base of the Caucasus. Her forces will no more be compelled to toil their way up the long, steep, narrow, and rocky glens of that mighty range, and cross its hoary summit alongst the brink of precipitous and unfathomable abysses, to arrive at the banks of the Kur. Nothing more will be requisite but a fleet of transports to convey them to the mouth of the Phasis, which is navigable 40 miles for large vessels, and 80 miles more for small craft to Sarapana or Shaoorapo, from whence, over the Iberian Pass, it is five days' journey to where the Kur becomes navigable. In this defile, according to Strabo, were precipices, deep abysses, mountain torrents, and doep glens. But this pass was made practicable even for elephants by the celebrated Nushirwaun, when he marched his armies into Colchis in the sixth century. A voyage of a week, or at most ten days, will waft the Russian armies to the Phasis, and fourteen days more will march them to Teflis. This will cause a vast saving of toil, expense, and time, and even of lives, as many must have undoubtedly perished in the long march from the Don to the Kur, both of men, and carriage, and cavalry horses. By this way all the battering and field artillery were formerly brought, and any one who is the least acquainted with the difficulties of a mountain road, may conceive the immense toil that must have been incurred in dragging them up the steeps of the Dariel, and across the mountain barrier that separates the sources of the Terek and the Aragwi, and which in winter is wholly impracticable.

Further, by her late acquisitions on the side of Asiatic Turkey and Persia, Russia is now complete mistress of the whole isthmus between the Caspian, and the Seas of Azoff and the Euxine. The whole range of the vast Caucasus, that monarch of mountains, with all its passes and lateral ranges, as far south as the plains of the Araxes, the Apsarus, and the source of the Kur, is now under her control. That mighty bulwark which, from immemorial time, separated the civilized regions of the south from the innumerable rude and warlike tribes of the north, which roamed in the wilds and deserts of ancient Scythia and Asiatic Sarmatia, is now laid open to conquering bands, more powerful by discipline and science than the congregated hordes of the martial Attila, or those which composed the immense host of that greatest of conquerors, Zingis Khan, or his successor in the path of destruction and carnage, the savage Timoor. In no antecedent period of past history, was any sovereign possessed of the whole of this isthmus; neither the Persians, nor the Macedonians, nor the Romans, ever possessed it but in part. Beyond the southern slopes of the Caucasus their dominions never extended, and the mountaineers of that range always asserted and retained their rude and wild independence, and the nations of the south were in constant dread of the warlike Scythians, that wandered on the extensive plains at the base of the Caucasus, or who dwelt on its northern slopes. Great care was consequently taken to occupy the passes of the Caucasus, in order to prevent those inroads, which were occasionally made by the nomadic tribes of Sarmatia and Scythia, into the territories of the Byzantine sovereigns, or those of the Sassanian monarchs. At the commencement of the sixth century, the energetic and sagacious Cabades, the father of Khosrou Nushirwaun, forcibly seized the Iberian Gate or Pass of Dariel, erected a fortress in the mouth of the strait, and maintained a garrison there; and the emperor Justinian was compelled, both by him and his successor Nushirwaun, to pay his quota of the expense incurred in the maintenance of this fortified pass. The maritime pass of Derbend, between Russia and the mountains, was also fortified by Nushirwaun, and a magnificent wall of 300 miles in length, and of great strength and elevation, was erected by him. It ran W.N.W. alongst the vallies and over the hills of the Caucasus, as far as the mountains which form the Albaniæ Portæ. It was fortified with towers at proper distances, furnished with small garrisons, and over the whole a Persian satrap was appointed, whose dignity and high importance, as the commander of an extensive frontier, were defined by the privilege of sitting on a throne of gold within the walls of Derbend. The walls of this city were double, running on both sides from the mountains to the sea, and had iron gates. Hence it was denominated Bab-al-abwab, or *the gate of gates*, and Demir-capi, or *the iron gate*. Remains of this magnificent bulwark, worthy of the genius and power of Nushirwaun, are still to be seen in various parts of the mountains. It is very strange how Gibbon could imagine that the fort of Dariel, erected by Cabades, could be designed by Alexander the Great, even though he has qualified the expression with *a perhaps*, as Alexander never was there, nor ever heard of such a pass as the Iberian Gates, as the whole tract of his marches lay several hundred miles to the souh of Caucasus, and even to the south of the Koordistaun mountains; and it is equally strange that the foundation of Derbend should ever have been attributed to Alexander or his Grecian successors.

On the subversion of the Sassanian dynasty, the passes fell into the hands of the natives, and the fortifications of Derbend were allowed, by the indolent monarchs of the Suffavian dynasty, to go to ruin. But the whole of the Caucasus, and its stupendous passes, are now in the hands of a power which knows well how to appreciate the conquest and the possession; and a sovereign infinitely more powerful than the Scythian Madyes, or Oguz Khan, will again inundate with his numerous cavalry, and disciplined legions, the regions of the south. The king of the north shall enter into the fortress of the king of the south, seize his accumulated treasures of gold, and silver, and precious things, whilst the conquered natives shall, with reluctant homage, own the irresistible power of the modern Gog, the prince of Rosch, and Meshech, and Tubal.

Let us now look farther east, and see what progress Russia has made in that direction towards universal domination. Let us take a view of what is denominated Independent Tartary. This extensive tract is commensurate with the Asiatic Scythia of the ancients, the Scythia *intra* Imaum ; and as it is inhabited wholly by tribes belonging to the great Turkish race, it may justly be denominated Toorkistaun ; and as all these tribes are addicted to robbery, it well deserves the Arabic appellation of Belad-al-Atrak, or the *Land of Robbers.* This great region may be divided into two, namely, Southern and Northern Toorkistaun, the latter being wholly tenanted by the Kirguisians of the little, middle, and great hordes ; the first occupying the step east of the Jaik and south of the Oural Tagh ; the second wanders alongst the north side of the Aral Lake, as far south-east as the Sarasu river, and as far north-east as the Algydim Shalo mountains, which bound Siberia on the south-west ; whilst the great horde roams to the south-east of the former, as far as the mountain barrier of Central Asia. The two former of these hordes were nominally subject to Russia, but never paid any tribute, nor owned themselves its vassals. On the contrary, the court of Russia was in the habit of sending them annual presents, in order to secure the Russian caravans from pillage, whilst passing through their deserts to the khanates of Khiva and Bokhara ; nay, the caravans, in spite of these annual presents made to the Kirguisian khans, were still liable to be plundered and murdered, and a numerous escort of Cossacks and light artillery usually attended them of late years, in their journey through their territories, to ensure their safety. The Russians were also obliged to keep a chain of fortified posts alongst the base of the Oural mountains and the frontiers of the step of Ischim, to protect their subjects from the incursions of the Kirguis, who usually made many captives, in spite of every precaution, and carried them across the desert, where they either employed them as slaves, or sold them to the neighbouring nomadic tribes. Yet the Russians were accustomed to class these robbers as their subjects, and the steps of the Small and Middle Horde were included in their maps of Asiatic Russia. But the Russians have now actually accomplished, by negociation, the real subjection of these hordes, and their territory has, by an ukase or edict published in 1823, been united to the Russian empire, and seven Kirguisian khans, that same year, came to St. Petersburgh, and paid homage to the Russian court as its vassals. The Russian agents at length, by long continued representations of a sure and large profit which the khans and their subjects would derive from the transit of commerce between Russia and Bucharia, prevailed on them to leave off their wonted practice of pillage and plunder, and submit themselves to the Russian sceptre, and allow the Russians to build forts in their territories. The khans were easily brought to negociate with the Russian agents, when they saw their country on the western side surrounded with a line of new military posts, in order to keep them in awe, and prevent them from changing their engagements. That line is guarded with Cossacks and other troops. But the cession was at length accomplished with the consent of the khans, and a new frontier line has been marked out, as the southern limit of demarcation on that side of Asiatic Russia.

In the second number of the *Nouveau Journal Asiatique* for 1828, p. 144—147, is a paper by Klaproth, read to the Asiatic Society of Paris, on this subject, with an account of the new Russian frontier on the side of the Kirguis. I have the honour, says he, to present you a map of Asiatic Russia, on which are marked, by different colours, the new frontiers of Asiatic Russia. The *green line* marks the old limit of Siberia, from the Oural mountains to the borders of the Eastern Ocean. The frontiers of the Chinese domination are marked *yellow*. The country which lies before you, marked *red* on one side, contains a tract equal in extent to France and Scotland, (220,000 British square miles.) This, says he, is precisely the country which Russia has acquired unknown to Europe, and that at the very same moment when this latter part of the world was occupied in exactly maintaining the political *status quo* fixed by the late treaty. Klaproth then proceeds to illustrate the new limits marked *red* in the map, and having mentioned that a line of military posts surrounded the step of the Kirguis, commencing on the western side, he adds, But as these posts are not at all indicated in our maps, I shall here give you a short description of this limit.

It commences at the fort of Zwerinogolovska, follows the left bank of the Abouya, and then goes to the Lake of Denghis-koul. From that it directs itself to the south, then to the south-east, by the redoubts of *Avlikouls-kaya, Tchiyanli, Danabika, Gipsovot, Naourvoumskaya, Kabanet, Kaïkoupa, Sari-tourai* or *Tchernaya, Moukourkoupa, Alabastrovoï*, and *Yalaminskoi*, newly constructed. This last redoubt is situated on the right bank of the *Yalama-tourgai*, which flows to the west, and then unites itself with the Tourgai. The new frontier directs itself from that point to the south-east, and reaches the mountains, which it follows for a considerable extent. Farther on, the line surrounds the upper part of the *Yar-Yakhchi* and its tributary streams ; continues to file off to the south-east, as far as the mountains of Khaltaï and the sources of the Achbouta ; directs itself to the south, towards the great lake Balkhasch, which it cuts off towards the south ; passes to the south the lakes Alaktow-goul, and Ala-goul ; turns to the north towards the Saïsan Lake, which it touches almost on its western point, and ends at the north-east, over against the junction of the Bouktarma with the Irtisch, on the left bank, which made, in former days, the frontier between Siberia and the country of the Kirguis.

Besides these redoubts situated on the long line of the new frontier, Russia has erected three other forts in the south of the newly acquired territory, namely, *Alexandrovskaya* on the Noura, *Saint Nicholas,* to the north of the Lake Karaya, and *Saint Constantine,* at the foot of the mountain *Yakhchi-yanghis-tau.* These forts protect the rich mines of copper and lead which they have begun to work. These are the following: those of *Anniuskoi* and *Saint Constantine,* in the vicinity of the Lake Air-tau; *Gourievskoi,* on the borders of the *Ischim;* those of *Baganou* and *Araktcheëvskoi,* on the banks of the *Tersekan;* those of *Mys-tau* and *Alexandrovskoi,* in the Ulu-Tau mountains; those of *Kart* and *Blagodatny,* on the Noura; those of *Michaelovskoi, Nitchayannost, Mariinskoi, Wolkonskoi,* and *Iielisavitinskoi,* in the mountains which give birth to the streams which form the *Yar-yakhchi;* finally, the copper mines of the mountain *Ken-Koslan,* and those of *Kambaou,* which appear at a small distance to the south-west of *Yamishchewskaya,* on the *Irtisch.*

By this new extension, (of the frontier line,) adds Klaproth, (and he seems to chuckle at the thought,) the Russian frontier is not more distant than 280 leagues (840 miles) from Attock on the Indus, and it is much less from Bokhara.

A part of the Kirguis, inclosed by this new demarcation of the Russian territory, was formerly dependent on China, that is to say, that the Kirguis sent every three years presents to Pekiu, in exchange for which the Chinese government gave them returns a hundred times more valuable. But these Kirguis were very restless and troublesome neighbours. It is therefore probable that the Chinese are perfectly content to see them ranged under the sway of the Russians, who are able to keep them in awe.

We may justly be permitted to presume that the Russians will not stop at this new frontier or stand still. The facility with which they have seized one part of Toorkistaun, commonly denominated *independent,* will stimulate them a-fresh to occupy, after the same manner, the whole country of the Kirguis, as far as the frontier of the khanate of Bokhara. This they will accomplish with so much the more facility, because such aggrandizements are almost continually unknown to, and never contested by the powers of Europe.

Once established in the country of the Kirguis, which is not wholly an arid waste, and which contains very fertile lands and meadows, dense forests and mountains, the Russians will be enabled to send their military colonies, establish their founderies nigh the copper mines, prepare all the military train necessary for a campaign, and complete their cavalry with the excellent horses of Middle Asia, to obtain which M. Moorcroft was dispatched to Bokhara by the English government of India. They will also be able to make commodious roads, and in a few years to prepare for farther acquisitions. These will probably commence by the conquests of Kokaund, Samarcand, Bokhara, and the other petty khanates which separate Russia from Persia and India. Thus ends the *ex-*

posé of Julien Klaproth on the increase of the Russian power in this part of Asia, and it is easy to perceive, from the whole tone of the communication, how much he and his *collaborateurs* at Paris are delighted with the subject, and are joyfully anticipating its farther extension, as the great mean of annihilating British domination and influence in continental Asia. It is impossible, from the want of a full and accurate map of Asiatic Russia, to trace clearly the new line of demarcation, and we must just wait till the Russians think proper to give it us. It must be remarked, however, that the great Kirguisian horde, superior in power and numbers to both the small and middle hordes taken together, still retains its independence. The population of the small and middle hordes is estimated at 60,000 tents, which, at 10 to a tent, gives a total of 600,000 persons, whilst that of the great horde is given at 120,000 tents, or 1,200,000 persons. But the population of nomadic tribes is matter of mere conjecture. But supposing the estimate to be correct, Russia has gained a farther accession of 220,000 square miles, and 600,000 new subjects to her wide-extended Asiatic dominions. The Asiatic acquisitions will stand thus :—

From Turkey,	60,000	square miles.
From Persia,	80,000	ditto.
From Kirguis,	220,000	ditto.
	360,000	square miles.

It is impossible, for want of documents, to state the amount of acquired population in the above cessions ; but we are sure, including the population of the Georgian principalities already given, it cannot be less than 6,000,000, to which, if 591,000 square miles, for her European acquisitions, before detailed, from Sweden, Poland, and Turkey, and about 16,000,000 of additional population, stated in round numbers, Russia has acquired, since the commencement of the 18th century, it will make a total of 951,000 square miles of territory, and 22,000,000 of subjects ; and this is by no means an exaggerated statement, for, by another anonymous calculation given in the *Asiatic Magazine* for June 1826, Russia is stated to have acquired 30,000,000 of inhabitants, and 100,000 German square miles of territory since 1725. One good result has already taken place since the Russians became masters of Northern Toorkistaun : That caravans can now traverse the Kirguisian Step with safety, whether from Bokhara or Kokaund on the south, or Russia on the north. The intercourse is now laid open, and instead of plundering and pillaging caravans and travellers as formerly, the Kirguis now escort and protect them. The value of goods sent to Bokhara by the caravans, now amounts to 20,000,000 of roubles annually. In the first five months of 1826, three caravans went from Petropaulovskoi, consisting of 101 camels, and 372 carts loaded with merchandize : two of these caravans were destined for the Kirguis Steps, and the other for Kokaund. The amount of value in roubles was more than 150,000. In the same year two caravans from Asia arrived at Petropaulovskoi, one from the Kirguis themselves, consisting of 85 camels, and 31 carts with furs, lambskins, and woollen goods. Seven Kirguis escorted it. These goods were bartered on the spot, and the furs were afterwards sent to Nishn-Novogorod, the lamb-skins to Kasan, and the woollens remained for home consumption. This caravan came from a place called Semiyark, 1500 versts distant. The second caravan came from Kokaund, with spun and raw cotton, destined for the fair of Nishn-Novogorod. These people belong to the town of Asret, and are Tashkunts, live in houses, and occupy themselves in agriculture and feeding cattle. This latter caravan came 1250 versts. Nay, what is more, and what is a strong proof how much Russian conquests have done in opening up a commercial intercourse between Europe and Asia, and a pathway to future civilization, Saratgoff, an Armenian merchant of Teflis, purchased in 1823, at Odessa, European merchandize to the amount of 100,000 francs. The adventure yielded a large profit. In 1824, six Armenian merchants appeared at the Leipsic fair, and purchased goods to the value of 600,000 francs. These goods were shipped at Odessa for the Phasis, whence they were carried up the river, and over the mountains to Georgia. Merchants from Teflis, Armenia, and Persia, have since appeared regularly at the Leipsic fair. In 1825, the amount of purchases made at that annual fair, by the merchants of Teflis, doubled that of 1824, and in 1826, it reached the amount of 2,800,000 francs. Thus, in the short space of three years, this newly-established commerce with the east, at Leipsic, by way of Odessa and the Phasis, has increased 2800 per cent., and most of the articles purchased, it may be presumed, were British manufacsures. All this has happened in consequence of Russian consequest, and, by means of it, a new opening into the Western and Middle Asia has been made, which could not have taken place in the previous state of political circumstances, and which will certainly prove an unexpected blessing to the inhabitants of both continents, and a godsend to our manufacturers. Nay, what is still more, two Bokharian traders, in 1828, visited for the first time the Leipsic fair with shawls, which are at Bokhara manufactured of the finest wool of the goats of Thibet and Cashmere, *by the Jewish families,* which make one-third of the population, and are as remarkable there for their industry and manufactures, as their brethren in Europe for their money transactions. All this has happened in consequence of Russian diplomatic and commercial intercourse with Bokhara, which they have found means to establish there in 1827. The two Bokharian merchants exchanged their shawls at Leipsic for coarse and fine woollen cloths, of such colours as are most esteemed in the east. It is quite a phenomenon in European history that Bokharian merchants should visit a German fair, 3000 miles distant at least from Bokhara. But that a third part of the inhabitants should be Jews, as the German paper asserts, is still as strange. I suspect the German writer has confounded the Bokhars, or native inhabitants, with the Jews, or taken them for Jews; for no writer, whether native or foreign, has noticed the fact. That Jews have been established there from time immemorial is fact; but so have they been also in China, which is much farther east. Whom he calls the Jews, and whom he praises so much for their industry, are in fact the Taujiks, or native inhabitants, in opposition to the Tartars, or the nomadic population, and are the descendants of the ancient Sogdians, or Sogdoites, so famous for their commercial journies to China in the days of the Sassanian and Byzantine sovereigns. But the wild hypothesis, that the Bokhars are the descendants of the ten tribes, is an old exploded dream revived; for Schickhard of Tubingen in 1628 took the Euthalite Huns of Bokhara for the tribe of Napthali, and Father Genebrard made the nomadic tribes of Central Asia the descendants of the ten tribes. But it is a piece of extraordinary intelligence, a precious sample of geographical knowledge, to tell us that the river of Gozan is the Ganges,—that this Ganges was a river of the Assyrian empire under Shalmaneser,—and that the Ganges has its source in Bokhara. It was certainly a great journey to be transported from the Jordan to the Kizil Ozan; but to be carried all the way from the Jordan to the distant Ganges, *Credat Judæus Apella, non ego!*

It now remains a query whether Russia will be contented with her vast acquisitions, and stop short in the career of conquest. Much has been said in praise of Russian magnanimity and moderation; and that having obtained her object of Greek independence, and the free passage from the Euxine to the Mediterranean, and the reimbursement of her military expenses from the prostrate sultan, she will forsooth be content, and proceed no farther; and that in virtue of our intercession, of mighty efficacy no doubt when combined with that of other European powers, she will generously spare a fallen foe, and not annihilate his political vitality. With all due deference to such an opinion, I believe that Russia will spare the sultan as the cat does the mouse, or as the Romans spared unfortunate Carthage. He will be spared just as long as Russia thinks fit, and a few more beatings and political bleedings will finish his existence. It is perfectly at variance with all past history and political analogy, to suppose, that with the game at her foot, with the mighty prize now completely within her reach, and to obtain which has been the labour of a century, Russia will generously forbear, and remain within her new acquired limits. She will just act as all conquering states have done before,—seize the whole. The thirst of conquest is always increased by repeated draughts of the cup of victory; and we may depend upon it, she will drain it off to the dregs themselves. The city of Constantine will ere long be the seat of the Russian Czar, and the dreary shores of the Finlandic Gulf be exchanged for the delightful banks of the Thracian Bosphorus. With the road to Byzantium laid open, and the bulwark of the Balkan scaled by her conquering legions, can we hesitate one moment in believing that Russia will avail herself of the advantage, and seize the City of the Seven Hills? And what power can interpose now to prevent the final catastrophe of the Othman power, and the consummation of Russian triumph? The provinces north of the Danube are now in her possession, and will remain so. Servia is now but in name subject to the Porte; and the new republic, or whatever we may choose to denominate it, of Greece, is now established, and we may be sure will extend its influence and its boundaries northward, in spite of the sultan, protected as it is, and will be, by Great Britain, France, and Russia. A tribute no doubt to the sultan is established in the protocol; but we are sure that in present circumstances the Greeks cannot pay it, and we are as sure that Russia will take special care that not one shilling of it shall ever be paid, and that the sultan, with Russia in his front, will never dare to enforce it.

The successful issue of the Greek contest, will stimulate the remaining Greek population of Northern Thessaly and Macedonia, in like manner, to assert their independence, and hoist the standard of rebellion against their Mussulman lords; and if we may judge from the past, there can be no reasonable doubt as to the issue. Russia has now completely gained her point in the independence of Greece. As far back as 1737, agents were dispatched by Marshal Munich, that bold and vigorous Russian general, to stir up the Greeks to rebel, and thus weaken the Turks, by producing a diversion in favour of Russia. The same scheme was attempted by the presence of a Russian fleet off the Morea in 1770; and though it finally proved disastrous to the unhappy Moriots, it was of vast advantage to Russia in that contest. We are perfectly certain that the late revolt, which has now ended in Greek independence, was effected by Russian agency; and no where can the Machiavelian maxim, which, by the way, is much older than Machiavel, of *Divide et impera,* be more successfully applied than to the heterogeneous, discordant mass which constitutes the population of the Ottoman empire. Whilst the contest lingered, Russia cunningly and cautiously stood aloof, surveying with pleasure the work of her own hands, whilst the unfortunate sultan was wasting his strength and resources in the struggle. Never was the imbecility of Turkey so clearly manifested as in that contest of six years; and when the die was cast by the decisive battle of Navarin, Greek independence secured, and the whole Turkish marine destroyed, Russia seized the felicitous moment, marched her armies to the Pruth, and declared war against a baffled, worn out, and completely disabled foe, —a foe whom, to oblige the Russians, we had shorn of his strength, and prepared as a victim to be offered up at the shrine of Russian ambition. We have of late viewed with a jealous eye the progress of Russian power, and anxiously hoped that Turkey would for once be successful in the contest with its mighty rival. That the Russian conduct towards the unoffending Turks was arrogant, cruel, and unjust, was the prevailing sentiment. But we have ourselves to blame for the disastrous issue. By the battle of Navarin we played the game into her hands, without the least provocation, at the desire of our friend the Russian admiral, in concert with the French, we attacked and destroyed the whole of the sultan's fleet, peacefully moored in one of his own harbours, not in the least expecting such a visit from his quondam allies. This battle, this unprovoked attack, will remain as a memorable sample of British simplicity and Russian dexterity. We, the generous friends of Greece and liberty, imagined we had done a glorious feat in the cause of humanity, whilst by that very action we had completely served the views of Russian ambition. Never did Russia play so deep a game,—never did she so dexterously gain her end, as by making the fleets of Britain and France the unconscious instruments of achieving her grand object, by paralyzing her foe. But for that battle the Turks might have been successful in their contest with the Greeks. It was actually the very thing that saved them. This, however, was but a small section in the chapter of events. By it the sultan was deprived of a fleet to protect his own capital from the Russians. But for the destruction of his fleet, the Russians could not have taken Varna, and laid open the road to Constantinople. But for it the Russians could not have brought a fleet up the Danube, to assist their military operations. And but for it the march up and across the Balkan would never have been attempted, and the Turks might have got time to improve themselves in European tactics. The issue of the contest, and the consequences of the battle of Navarin, have proved us to be shallow politicians in the eyes of all Europe, and evinced a clear proof of the rapid march of Russian political intellect.

It will be asked, Will the Ottoman empire be subverted in consequence of late events, and become an integral portion of an empire now reaching from the Bothnic Gulf to the eastern extremity of Asia, and from the frozen regions of a polar climate, to the fertile plains of the Araxes and the genial climes of Middle Asia? I have no hesitation to answer the question in the affirmative, but do not venture to predict the exact time. But the thing is in progress, and will assuredly take place, and must do so, as the elements of political dissolution have been long in a train of development, and are now, from the increasing power of Russia, and a multitude of other concomitant circumstances, rapidly hastening to a crisis. These elements existed at the very commencement of the Othman power; and nothing for a time prevented their operation, but the warlike character and military talents of a succession of sultans of great energy of mind, and the military enthusiasm of the Turks, stimulated and fed by repeated victories.

But when the tide was checked, and began to roll back in consequence of the political changes in the state of Europe,—when the Turks were no longer headed by sultans as formerly, but by a succession of ignorant and incapable viziers,—whilst the sultans slumbered in the Haram, these elements began to operate, and decline commenced, a decline more rapid than the growth. The conquests of the Turks were not over tribes of the same religion with themselves, for in that case an amalgamation of the victors and the vanquished would have been the natural consequence ; but over people and nations of a faith hostile to that of the conquerors; and as compulsion, but not conviction, is the ruling principle of the Islamitish creed, so unless they conquered the minds as well as the bodies of the vanquished, amalgamation was impossible. It was one of the greatest misfortunes of the Ottoman empire that its wide spread population had a diversity of religious creeds, which not only severed the great mass from the religion of the conquerors, but even from each other, as the Greek, Arminian, Jacobite, Nestorian, Catholic, and Maronite creeds, besides Zizides and Druses, avowedly hostile to the doctrines of the Koran. This medley of religious opinions, by producing mutual and persevering hatred and hostility, weakened the internal state of the empire. There is no hatred like religious hatred, and it is destructive to the happiness and strength of a state. It totally prevents that moral and political union, that concentration of patriotic feeling, which, when brought to bear in one focus, insures the independence of a country. It was impossible, therefore, that an empire of such discordant materials could be strong, and what strength it did possess and could exert, lay in the conquerors themselves and their progeny, the Mussulman population. In European Turkey the Mohamedans do not compose one-fourth of the population, and in Asiatic Turkey not above two-fifths; or, in other words, out of a supposed population of 22 millions for both, not above one-third, or 7 millions, profess the creed of Mohamed, including Koords and Arabs. The whole number of genuine Turks does not perhaps exceed 5 millions, and these rule all the rest. We only speak from mere calculation. Such a disproportionate number to the rest of the population could never furnish very numerous armies ; and even in the time of Solomon the Magnificent, when the empire was in its best state, that sultan had not above 150,000 men of a disposable army. With such a discordant population, hateful to, and hating each other—with an exclusive intolerant system of faith which precluded every other, and thereby produced, preserved, and fomented the irreconcileable hate of two-thirds of the population,—how could such an empire exist for any length of time, and how can its existence be now prolonged against the increasing power of an empire whose political maxim and conduct are directly the reverse ? The Turks have no efficient military force to oppose the Russians ; they have no navy, and never will, as the independence of Greece has now deprived them of sailors. Mahmood abolished the disorderly ill-organized janissaries, once the military arm of the state, but for a long time fitted only to disturb, not to defend an empire. He attempted to introduce European tactics, and form soldiers capable of coping with the disciplined armies of Russia, but the attempt at military innovation displeased his Mussulman subjects, and was made in an evil hour. The Russians saw it at once, and before the sultan had time to have an army on the improved plan sufficiently numerous and efficient, attacked him, deprived him of the greater number of his new soldiers, whilst the rest of his army on the old footing abandoned him to a man. Reform in military tactics cannot now be introduced, and even though it should, it will not save the empire, nor prevent its becoming a prey to the Russians. The religious system of the Koran has rivetted the minds of the Turks in an obstinate adherence to antiquated ignorance, and placed an insurmountable barrier against all improvement of any kind, especially from the *Djours* or infidels, and since they will not learn any thing at *their hands,* they will be compelled to submit *to their power.* The country is so wasted and depopulated, that a very few thousands of European soldiers would conquer Natolia, and drive the sultan and his troops to the banks of the Euphrates; and in the opinion of an English traveller, a military man, 4000 men would conquer all Syria and Palestine, and 10,000 would subjugate Egypt. Russia knows all this, and the capture of the strongest fortresses which Turkey possessed on her Armenian frontier, as Kars, Bayazid, Akhalziche and Erzeroom, with little or no trouble, has shown that the conquest of Turkey would be no arduous task, even to a small European force. The sultan, now placed between two political fires on either hand, the Greeks and the Russians, cannot preserve his independence, but must be crushed between the two in any future contest. To talk of Greece as an independent power is a chimera; her independence will be merely nominal, whilst in reality she will become a province of Russia, and be completely subservient to her schemes of ambition. It is not probable that Turkey will be partitioned by Austria and Russia, and the latter will never suffer Constantinople to fall into any other hands than her own. The great mass of the Christian population are Greeks, as the Wallachians, Moldavians, Bulgarians, Servians, Bosniacs, Albanians, and Macedonians, besides the native Greeks; and from the era of the separation of the eastern and western churches, the Greek Christians have preserved an irreconcileable hatred to the Catholics. As the Russians are staunch adherents of the Greek church, have always avowed themselves the protectors of the Greeks and the Greek faith, and have avenged the injuries and oppressions of the Greeks on the heads of the Turks, can we hesitate for one moment to believe that the Greek population will prefer the yoke of the Russian Czar to that of Austria. Both parties have always been in the habit of mutual intolerance, and the Venetians lost the Morea in 1715, from their persecution of the Greeks, who preferred the Mussulman yoke to that of Catholics.

(To be concluded in our next.)

ART. III.—*An Account of the Whidah Bird, or Paradise Bunting; with Three Figures of the different stages of Plumage.* By CAPT. THOMAS BROWN, F.R.S.E. F.L.S. &c. &c. *

The Whidah Bunting, (Emberiza paradisea, LINN.)

Emberiza fusca, pectore rubro, rectricibus intermediis quatuor elongatis accuminatis, duabus, longissimis, rostro nigro.

Emberiza paradisea, Linn. Syst. Nat. I. p. 312—19. Gmel. Linn. Syst. Nat. I. p. 882. Lath. Ind. Orn. I. 405—20.
Vidua, Briss. III. 120—25. t. 8. f. 1.
La Veuve à collier d'or Buff. Hist. Nat. Ois. IV. 155, 6.
Grande Veuve d'Angola, Buff. Pl. Enl. 194.
Red-breasted Long-tailed Finch, Edwards, 86.
Whidah Bunting, Lath. Gen. Syst. III. 178. 15. Shaw's Gen. Zool. IX. Part 2d. p. 418.

ALTHOUGH this remarkable species has been long known to European ornithologists, yet we have hitherto had but an imperfect account of its habits. On that account, I trust what little I have to add to it, will draw the attention of naturalists who may have an opportunity of observing it in its native wilds, to lay their observations before the world.

The varied changes of plumage which take place during the year in this species, is not less extraordinary than useful in pointing out to the ornithologist how careful he should be in not at all times depending on colour, or even the structure of the feathering, in descriptions of species. There is no doubt but in many instances these are good grounds of distinction, and when taken in conjunction with other specific marks, are generally of much use in characterizing species. In almost the whole of the feathered creation, considerable change of plumage takes place, from the young to the adult state ; and in many instances so great is this alteration, that even the best ornithologists in Europe have described immature birds, in their various progressive approaches towards their perfect state, as animals of a different species. This has been more especially the case with birds of the vulture, eagle, and falcon tribes, and many others of the larger birds, most of which take from three to five, and even six years of arriving at the adult state ; while the smaller birds usually reach maturity in one or two years. But in the instance of the Whidah Bunting, we have a bird exhibiting remarkable changes twice a-year.

The bird from which I have taken my description is a male of about four years of age, and has been in the possession of Sir Patrick Walker, at Drumsheugh, near Edinburgh, for upwards of two years, which has afforded me an opportunity of watching its progress for fully two seasons, it having been thrice in its summer plumage since its arrival in Scotland.

* Read before the Royal Physical Society 23d June 1829.

The Whidah Bunting, like most other birds, moults twice a-year, and at two periods assumes so completely different an aspect, both in colour and structure of its feathering, that few would believe it to be the same bird. I have not been able to meet with an account of these periodical changes in its native haunts, and can therefore only describe them as they take place in this country, distinguishing them by the summer and winter plumage, although these terms but ill express the periods of the year in which the bird is in those distinct conditions; for it is about the 10th of November that what I term its "summer plumage" is in perfection; and about the 10th of June its winter garb is in full feather.

The moult in the Whidah Bunting takes place in a manner different from all other birds with which I am acquainted; for it may be said to be in a state of perpetual change, as feathers drop off during the whole year; and the colours of the bird gradually and imperceptibly deepen as it approaches towards the perfect state, and decrease in density when it has reached that point.

I may remark that this particular bird has, ever since its arrival at Drumsheugh, been in the most healthy condition, and its plumage has at all times exhibited every mark of the total absence of disease. In its first moulting there was considerable irregularity, arising, in all probability, from the constitution of the bird not having been yet adapted to this climate.

In 1828, it commenced its change on the 12th of August, and almost the whole feathers of the breast dropt off in one night, and were nearly as speedily replaced. It reached the perfect state on the 20th October; whereas last year an indication of change took place on the 16th July, when the feathers of the head became somewhat irregular, at which date the whole colour of the bird was darker than on the 10th June, which I consider the time of its perfect plumage. On the 19th, still greater indications of a change took place. On the 24th, almost all the throat feathers had fallen off, and were replaced by black ones, and the ferruginous pectoral feathers were bursting from their sheaths. Many of the cinereous feathers had fallen off from the back, and were replaced by black ones. On the 30th all the throat feathers were replaced by black ones, and the pectoral feathers had given place to the ferruginous ones. From that period a progressive improvement took place in the long and middle tail feathers, which had just begun to appear, and they had reached their full length on the 10th November.

Winter Plumage.—Plate VIII. (Size of Nature.)

The Whidah Bunting is five inches and three quarters from the tip of the bill to the extremity of the tail; and, in this state, is not unlike the common bunting of Britain, the bill is, however, stronger, and of a pale-bluish lead colour; the irides dark hazel. When the first change of feathering has been effected, its general tone is pale ash-colour, which gradually deepens till it becomes of a dark wood-brown, with black patches over different parts of the head, neck, and back ; a black stripe reaches from the bill to the nape, on each side, immediately over the eyes, with a double longitudinal row of black spots on the crown of the head ; the auricles are also black, The minores of the wing with black patches at their base ; the primaries, secondaries, middle wing coverts, and remiges, deep black, with cinereous edges ; the middle and lateral tail feathers black, edged with pale wood-brown : from the pectus to the crissum the belly is pure white, deepening into wood-brown, towards the wings ; thighs white, legs, feet, and claws, pale skin-colour, which they preserve during the whole year.

A precise description of the plumage, in its winter or summer garb, will not apply, during either of the periods of these moults, for, as above noticed, it is perpetually changing, so that my descriptions apply only to its perfect condition.

Summer Plumage.—Plate IX.

The summer attire, when perfect, has the head as low as the nape, chin, fore part of the throat and neck, wings, vent, and tail of a deep black ; the lower part of the neck or jugulum, bright orpiment-orange ; the breast or peltus vivid burnt terra-sienna, growing paler as it descends ; the belly or epigastrium, and tibia, white in the centre, inclining to orange, towards the wings ; the two middle tail feathers are four inches in length, placed vertically, one inch and a fourth broad, ending in a filamentary prolongation of the quills, an inch and a-half long, tipped with a small nob of feathers ; the two outer tail feathers are nine inches and a-half in length, and an inch and an eighth broad at their centre, gradually tapering towards each end, and terminating in a filament an inch and an eighth in length, with a nob at their tips. From the middle of the shafts of these last arise two long thread-like extremely flexible feathers, four and a-half inches in length ; the under tail feathers are four in number, two and a quarter inches long, black, with cinereous edges. The whole tail feathers are extremely glossy ; and strongly undulated, which is distinctly to be seen, and is very perceptible to the touch : which last character is peculiar to all the feathers of the bird, but not so evident without the assistance of a lens.

The bill undergoes considerable change in the summer and winter plumage, both in shape and colour, which is produced by exfoliation. being deep bluish-black in summer and pale lead colour in winter.

On the morning of the 6th December last, the centre tail feathers fell off, and on the evening of the same day the long side tail feathers dropt, which has been uniformly the case in the changes that have already taken place.

At this date (5th January 1829,) the shorter tail feathers have all been replaced by four new ones, at present of a dark ash-colour; these have a peculiar twist, but will eventually become lateral; the bill has made considerable progress in its exfoliation.

The female Whidah Bunting, when young, has much the appearance of the male bird in its winter dress, but considerably deeper in the tone of its plumage, which annually becomes darker till it arrives at its mature age, which is said to be four years. Like the male, it also undergoes considerable change in its summer and winter moults; in the latter state being of a dark rusty brown, with patches of black on the head, neck, and back; and, in its summer garb, is of deep blackish-brown, without any patches of black, but considerably lighter on the belly. It is always destitute of the long tail feathers, like the male.

This remarkable species is a native of Africa, and is said to be common at Mongolia, Angola, and the neighbourhood of Fort Whidah, in which last locality it abounds, and in consequence has derived its name. It has no song, but utters a sharp and clear chirp, not unlike that of the common bunting of Great Britain before rain. It is a lively and active bird, seldom resting above a few seconds in one place or position during the day.

The French have given it the name of *La Veuve*, or Widow Bird, which appellation it commonly bears in England, and has been applied, on account of the black garb which it assumes in summer. But as Edwards justly observes, it is more likely to have been derived from a corruption of the word Whidah.

This bird has been fed on canary seed and oats since its arrival in Scotland, on which it has thriven remarkably well; it is fond of bread, pears, and lettuce.

Instances have been known of this bird living to a great age in England when taken care of.

In the Edinburgh College Museum there are four specimens marked the "Whidah Bunting." One is the male in its winter garb, with the long tail feathers attached to it,—an utter impossibility. A second is the male in its summer attire; but the position of the long tail feathers are completely inconsistent with the character of the bird, being stuck in like those of the common domestic cock, whereas they are always pendulous. A third appears to me to be the Variegated Bunting, *(Emberiza principalis,)* and the fourth, the Panayan Bunting, *(Emberiza panayensis,)* both of which are considerably smaller than the Whidah Bird. But I cannot speak with certainty on these two last, having only examined them through the glass. However, if they were the Whidah Bird, the same observation would apply to the former species as I have made on the Whidah Bunting in its winter plumage.

Plate X.* exhibits the bird in the intermediate change betwixt the summer and winter moult, in which condition it has the appearance of being a distinct bird from the other two figures.

* This Plate will accompany the next Number. Ed.

ART. IV.—*On the Economical Uses of the Marine Algæ, or Sea Weeds.* By R. K. GREVILLE, LL.D. F.L.S. F.R.S.E. &c.*

MAN, who has been humorously defined to be a cooking animal, not content with the tribute of fish rendered to him by the Ocean, converts many of her vegetable productions into articles of diet. *Rhodomenia palmata,* the *dulse* of the Scots, *dillesk* of the Irish, and saccharine Fucus of the Icelanders, is consumed in considerable quantities throughout the maritime countries of the north of Europe, and in the Grecian Archipelago; *Iridæa edulis* is still occasionally used both in Scotland and the south-west of England. *Porphyra laciniata* and *vulgaris* is stewed, and brought to our tables as a luxury, under the name of *Laver:* and even the *Ulva latissima* or *Green Laver* is not slighted in the absence of the *Porphyræ. Enteromorpha compressa,* a common species on our shores, is regarded, according to Gaudichaud, as an esculent by the Sandwich Islanders. *Laurentia pinnatifida,* distinguished for its pungency, and the young stalks and fronds of *Laminaria digitata*—the former called *Pepper-dulse,* the latter *Tangle*—were often eaten in Scotland, and even now, though rarely, the old cry, "Buy dulse and tangle," may be heard in the streets of Edinburgh. When stripped of the thin part, the beautiful *Alaria esculenta* forms a part of the simple fare of the poorer classes in Ireland, Scotland, Iceland, Denmark, and the Faroe Islands.

To go farther from home, we find the large *Laminaria potatorum* of Australia, furnishing the aborigines with a proportion of their "instruments, vessels and food." On the authority of Bory de St. Vincent, the *Durvillæa utilis,* and other LAMINARIEÆ, constitute an equally important resource to the poor on the west coast of South America.† In Asia, several species of *Gelidium* are made use of to render more palatable the hot and biting condiments of the east. Some undetermined species of this genus also furnish the materials of which the celebrated edible Swallows' nests are composed. It is remarked by Lamouroux, that three species of Swallow construct edible nests, two of which build at a distance from the sea-coast, and use the sea-weed only as a cement for other matters. The nests of the third are consequently most esteemed, and sold for nearly their weight in gold. *Gracilaria lichenoides* is highly valued for food in Ceylon and other parts of the east, and bears a great resemblance to *Gracilaria compressa,* a species recently discovered on the British shores, and which seems to be

* Read before the Wernerian Nat. Hist. Soc. Jan. 9. 1830. and forming part of the Introduction to the *Algæ Britannicæ.*

† A marine production, Dr. Gillies informs me, is also commonly eaten in South America by the Roman Catholics during Lent, under the supposition that it is a sea-weed; but, from the specimens brought home by that gentleman, it is clearly of an animal nature, belonging to some genus not far from *Alcyonidium.*

little inferior to it ; for my friend Mrs. Griffiths tried it as a pickle and preserve, and in both ways found it excellent.

It is not to mankind alone that marine *Algæ* have furnished luxuries, or resources in times of scarcity. Several species are greedily sought after by cattle, especially in the north of Europe. *Rhodomenia palmata* is so great a favourite with sheep and goats, that Bishop Gunner named it *Fucus ovinus*. In some of the Scottish Islands, horses, cattle, and sheep feed principally upon *Fucus vesiculosus* during the winter months, and in Gothland it is commonly given to pigs. *Fucus serratus* also, and *Chorda Filum*, constitute a part of the fodder upon which the cattle are supported in Norway.

In medicine we are not altogether unindebted to the *Algæ*. The *Gigartina helminthocorton*, or *Corsican Moss*, as it is frequently called, is a native of the Mediterranean, and held once a considerable reputation as a vermifuge. The most important medical use, however, (omitting minor ones,) derived from sea-weeds, is through the medium of *Iodine*, which may be obtained either from the plants themselves or from kelp. French kelp, according to Sir Humphrey Davy, yields more Iodine than British ; and, from some recent experiments made at the Cape of Good Hope, by M. Eklond, *Laminaria buccinalis* is found to contain more than any European *Algæ*. Iodine is known to be a powerful remedy in cases of Goitre. The burnt sponge formerly administered in similar cases, probably owed its efficacy to the iodine it contained ; and it is also a very curious fact, that the stems of a sea-weed are sold in the shops, and chewed by the inhabitants of South America, wherever Goitre is prevalent, for the same purpose. This remedy is termed by them *Palo Coto*, (literally Goitre-stick,) and, from the fragments placed in my hands, by my friend Dr. Gillies, to whom I am indebted for this information, the plant certainly belongs to the order LAMINARIEÆ, and is probably a species of *Laminaria*.

Were the *Algæ* neither " really serviceable either in supplying the wants or administering to the comforts of mankind" in any other respect, their character would be redeemed by their usefulness in the arts ; and it is highly probable that we shall find ourselves eventually infinitely more indebted to them. One species—and I regret to say it is not a British one—is invaluable as a glue and varnish to the Chinese. This is the *Gracilaria tenax*, the *Fucus tenax* of Turner's *Historia Fucorum*. Though a small plant, the quantity annually imported at Canton from the provinces of Fokien and Tchekiang, is stated by Mr. Turner to be about 27,000 lb. It is sold at Canton for 6d. or 8d. per pound, and is used for the purposes to which we apply glue and gum arabic. The Chinese employ it chiefly in the manufacture of lanthorns, to strengthen or varnish the paper, and sometimes to thicken or give a gloss to gauze or silks. In addition to the above account, the substance of which I have extracted from Mr. Turner's work, Mr. Neill remarks that it " seems probable that this is the principal ingredient in the celebrated gummy matter called *Chin-chou,* or *Hai-tsai,* in China and Japan. Windows made merely of slips of bamboo, crossed diagonally, have frequently their lozenge-shaped interstices wholly filled with the transparent gluten of the *hai-tsai.*"

On the southern and western coasts of Ireland, our own *Chondrus crispus* is converted into size, for the use of house-painters, &c.; and, if I be not erroneously informed, is also considered as a culinary article, and enters into the composition of *Blanc-mange,* as well as other dishes.

In the manufacture of kelp, however, for the use of the glass-maker and soap-boiler, it is that the *Algæ* take their place among the most useful vegetables. The species most valued for this purpose are *Fucus vesiculosus, nodosus* and *serratus, Laminaria digitata* and *bulbosa, Himanthalia lorea* and *Chorda Filum.* The manufacture of kelp was introduced into Scotland, according to Mr. Neill, half a century subsequent to its establishment in France and England, and the first cargo exported from Orkney was about the year 1722. The employment, however, being new to the inhabitants of Orkney, the country people opposed it with the utmost vehemence. Their ancestors had never thought of making kelp, and it would appear that they themselves had no wish to render their posterity wiser in this matter. So violent and unanimous was the resistance, that officers of justice were found necessary to protect the individuals employed in the work. Several trials were the consequences of these outrages. It was gravely pleaded in a court of law, on the part of the defendants, "that the suffocating smoke that issued from the kelp-kilns, would sicken or kill every species of fish on the coast, or drive them into the ocean far beyond the reach of the fishermen; blast the corn and the grass on their farms; introduce diseases of various kinds; and smite with barrenness their sheep, horses and cattle, and even their own families." The proceedings exist, as I am informed by Mr. Peterkin, in the Records of the Sheriff-Court;—a striking instance of the prejudices, indolence and superstition, of the simple people of Orkney in those days. The influential individuals who had taken the matter up, succeeded in establishing the manufacture; and the benefits which accrued to the community soon wrought a change in the public feeling. The value of estates, possessing a sea-coast well stocked with sea-weed, rose so much, that, where the plants did not grow naturally, attempts were made, and not without success, to cultivate them, by covering the sandy bays with large stones. By this method a crop of *fuci* has been obtained, as we are informed by Mr. Neill, in about three years, the sea appearing to abound everywhere with the necessary seeds. Upon the authority of Dr. Barry,* during the years 1790 to 1800, the quantity sometimes made was 3000 tons, and, as the price was then from nine to ten pounds per ton, the manufacture brought into the

* History of the Orkney Islands, p. 383.

place nearly L.30,000 Sterling, sometimes in one season. During the eighty years subsequent to its introduction (from 1720 to 1800) the total value will rise to L.595,000 Sterling. Thus, says Dr. Barry, "in the space of eighty years, the proprietors of these Islands, whose land-rent does not exceed L.8000 a-year, have, together with their tenants and their servants, received, in addition to their incomes, the enormous sum of more than half a million Sterling.

Among the Hebrides, also, large quantities of kelp are manufactured. "The inhabitants of Canna," observes Dr. E. D. Clarke,* in 1797, "like those of the neighbouring islands, are chiefly occupied in the manufacture of kelp. Cattle and kelp constitute, in fact, the chief objects of commerce in the Hebrides. The first toast usually given on all festive occasions is, 'A high price to kelp and cattle.' In this every islander is interested, and it always is drank with evident symptoms of sincerity. The discovery of manufacturing kelp has effected a great change among the people; whether for their advantage or not, is a question not yet decided. I was informed, in Canna, that, if kelp keeps its present price, Mr. Macdonald of Clanranald will make L.6000 Sterling by his kelp, and Lord Macdonald no less a sum than L.10,000."

During the course of the late war, kelp rose to eighteen and even to twenty pounds per ton, in consequence of the interruption to the importation of *barilla*, and the profits upon it during that period were enormous. The price has subsequently fallen by degrees to five guineas per ton, and the sale has latterly been heavy even at that rate. This is to be attributed, partly to the superior quality of the Spanish *barilla*, for the purposes of glass-making and soap-boiling, and partly to the reduction of the duty on muriate of soda, or common salt. The rock-salt of Cheshire, which now bears an insignificant price, is submitted to a chemical process, by means of which the muriatic acid is separated from the soda; and this is found to answer so completely, that the great glass manufactories of Newcastle are supplied with soda thus prepared. So pernicious, however, are the fumes of the muriatic acid gas which issue from the soda works, that vegetation is destroyed to a considerable distance, and the proprietors have been compelled to purchase the ground in the immediate neighbourhood.

The number of people that find occupation in the manufacture of kelp is so great, that a permanent interruption to the trade would be a serious evil. In the Orkney Islands alone, the number of hands, according to Mr. Peterkin, who has obligingly furnished me with information on this subject, probably amounts to 20,000; for all the rural population is more or less employed in the business during the kelp season. Such being the case, it is gratifying to find that that public-spirited body, the Highland Society, is exerting itself to procure exact information about the qualities of kelp as a manure. It has long been known that common sea-ware is

* Life and Remains of E. D. Clarke, by Otter, V. i. p. 388.

extremely valuable for that purpose; and if the success which has attended the experiments already made with kelp, be confirmed by additional observations, the manufacture may still be regarded as an important article of domestic commerce. It appears from the communications made to the Highland Society, that the past success has been such as to induce Lord Dundas to take a cargo of 50 tons of kelp to Yorkshire, for the sole purpose of agricultural experiments. It has been tried singly, or in combination with other manures, on corn, pasture, potatoes, turnips, &c. and in most instances with decided good effect. The Committee appointed to collect the result of the experiments, are inclined to think, that for raising green crops it would be better to compost it with other substances. That with good earth or moss, and a little vegetable or animal manure, " a few tons of kelp would enable a farmer to extend his farm-dung over at least four times the usual quantity of land." A very curious circumstance is mentioned by Charles Mackintosh, Esq. who tried the effects of kelp manure upon potatoes, at Crossbasket, near Glasgow. A severe frost which occurred in September, injured and blackened every lot of potatoes to which the kelp had not been applied, while the kelp lots remained in perfect foliage, even when the respective drills were contiguous. It would appear that the soil, for the time being, had acquired a property equivalent to a certain degree of atmospheric temperature.

Note and Correction to DR. KNOX's *paper on the Stomach of the Lama.*

THE description of the third stomach, (p. 327.) drawn from the brief notes of the author, does not convey the idea which the structure presents. Like the third stomach of the camel, it may be said to form a sort of rudiment of the king's hood of other ruminants, except that the cells, instead of being polygonal, are formed by the intersection of longitudinal and transverse folds. Cuvier describes it as composed of " longitudinal folds connected by other transverse folds, which disappear towards the end," (Anat. Comp. III. 398.) It will be remarked that Cuvier thus considers this third stomach, and the fourth, which is distinguished by longitudinal folds, as only one. On the other hand, " there is no separation whatever between them, (says Dr. Knox,) but the surfaces are perfectly distinct;" and hence he holds them to be two stomachs. But we shall return to this subject, in a general paper on the stomachs of ruminating animals, in a future Number.

Instead of " Both the fourth and fifth stomachs are characterized by longitudinal folds; but there is a slight change of surface, and a positive contraction between the two stomachs," *read* " The fourth stomach is characterized by longitudinal folds; an evident change of surface, and a positive contraction distinguish it from the fifth or true digesting stomach."—ED.

SCIENTIFIC REVIEWS.

Narrative and Successful Result of a Voyage in the South Seas, performed by order of the Government of British India, to ascertain the actual fate of La Perouse's Expedition, &c. By the CHEVALIER CAPT. P. DILLON. 2 vols. 8vo. London, Hurst, Chance, & Co. Edinburgh, Constable & Co. 1829.

THE words in which this work is dedicated to the Honourable East India Company, are as a voyage of discovery, " which has secured the gratitude of the French nation, and of the civilized world, by an act evincing a noble regard for the cause of humanity and science," and the spirit with which the enterprize was founded, and the success which crowned the attempt have warranted this address. It has pleased some of our contemporaries to be sceptical on the gratitude of our continental neighbours, and never with less reason. Even the manner in which D'Urville, whose travels we have already noticed at length, (No. I. p. 50.) was received by the Geographical Society, has been considered as reflecting upon the merits of our navigator, but this is certainly from ignorance of the facts. The *Globe,* the *Moniteur,* the *Bulletin de la Societé de Geographie, Nouvelles Annales des Voyages,* and the *Bulletin des Sciences Geographiques,* vied with one another in reporting on the progress of Captain Dillon's voyage. On his return to England he was charged by our sovereign with the amiable task of offering to his majesty Charles X. the remains of the shipwrecks of La Perouse, discovered on the island of Mannicolo. He was acknowledged by the French authorities as the first discoverer of these remains,—was elected a member of the legion of honour,—and we believe, on the refusal of the East India Company to receive any pecuniary indemnification, was very handsomely rewarded for his labours, and admitted into the body of the Geographical Society, to which he was presented about two months ago by Mr. Charles Moreau, being received with enthusiasm by the president and members. It was not till the report had got abroad that some indications of La Perouse had been obtained, that the corvette La Coquille was fitted out, and the command given to Mr. D'Urville. Its operations were carried on with little or no knowledge of the researches of Captain Dillon. Its perseverance was crowned with success ; and though it followed in the wake of our countryman, it reached the island on which the Boussole and the Astrolabe had perished, and it returned loaded with objects of natural history, and observations on the physical sciences, which entitled the expedition to the unrestrained gratitude of the French nation.

It was in a voyage undertaken in 1812 and 1813, to the Beetee Islands, (commonly called the Fejee islands,) for the purpose of commerce, that Captain Dillon first fell in with some objects of European art, which he was led to conceive might be the remains of the shipwrecked vessels of La Perouse's expedition. The narrative of this first journey, which is given in Captain D.'s work, contains a fearful picture of the means by which commerce is oftentimes carried on. The natives are encouraged and assisted in warring with one another, to satiate their appetite for human food, and the price of the blood shed is paid by a ship-load of sandal wood! On his return Captain Dillon commenced a correspondence with the Bengal government, which led to the fitting out of this expedition, in the search of further traces of the fate of La Perouse. Previous to his departure from Calcutta, a Dr. Tytler was appointed to the superintendence of the medical and natural-historical departments of the enterprize. This man, at the very commencement of the undertaking, was a cause of much serious annoyance to our author. To believe his own words, he shaved his head, and confined him to his house, when he never was in better health,—piled up the fuel of mutiny on board the ship, and then blazed out in open rebellion against his commanding officer. Captain Dillon, obliged to arrest him in the king's name, was afterwards tried on this account, on his arrival at Van Dieman's land, and subjected to corporeal restraint. To judge of the doctor's capabilities as a naturalist, and his anxiety to promote that science, and, at the same time, of the negligence that must have occurred in appointing such a madman to a situation of so much importance, even though supported by Captain Dillon, it may be mentioned that he frequently requested this gentleman to get a few stones and fragments of rock at Van Dieman's Land, to fill up the chest sent by the Bengal Government for specimens of natural history. "It was immaterial (he said) whether it were clods of dried mud, or stones of any sort; so that he brought a large cargo it would answer the purpose, as there was no person in the Asiatic Society capable of judging as to their qualities." What a contrast to D'Urville's expedition! No doubt that every credit is due to the East Indian Government for its philanthropy in equipping this expedition, but why entrust the second most responsible situation to a man who could only lay it open to the ridicule of all nations?

It is curious to see how many Europeans, some in small settlements, others singly or a few together, are met with scattered among the South Sea Islands. Some are left for misconduct, others by shipwreck, and even a few from their own desire, uniting themselves with the fair natives of these shady coral rocks, or buffetted from isle to isle in frail barks of their own construction. Their superior knowledge, or the possession of European arms, leads them constantly to be the aggressors of the unfortunate natives, and those who love to dwell on the unequal warfare waged between the savage and the civilized man, will find an ample fund of amusement in the pages of Captain Dillon's Narrative. Part of the work contains an account of the manners and customs of the Friendly Islanders, derived principally from "Mariner's Account," which was scarcely worth re-printing after its appearance in Constable's cheap Miscellany. The remainder is occupied by the same train of adventures which falls to the lot of all navigators of the South Sea Islands. "Friendly reception by the savages." "Intercourse with the natives." "Mutiny on board." "Best mode of conciliating the savages." "Visited by chiefs of rank." "Temporary wives." "Cannibalism," &c. &c. The profession of Captain Dillon bespeaks indulgence on the score of literary acquirements, though even in that point of view we have little to find fault with in the work, and the energy with which he conducted himself in the enterprize, the difficulties with which he had to battle, render the progress of his expedition a source of pride and interest, and the success which has attended his efforts, have fully entitled him to those rewards and to that credit which he has obtained from European courts, and the suffrage which will be unanimously given to him by a British public.

On the present State of Science in Great Britain.

No. II. *Wernerian Natural History Society.*

"That which the despotical master has sown, cannot quicken unless it die."—FERGUSON.

NOTHING contributes to excite and sustain a love for natural science more than the institution of Societies. The associations of the learned for the purposes of teaching, and the Societies of students (using the term in its extended sense) for the means of communication, are alike instances of the advantages which result from the combined labours of men. But the high value of scientific communication has been so distinctly shown by the experience of all countries, that it would be an idle waste of time to prove it.

Our thoughts have been naturally turned towards subjects of this kind, since the exposure of the non-utility of the Edinburgh Museum has created so much excitement in the public mind. It will be recollected that it was mentioned incidentally, in a letter published in the Edinburgh Evening Courant, that some of the property of the Wernerian Society formed a part of the College Collection. We were greatly tempted, in our last Number, to make some observations upon this circumstance; but being reluctant to do any thing hastily or unadvisedly, we instituted some inquiries, and can now throw together what we have to say with more confidence.

The Wernerian Natural History Society received its name in honour of the celebrated Werner, and was established, as our readers probably know, by Professor Jameson. It enjoys a considerable degree of reputation, derived partly from the number of eminent men belonging to it, partly from the celebrity of its founder; for we freely accord to Professor Jameson that fame which he has well earned by his scientific writings. We find, from the appendix to the second volume of the Society's transactions, that the first meeting was held on the 2d of March 1808. It has thus existed full twenty years. Now as this Natural History Society is composed of many and eminent individuals, and as the perpetual president is the Professor of Natural History, it is only reasonable to expect that some fruit should have been borne by so promising a tree, and that it should increase in quantity, size, and flavour, in proportion to its maturity. Our only object is to ascertain the state of Natural History in this country, and if it is behind what might have been anticipated, to trace the impediments to their true source, and if possible to remove them. With this view we think it fair to ask, What has the Wernerian Natural History Society done?

1. What has it published?
2. What is the extent of its library?
3. What collection of objects in Natural History has it made?

1. The transactions of the Society are before the public; but it may not be amiss to bring its volumes into a chronological table.

1808—1810. Vol. I. Pp. 630. 15 Plates.
1811—1816. Vol. II. (in two parts,) Pp. 697. 27 Plates.
1817—1820. Vol. III. Pp. 559. 25 Plates.
1821—1823. Vol. IV. (in two parts,) Pp. 603. 17 Plates.
1823—1825. Vol. V. (in two parts,) Pp. 599. 17 Plates.

Five volumes have thus been published within a space of twenty years; which gives about four years to each volume. It is perfectly evident that this will not do for the *present* state of natural science. It is moreover rather remarkable, that during the last four years not even the first part of a sixth volume has made its appearance,* while, at the same time, Natural History is known to be increasing in popularity! We are told that many interesting papers are read before the Society; what becomes of them?

2. What is the extent of the library? We have been informed that the Society has received many donations of books, and that some have also been purchased. We are, at the same time, positively assured that no one knows where a very considerable proportion of the volumes are to be found: that a catalogue of the library does not exist; and moreover, that although there is a titular librarian, the library has never been placed under his charge!

3. What collection of objects in Natural History has the Society made? The public will doubtless be surprized when it is informed that the Society has no collection, although it is universally agreed that there *ought* to have been a collection, as the Society has received many donations from gentlemen, who intended them for the general use of the Institution. We find, indeed, the following, enumerated in the first volume of the transactions:

* We are, however, informed that this first part has been in the press for some time; but it seems likely to remain there.

R. Bald, Esq. collection of rocks of the coal formation of Alloa.

Rev. Mr. Fleming, collection of rocks of the island of Papa Stour.

Colonel Imrie, collection of rocks of the Grampians.

Professor Jameson, series of rocks illustrating the geognosy of Arran.

J. Laskey, Esq. collection of North British testacea.

Dr. Macknight, rocks collected during his journey through the Highlands.

Gilbert Meason, Esq. bones of the Orkney animal.

We observe that in the subsequent volumes donations are not regularly mentioned. What has become of the above donations? and of all subsequent ones? There is indeed a rumour that they all pass to the College Museum, in consideration of the privilege the Society enjoys of assembling in an apartment belonging to the Museum establishment. We cannot, however, vouch for the truth of this statement.* We only know that the Wernerian Natural History Society *has no ostensible collection*, in spite of what its friends and foreign naturalists have been kind enough to communicate!

What, then, *is* the Wernerian Natural History Society? Whatever respect, whatever admiration we pay to the individuals composing it, (and many we esteem as our particular friends,) the Wernerian Natural History *Society* is a body which meets periodically in the College, only by *sufferance either of the Senatus Academicus, or of the Keeper of the Museum.* The very room in which it assembles is used for the purposes of the Museum, and is closed against the members (although what little property they actually possess lie in it) at all other times! For an hour and a half once a fortnight, during the season, it is a delightful thing to attend its meetings. But as an active influential Society, of twenty years standing, what is it? Alas! what *could* have been expected? Has it ever dared to walk alone? Does it not, to this very day, resemble a seven month's child, afraid to abandon its leading-strings? Without a room of its own, a museum of its own, or an accessible library, what is it but *the Wernerian Society? Vox et præterea nil!* Let those best acquainted with the affairs of the Society, contradict us if they are able to do so.

It will only be necessary, in addition, to inform our readers, that this lamented condition of the Wernerian Society, originates in and

* Since the above remarks were in the press, we have learnt that there is a law in the code of the Wernerian Society, providing that "all specimens presented to the Society shall be deposited in the College Museum, *for the use of the members.*" But these laws have never been printed, and we do not believe that the members are generally aware of any such enactment; the best proof of which is, that several of them have declared to us their ignorance of that law. But do those who know that they have a right of admission to the Museum, to see the specimens that have been presented to their Society, obtain access to the Collection at pleasure? We expect a negative answer.

If, however, for the sake of convenience, such a law was originally permitted with respect to their specimens of Natural History, it surely cannot have an equivalent applicable to the Library. We cannot believe that there is a provision in the code, that the books presented to the Society, or purchased by it, shall merge into the private library of any of the members.

forms part of the same close system against which we have before inveighed; and were it not for the principle, that "when human nature appears in the utmost state of corruption, it has actually begun to reform," we should with the voice of prophecy exclaim, that the Wernerian Society must shortly pass away, and terminate dishonourably a dotage of decrepitude, which is nothing but a burden to its friendly supporters. But let those active and spirited members, who dare to assert their independence, labour for its *regeneration;* for it "cannot quicken unless it die."

With this view, we have but one more suggestion to offer. We have pleasure in being able to testify that Professor Jameson is calculated to make an excellent President, and in a certain sense does make such a one. But as it is sufficiently known that he exercises uncontrolled authority over the affairs of the Society, we shrewdly suspect that the editor of a Philosophical and Natural History Journal is not the individual best fitted to regulate the publication of the Transactions of a Natural History Society. We have spoken.

C. A. Agardh Species Algarum rite cognitæ cum synonymis, differentiis specificis, et descriptionibus succinctis. Vol. II. Sect. I. Gryphiæ 1828.

Algæ Britannicæ; or Descriptions of the Marine and other Articulated Plants of the British Islands, belonging to the order Algæ; with Plates illustrative of the Genera. By ROBERT KAYE GREVILLE, LL.D. F.L.S. F.R.S.E. &c. Maclachlan & Stewart, Edinburgh; Baldwin, Cradock, & Joy, London. 1830.

THE degree of attention which is paid to any particular branch of natural history, very often depends upon the success with which one or two individuals have devoted themselves to its study, and have developed its history and comparative situation in the scale of organization. The inarticulated *Algæ* of the British Islands, would probably have long remained unknown, had it not been for the labours of Turner, Hooker, and Greville; but after the publication of the "Algæ Britannicæ," no botanist can be excused for not being as well acquainted with the unobtrusive productions of our shores and rivulets, as with the lively forms which grace the mountain side, or are scattered over the flowering mead.

Our review is headed by two works of interest, which will prove how much attention is paid to the subject at home and on the continent. Lamouroux must be considered as having not only laid the foundation-stone of an uniform system, but as having carried up the edifice to a considerable elevation. To Professor Agardh's *Synopsis Algarum Scandinaviæ,* succeeded Hans Christian Lyngbye's *Tentamen Hydrophytologiæ Danicæ,* (Copenhagen, 1819.) Bory St. Vincent, in Duperrey's Voyage, described the new species brought home by the naturalists of that expedition, and the same observer contributed a series of splendid articles to the *Dict. Clas-*

sique d'Histoire Naturelle, in which he established several new orders. At home the "English Botany" exhibits in its volumes nearly a complete series of the British *Algæ;* and though a great number of naturalists, even in the present day, can only see in the *Algæ* fronds and seeds, the existence of a much more complex organization has been established, and we are certain of the existence of roots,—of stalks analogous to those of dicotyledonous plants,—of leaves similar to those of other plants, with transverse or longitudinal vessels,—and lastly, of organs of fructification, whose degree of complication varies with the organization of the plant.

In alluding to Agardh's *Species Algarum,* it is unnecessary perhaps to state, that this work is the only complete system of Algæ in the hands of botanists. The two sections which compose the first volume appeared in 1821 and 1822, and contained the inarticulated species. The present section is devoted to the *Lemanieæ, Ectocarpeæ,* and *Ceramieæ,* which include the fifteen first genera of the articulated Algæ. We observe that the author still retains the name of *Hutchinsia* for the *Polysiphonia* of Greville, although the prior *Hutchinsia* of Mr. Robert Brown has been taken up by Decandolle and all other systematic botanists. Such a mode of proceeding cannot be admitted, simply because Professor Agardh is of opinion that Mr. Brown's *Hutchinsia* is badly constituted. The volume commences with a laboured defence of the author's system; and the whole is executed in a manner that bears evidence of much minute research, and of intimate acquaintance with the subject.

From such a glance at the progress of the study of this interesting tribe of plants, we obtain a greater sense of the value of the work which Dr. Greville has now presented to the public. Much of his leisure, during the last three years, has been devoted towards the accumulation of materials, and that mostly by personal investigation. The habits of most of the species have been patiently watched on their native rocks, and their progress, from their first appearance to their perfect state, diligently marked; and the structure of the frond, and the phenomena of fructification, have been rigidly examined by means of the microscope. A work of this kind is not capable of analysis. We have already embodied in this Number that part which relates to the "Economical Uses of the Marine Algæ," and the geographical distribution of the same plants is of so much interest, that we shall further extract some of the observations which Dr. Greville has made on this subject.

"Phænogamous plants have furnished botanists with several grand vegetable regions, and a marked difference (not to specify more examples) has been recognised between the plants of America, Africa, Asia, Australia, and Europe. Lamouroux endeavoured to trace these great divisions among marine plants, and observed that the polar Atlantic basin, to the fortieth degree of north latitude, presents a well-marked vegetation. The same may be said of the West Indian sea, including the Gulf of Mexico—of the eastern coast of South America—of the Indian Ocean and its gulfs, and of the shores of New Holland, and the neighbouring islands. The Mediterranean possesses a vegetation peculiar to itself, extending as far as the Black Sea, and notwithstanding the geographical proxinity of the port of Alexandria and the coasts of Syria to those of Suez and the Red Sea, the marine plants of the former, in regard to species, differ almost entirely from those of the latter. Bory de St. Vincent characterizes each of his Mediterranean Seas by a vegetation different from that of the Arctic, Atlantic, Antarctic, Indian, and Pacific Oceans, and, to a certain extent, he is probably correct, as such seas are of less depth, often of a higher temperature, and more directly influenced by the countries which more or less enclose them. The seas which he considers as Mediterranean, are the Mediterranean properly so called, the Baltic Sea, the Red Sea, the Persian Gulf, the Chinese Sea, the Seas of Okhotsk and Bhering, and the West Indian Sea, along with the Gulf of Mexico, denominated by him The Columbian Mediterranean.

"Every great zone presents a peculiar system of existence: and it is said, that after a space of twenty-four degrees of latitude, a nearly total change is observed in the species of organized beings, and that this change is mainly owing to the influence of temperature. Lamouroux remarks, that if this holds good, as we know it to do, to a wonderful extent in phænogamous plants, it should also exert some corresponding force upon marine vegetation. It is unquestionable that the *Algæ* are found on our own coasts, in the greatest abundance, during the summer months, and in unusual luxuriance in hot seasons. It is probable also, observes the same author, that these plants may be acted on by the temperature of the water at greater or less depths; and that the species which grow at the bottom of the ocean may have some resemblance to those of the Polar Circle. On the shores of the British Islands it is easy to perceive that some species, *Gelidium corneum*, *Phylophora rubens*, and *Sphærococcus coronopifolius*, for example, become more plentiful and more luxuriant as we travel from north to south; and, on the other hand, that *Ptilota plumosa*, *Rhodomela lycopodioides*, *Rhodomenia sobolifera*, and several others, occur more frequently, and in a finer state, as we approach the north. *Odonthalia dentata*, and *Rhodomenia cristata*, are confined to the northern parts of Great Britain, while the *Cystoseiræ*, *Fucus tuberculatus*, *Haliseris polypodioides*, *Rhodomenia jubata*, *R. Teedii*, *Microcladia glandulosa*, *Rhodomela pinastroides*, *Laurencia tenuissima*, *Iridæa reniformis*, and many others, are confined to the southern parts. Others again, such as the *Fuci* in general, the LAMINARIEÆ, many *Delesseriæ*, some *Nitophyllæ*, *Laurentiæ*, *Gastridia* and *Chondri*, possess too extended a range to be influenced by any change of temperature between the northern boundary of Scotland and the south-western point of England. The researches and calculations of Lamouroux have demonstrated satisfactorily, that the great groups of *Algæ* do affect particular temperatures or zones of latitude, though some genera may be termed cosmopolite. Setting aside the great division of articulated *Algæ*, of which we know but little, the SIPHONEÆ, or at least the genus *Codium*, and the ULVACEÆ, are scattered over every part of the world. *Codium tomentosum* is found in the Atlantic, from the shores of England and Scotland to the Cape of Good Hope; in the Pacific from Nootka Sound to the southern coast of New Holland. It abounds in the Mediterranean, on the shores of France, Spain, and Africa, and is common in the Adriatic. More recently it has been also brought from the coasts of Chile and Peru. This plant, however, is not a social one—to make use of a term that Humboldt has applied to some phænogamous plants. It grows even in the same locality, in a solitary and scattered manner. The ULVACEÆ, on the contrary, are strictly social, and preserve this character in every part of the world. They appear, however, to attain the greatest perfection in the polar and temperate zones, although I have very fine *Porphyræ* from the Cape of Good Hope. That they are capable of sustaining very extreme cold, is proved by the fact, that fine specimens of *Enteromorpha compressa* were picked up in high latitudes of the Arctic Ocean, by some of the gentlemen who accompanied Captain Sir Edward Parry in his second Voyage of Discovery. The DICTYOTEÆ, of which we have eight representatives in Scotland, and thirteen in England, increase both in quantity and number of species, as we approach the Equator. The FUCOIDEÆ, in a general sense, increase as we leave the polar zone, especially in the variety of species. But the natural groups into which they are separated, are strongly marked in their distribution. The *Fuci* flourish between the latitudes 55° and 44°, and, according to Lamouroux, are rarely seen nearer to the Equator than 36°. *Fucus serratus* is entirely confined to Europe. If the imperfectly known *Macrocystis comosa* and *Menziesii* should prove to be true *Fuci*, the latter will be an exception to the rule, as it is said to be found at Trinidad, as well as on the western coast of North America. The large genus *Cystoseira* is found between the 50th and 25th degrees of latitude, becoming more plentiful as the *Fuci* diminish. In New Holland, remarkable alike for its vegetable and animal productions, a distinct group of *Cystoseiræ* predominates, as singular in the water as the aphyllous *Acaciæ* are on the land. Their stems are compressed, often appearing to be jointed; the branches spring from the flat side, and not from the angles, and are deflexed at their insertion; besides which, their vesicles are solitary and pedicellate. This most extraordinary and local group, including some new species kindly communicated to me by Mr. Fraser, the Colonial Botanist at Sidney, is already known to consist of twenty species. The genus *Sargassum*, the most extensive of the FUCOIDEÆ, comprising above seventy species, is nearly confined to the two Tropics, and examples rarely occur beyond the 42d degree in either hemisphere. The Red Sea is full of *Sargassa*. It is principally to one or two species of *Sargassum* that the popular name of *gulf-weed*, has been applied by mariners. The prodigious accumulations of these plants were first encountered by the early Portuguese navigators: Columbus and Lerius compare them to extensive inundated meadows, and state, that they absolutely retarded the progress of the vessels, and threw the sailors into consternation. Such accumulations occur on each side of the Equator, in the Atlantic, Pacific and Indian Oceans; but the sea, particularly denominated *Mar de Sargasso* by the Portuguese, stretches between the 18th and 22d parallels of north latitude, and the 25th and 40th meridians of west longitude. Humboldt, in his Personal Narrative, describes the two banks of seaweed that occur in the great basin of the Northern Atlantic Ocean; but not having the passage at hand, I transcribe it in the words of Mr. Neill. "The most extensive is a little west of the meridian of Fayal, one of the Azores, between latitude 25° and 36°. Violent north winds sometimes prevail in this space, and drive the sea-weed to the low latitudes, as far as 24° or even 20°. Vessels returning to Europe, either from Monte Video or the Cape of Good Hope, cross the bank nearly at an equal distance from the Antilles and Canaries. The other occupies a much smaller space between 22° and 26°, eighty leagues west of the meridian of the Bahama Islands. It is generally traversed by vessels on the passage from the Caicos to the Bermudas." That these plants are produced within the tropics, there can hardly be a question, but at what depth they vegetate is still involved in obscurity. Neither is it clearly ascertained why the banks of weed should always occur in the same places. The supposition that they proceed with the Gulf-Stream from the Gulf of Mexico—whence the original name of gulf-weed—is now exploded. Mr Neill justly observes, that the Gulf-Stream would convey them rather to the banks of Newfoundland than to the latitudes in which they usually occur; and it could not in any case accumulate them to the south of the Azores. In the genus *Sargassum* is observed a small group, as local and almost as peculiar as that we have shewn to exist in *Cystoseira*. This occurs in the seas of China and Japan, and consists of *Sargassum fulvellum*, *microceratium*, *macrocarpum*, *sisymbrioides*, *Horneri*, *pallidum*, and *hemiphyllum*, distinguished from the rest by terminal fructification, a slender habit, small nerveless leaves, and often elongated vesicles.

"The LAMINARIEÆ, among which are the giants of the marine flora, exhibit, in a broad view, a tolerably decided geographical distribution. The *Laminariæ* predominate from the 40th to the 65th degree of latitude; while the *Macrocystes* seem, as far as we know, to exist from the Equator to about 45° of south latitude.

"The only order of any extent remaining to be noticed is FLORIDEÆ. This order, *generally* speaking, belongs, according to Lamouroux, to the Temperate Zones; and in this conclusion I think he is correct. But, as might be anticipated, in an order which contains so large a number of genera and species, there are many exceptions. The genus *Amansia* is exclusively tropical. *Hypnæa* and *Acanthophora* belong also, rather to the tropical than the neighbouring zones. It is worthy of notice, that, comparatively speaking, the southern temperate zone contains much fewer FLORIDEÆ than the northern: a fact that Lamouroux thinks may be accounted for by the inferior extent of the temperate zone in that hemisphere.

"From the number of species known to Lamouroux, he calculated that the FLORIDEÆ predominate greatly over the FUCOIDEÆ; the latter over the ULVACEÆ, and these last again over the DICTYOTEÆ. He estimated the number of species known to botanists (including the articulated *Algæ*) to be 1600, which is certainly considerably exaggerated. The total amount of species supposed to exist was conjectured by the same author to be at least five or six thousand. If this be an approximation to the truth, we cannot be said to be well acquainted with a fifth part of the subaqueous vegetation of the globe."

This extract will give an idea of our author's style, which is always chaste and sometimes eloquent, to which we further add, that the remarks on each species, which, with the descriptions, are in English, contain a degree of interest which it would have been thought impossible to throw over productions to which so little general attention has been paid, and whose history was so imperfectly known. It was the author's intention, when he first began collecting the materials of this work, to have followed the arrangement of Professor Agardh; but in the course of his investigation of the habits and structure of species, he was naturally led to make many alterations in this arrangement. Several new genera have accordingly been admitted into this synopsis, which our space will not allow us to delineate, and for their accuracy Dr. Greville's name must to our readers be a sufficient warrant. The work is also accompanied with plates, in each of which several figures, mostly from drawings by the author, and sketches of parts, or illustrations of genera and species, are introduced. We have no doubt that the work will meet with the approbation of all classes of readers; but from the student in botany Dr. Greville is entitled to every eulogy, and to the warmest expressions of gratitude.

Elements of General Anatomy. Translated from the French of P. A. Béclard. With Notes and Corrections by ROBERT KNOX M.D. F.R.S.E. Lecturer on Anatomy, &c. Edinburgh. Maclachlan & Stewart. 1830.

Elements of General Anatomy, containing an Outline of the Organization of the Human Body. By R. D. GRAINGER, Lecturer on Anatomy and Physiology. London. Highley. 1829.

IT is but a very short time since there existed any book in the English language dedicated exclusively to the subject of General Anatomy.

The merit of having given to this branch of the study of animal beings the character it now bears, is certainly due to Bichat, whose extensive acquaintance with the structure of animal bodies in the sound and diseased state, together with his many opportunities, enabled him not only to arrange and generalize what had been done by the labours of preceding anatomists, but to add many additional observations and discoveries of his own. For although Carmichael Smyth in England, and Pinel in France, had remarked the influence of structure in modifying disease, and had from thence formed a nosological arrangement, and although Bonn had, long before, treated of the limits and continuations of the membranes, in a thesis which evinces much acuteness of observation, yet it was Bichat who wrote the "Traité des Membranes," and "Anatomie Generale." Since Bichat wrote, much has been added to this subject, as well by the anatomists of France as by those of Germany and England.

We shall not now inquire how far the name *General Anatomy* comprehends all that the subject embraces, because, like many others, it is a conventional name, and is understood to mean what in a strict acceptation it would not; but we shall merely state, that by General Anatomy is understood a particular and minute account of the structure and properties of the different tissues or textures of animal bodies, and an examination into the general characters of the organs which these tissues compose.

Having made these preliminary remarks, we proceed to speak of the books, the perusal of which has given rise to them.

The first, then, is a translation from the French of the late Professor Béclard, the editor and continuator of Bichat's General Anatomy. This has, in its original form, already passed the ordeal of criticism, and has been written down a *good book.* As for the translation, it is perhaps enough to say that it has been prepared and published under the superintendency of Dr. Knox, who has added a few notes and an appendix illustrating his views of the pathology of Necrosis, and the means followed by Nature in the regeneration of bone.

The second is by Mr. Grainger of London, and is a compilation which he has made for the use of students. In compiling we ought to convert into our own words what we take from other authors; for it is by this means only that we can express ourselves clearly, and speak with precision from beginning to end. Now Mr. Grainger has perhaps not rigidly enough adhered to this, especially in his introduction, the greater part of which, relating to the human organization, he has very literally translated from Béclard and Meckel.

In the composition of the body of the work, he seems to have borrowed with more moderation, but his descriptions are neither so full nor so precise as those of Béclard; and deviating from the method followed by other systematic writers on General Anatomy, he has passed over in silence the alterations effected in the texture by disease,—a subject of very great importance, and indeed the elucidation of which is one of the chief ends of the study of General Anatomy. * *

GEOGRAPHICAL COLLECTIONS.

Geography of Rajast'han, or Rajpootana ; from the " Annals and Antiquities of Rajast'han, or the Central and Western Rajpoot States of India." By LIEUT.-COL. JAMES TOD. Vol. I. Smith, Elder, & Co. London, 1829.

RAJAST'HAN is the collective and classical denomination of that portion of India which is " the abode * of Rajpoot princes." In the familiar dialect of these countries it is termed Rajwarra, but by the more refined Ract'hana, corrupted to Rajpootana, the common designation amongst the British to denote the Rajpoot principalities.

What might have been the nominal extent of Rajast'han, prior to the Mahomedan conqueror Shabudin, (when it probably reached beyond the Jumna and Ganges, even to the base of the Himalaya,) cannot now be known. At present we may adhere to its restrictive definition, still comprehending a wide space and a variety of interesting races.

Previous to the erection of the minor Mahomedan monarchies of Mandoo and Ahmedabad (the capitals of Malwa and Guzzerat) on the ruins of Dhar and Arhulwarra Ruttun, the term Rajast'han would have been appropriated to the space comprehended in the map prefixed to the work quoted above: the valley of the Indus on the west, and Boondelkhund † on the east; to the north, the sandy tracts (south of the Sutledge) termed *Jungul dés ;* and the Vindhya mountains to the south.

This space comprehends nearly eight degrees of latitude and nine of longitude, being from 22° to 30° north latitude, and 69° to 78° east longitude, embracing a superficial area of 350,000 square miles.

The states are as follows :—1. Mewar or Oodipoor. 2. Marwar or Jodpoor. 3. Bikaner and Kisengush. 4. Kotah. 5. Boondi, (these two states are sometimes comprehended under the common appellation of Harouti.) 6. Amber or Japoor, with its branches dependent and independent. 7. Jesselmér. 8. The Indian desert to the valley of the Indus.

The laborious research, in the course of which the data for the geography and history of the Rajast'han were accumulated, commenced in 1806, when the author was attached to the embassy sent, at the close of the Mahratta wars, to the court of Sindia. This chieftain's army was then in Méwar, at that period almost a *terra incognita,* the position of whose two capitals, Oodipoor and Cheetore, in the the best existing maps, was precisely inversed ; that is, Cheetore was inserted S. E. of Oodipoor, instead of E. N. E., a proof of the scanty knowledge possessed at that period.

In other respects there was an almost total blank. In the maps prior to 1806, nearly all the western and central states of Rajast'han will be found wanting. It had been imagined but a little time before, that the rivers had a northerly course into the Nerbudda,—a notion corrected by the father of Indian geography, the distinguished Rennell.

This blank our author filled up ; and in 1815, for the first time, the geography of Rajast'han was put into combined form, and presented to the Marquis of Hastings on the eve of a general war, when the labour of ten years was amply rewarded, by its becoming in part the foundation of that illustrious commander's plans of the campaign. Every map, without exception, printed since this period, has its foundation, as regards central and western India, on the labours of the author.

* Or regal (raj) dwelling (t'han.)

† It is rather singular that the Sinde river will mark the eastern boundary, as does the Indus (or great Sinde) that to the west. East of this the Hindu princes are not of pure blood, and are excluded from Rajast'han.

The route of the embassy was from Agra, through the southern frontier of Japoor, to Oodipoor. " A portion of this had been surveyed," says the author, " and points laid down from celestial observation, by Dr. W. Hunter, which I adopted as the basis of my enterprize. The resident envoy (Græme Mercer, Esq. of Mævisbank) to the court of Sindia, was possessed of the valuable sketch of the route of Colonel Palmer's embassy in 1791, as laid down by Dr. Hunter, the foundation of my subsequent surveys, as it merited from its importance and general accuracy. It embraced all the extreme points of Central India, Agra, Mewar, Ditteah, Jhansi, Bhopal, Sarangpoor, Oojein, and on return from this, the first meridian of the Hindus, by Kotah, Boondi, Rampoora, (Tonk,) Biana, to Agra. The position of all these places was more or less accurately fixed, according to the time which could be bestowed, by astronomical observation."

After giving some account of his interesting proceedings, Lieut.-Colonel Tod states that in his work he has taken advantage of the labours of Mr. Elphinstone, Mr. J. B. Frazer, and the late General Reynolds.

" Rajast'han presents a great variety of features. Let me place the reader on the highest peak of the insulated Aboo, " the Saint's Pinnacle," as it is termed, and guide his eye in a survey over this wide expanse, from the " blue waters" of the Indus west, to the " withy covered" * Betwa on the east. From this, the most elevated spot in Hindust'han, overlooking by 1500 feet the Aravulli mountains, his eye descends to the plains of Medpat, † (the classic term for Mewar,) whose chief streams flowing from the base of the Aravulli, join the Beris and Bunas, and are prevented from uniting with the Chumbul only by the Pat-ar ‡ or plateau of Central India.

Ascending the plateau near the celebrated Cheetore, let the eye deviate slightly from the direct eastern line, and pursue the only practicable path by Ruttungurh and Singalli to Kotah, and he will observe its three successive steps, the miniature representations of those of Russian Tartary. Let the observer here glance across the Chumbul, and traverse Harouti to its eastern frontier, guarded by the fortress of Shahabad, thence abruptly descend the plateau to the level of the Sinde, still proceeding eastward, until the Table Mountain, the western limit of Boondelkhund, affords a resting point."

To render this more distinct, Lieut.-Col. Tod presents a profile of the tract described from Aboo to Katra on the Betwa, || from Aboo to Chumbul, the result of barometrical measurement, and from the latter to the Betwa from general observations § of the irregularities of surface. The result is, that the Betwa at Kotah is 1000 feet above the level of the sea, and 1000 lower than the city and valley of Oodipoor, which again is on the same level with the base of the Aboo, 2000 feet above the sea. This line, the general direction of which is but a short distance from the tropic, is about six geographical degrees in length, yet is this small space highly diversified, both in its inhabitants and the productions of the soil, whether hidden or revealed.

" Let us now from our elevated station (still turned to the east) carry the eye to the southward, north of the line described, which nearly bisects Media-desa, the *central land* of Rajast'han, best defined by the course of the Chumbul and its tributary streams, to its confluence with the Jumna, while the regions west of the transalpine Aravulli, may as justly be defined Western Rajast'han.

Looking to the south, the eye rests on the long-extended, and strongly-defined

* Its classic name is Vitraventi, *vitra* being the common willow in Sanscrit; said by Wilford to be the same in Welsh.

† Literally the central (medya) flat.

‡ Meaning table (pat) mountain (ar.)

|| The Betwa river runs under the table land just alluded to on the east.

§ I am familiar with these regions, and confidently predict that when a similar measurement shall be made from Betwa to Kotah, these results will little err, and the error will be in having made Kotah somewhat too elevated, and the bed of the Betwa a little too low.

line of the Vindhya mountains, the proper bounds of Hindust'han and Dekhan. Though from our elevated stand on "Saint's Pinnacle" of Aboo, we look down upon the Vindhya as a range of diminished importance, it is that our position is the least favourable to viewing its grandeur, which would be most apparent from the south, though throughout the skirt of descent, irregular elevations attain a height of many hundred feet above such points of its abrupt descent.

The Aravulli itself may be said to connect with the Vindhya, and the point of junction to be towards the Champanér, though it might be as correct to say, the Aravulli thence rose upon and stretched from the Vindhya. Whilst it is much less elevated than more to the north, it presents bold features throughout, south by Lunarwarra, Dongurpoor, and Edur, to Amba, Bhawani, and Oodipoor.

Still looking from Aboo, over the table land of Malva, we observe her plains of black loam, furrowed by the numerous streams from the highest points of the Vindhya, pursuing their northerly course, some meandering through vallies, or falling over precipices; others bearing down all opposition, and actually forcing an exit through the central plateau to join the Chumbul.

Having thus glanced at the south, let us cast the eye north of this line, and pause on the alpine Aravulli.* Let us take a section of it from the capital Oodipoor, the line of our station on Aboo, passing through Oguna, Panurwa, and Meerpoor, to the western descent near Sirohi, a space of nearly sixty miles in a direct line, "where hills o'er hills, and alps on alps arise," from the ascent at Oodipoor to the descent to Marwar. All this space to the Sirohi frontier is inhabited by communities of the aboriginal races, living in a state of primeval and almost savage independence, owning no paramount power, paying no tribute, but with all the simplicity of republics; their leaders, with the title of Rawut, being hereditary. Thus the Rawut of the Oguna commune can assemble five thousand bows, and several others can on occasion muster considerable numbers. Their habitations are dispersed through the vallies, in small rude hamlets, near their pastures or places of defence.

Let us now transport the reader to the citadel pinnacle of Komulmér, thence surveying this range running north to Ajmer, when shortly after it loses its tabular form, and breaking into lofty ridges, sends numerous branches through the Shekhavati federation and Alwa, till in low heights it terminates at Delhi."

From Komulmer to Ajmer, which space is termed Mérwarra, and is inhabited by the mountain race of *Mér*† or *Mair*, the habits and history of which singular class are narrated in Lieut.-Col. Tod's work. The range averages from six to fifteen miles in breadth, having upwards of 150 villages and hamlets scattered over its vallies and rocks, abundantly watered, not deficient in pasture, and with cultivation enough for all internal wants, though it is raised with infinite labour on terraces, as the vine is cultivated in Switzerland and on the Rhine.

"In vain does the eye search for any trace of wheel carriage across the compound range from Edur to Ajmer, and it consequently well merits its appellation *ara*, "the barrier;" for the strongest arm of modern warfare, artillery, would have to turn the chain by the north, to avoid the impracticable descent to the west.

Guiding the eye along the chain, several fortresses are observed on pinnacles guarding the passes on either side, while numerous rills descend pouring over their acclivities, seeking their devious exit between the projecting ribs of the mountain. The Beris, the Bunas, the Kotaseri, the Khari, the Dye, all unite with the Bunas to the east, while to the west the still more numerous streams

* "The refuge of strength," a title justly merited from its affording protection to the most ancient sovereign race which holds dominion, whether in the east or west,—the ancient stock of Sooryavians, the Heliadæ of India, our "children of the sun," the princes of Mewar.

† *Mer* signifies a hill in Sanscrit; hence Komul, or properly Koombhomer, is "the hill or mountain of Koombho," a prince whose exploits are narrated: likewise Ajmer is the hill of Ajya, the "invincible hill." *Mer* is with the long *é*, like *mére* in French in classical orthography.

which fertilize the rich province of Godwar, join the "salt river," the *Looni*, and mark the true line of the desert. Of these the chief are the Sookri and the Bandi; while others which are not perennial, and depend on atmospheric causes for their supply, receive the general denomination of *rayl*, indicative of rapid mountain torrents, carrying in their descent a vast volume of alluvial deposit, to enrich the siliceous soil below.

However grand the view of the chaotic mass of rock from this elevated site of Komulma may be, it is from the plains of Marwar that its majesty is most apparent, where its splintered pinnacles are seen rising over each other in varied form, or crowning the dark indented recesses of its forest-covered and rugged acclivities.

On reflection, I am led to pronounce the Aravulli a connection of the "Appenines of India," the Ghats on the Malabar coast of the Peninsula. Nor does the passage of the Nerbudda or the Lassti, through its diminished course, militate against the hypothesis, which might be better substantiated by the comparison of their intrinsic character and structure.

The general character of the Aravulli is its primitive formation,—granite reposing in variety of angle, (the general dip is to the east,) on massive, compact, dark-blue slate, the latter rarely appearing much above the surface or base of the superincumbent granite. The internal vallies abound in variegated quartz, and a variety of schistous slate, of every hue, which gives a most singular appearance to the roofs of the houses and temples when the sun shines upon them. Rocks of gneiss and of sienite appear in the intervals, and in the diverging ridges west of the Ajmer. The summits are quite dazzling with the enormous masses of vitreous rose-coloured quartz.

The Aravulli and its subordinate hills are rich both in mineral and metallic products; and, as stated in the annals of Mewar, to the latter alone can be attributed the resources which enabled this family so long to struggle against superior power, and to raise those magnificent structures which would do honour to the most potent kingdoms of the west.

The mines are royalties: their produce a monopoly increasing the personal revenue of their prince. "An-Dan-Kan" is a triple figurative expression, which comprehends the sum of sovereign rights in Rajast'han, being *allegiance, commercial duties, mines.* The tin-mines of Mewar were once very productive, and yielded, it is asserted, no inconsiderable portion of silver; but the caste of miners is extinct, and political reasons, during the Mogul domination, led to the concealment of such sources of wealth. Copper of a very fine description is likewise abundant, and supplies the currency; and the chief of Saloombra even coins by sufferance from the mines of his own estate. *Soonna*, or the oxide of antimony, is found in the western frontier. Garnet, amethystine quartz, rock crystal, the chrysolite, and inferior kinds of the emerald family, are all to be found within Mewar; and though I have seen no specimens decidedly valuable, the Rana has often told me, that, according to tradition, his native hills contained every species of mineral wealth."

(To be continued.)

Geographical and Geognostical Labours of MR. PENTLAND *in Southern Peru; by* MR. ALEXANDER DE HUMBOLDT.—*Concluded from p.* 288.

II. *Western Chain of the Andes.*—With respect to the western chain of the Andes, the highest summit which it presents is a cone, or rather a dome of trachyte, which rises majestically above the valley of Chuquibamba, to the north of Arequipa, and nearly at the point where that chain begins to separate itself from the eastern chain. This mountain attains a height of 22,000 feet. Its form and geognostic structure are altogether analogous to that of Cayambé, as that mountain appears only to want a crater.

To the east and north-west of the town of Arequipa, occurs the valley of the same name, surrounded by mountains covered with eternal snow. The central peak of this group of nevadas, is the celebrated volcano of Arequipa. Its form and gigantic proportions allow of its being compared with the Cotapaxi of the Andes of Quito. Its elevation exceeds 18,000 feet.

More to the south, between the parallels of Arica and of the Rio de Loa, are several volcanic cones of a great height. The most elevated, namely, the nevadas of Gualatieri and of Sahuma or Sehama, do not appear to be inferior to the Cerro of Chuquibamba. The volcano of Gualatieri, in the Bolivian province of Carangas, rises above a table land of red sandstone, which contains much copper. The cone, which attains the region of eternal snow, offers the most imposing aspect by its regular, almost geometric, form. There is not perhaps any mountain which can be compared to it, in this respect, in the whole chain of the Peruvian Andes. It is truncated, and allows the presumption that at its summit there is a vast and deep crater. Vapour and smoke are constantly issuing from it; and, according to the report of the Indians who inhabit the village of Turco, at the foot of the mountain, flames also sometimes escape.

The Sahuma presents two conical summits, which have the same regularity as that of Gualatieri. They are also formed of trachyte and trachytic conglomerates.

Between the parallel of Sahuma and that of Tacora, (17° 51′,) there are several other volcanic mountains, some of which attain a height of 20,000 feet. The village of Tacora is the most elevated group of habitations upon the earth, (2232.2 toises.) It is situated in a little valley which separates two of these enormous volcanic cones.

To the north-west of Tacora occurs the Nevada of Chipicani, upon the summit of which a crater has burst open on the eastern side. A little farther a less elevated mainland offers the remains of an extinguished volcano, a true solfatara, whose vapours are condensed in the Rio Azufrado. The waters of this river, or rather of this torrent, are strongly impregnated with iron and sulphate of alum. They may be seen pouring from the solfatara itself, and in their rapid course towards the sea, they even attack animal organization, as in the Rio-Vinagre near Papayan.

III. *General Remarks.*—A geognostic fact alluded to by Mr. Pentland as remarkable, is, that in no part of the volcanic regions of the chain of the Andes which he has crossed, has he found traces either of basalt or of pyroxene. Trachytic conglomerates, and trachytes mixed with grains of quartz, are the forms under which masses of volcanic origin present themselves most frequently. The trachytic pitchstones, obsidians, and other vitrified products of volcanoes, are extremely rare.

Mr. Pentland mentions as a characteristic feature of the physical constitution of the ancient inhabitants of Southern America, their inclination to elevate themselves upon the highest parts of the chain of the Andes, and the faculty which they had of executing mining labours in those regions. The Cerro de Descuelga, situated upon the northern slope of the Illimani, is composed of transition slates, in which an immense quantity of veins, and of transported auriferous quartz, is met with; the north-western part is cut off almost vertically: it is nevertheless covered with little excavations, from whence the Peruvians obtained a great quantity of auriferous earth long before the conquest of the Spaniards. Several of these artificial excavations (*bocas minas*) are met with at a height of 16,600 feet. In other parts of High Peru, strangers are equally struck with the astonishing elevation at which mining excavations were carried on. All the Cerro de Potosi is at 16,080 feet of elevation, and yet that mountain is covered up to its summit with wells and galleries. The entry of the gallery of San Miguel and of Pomaré, in the Peruvian province of Lampa, is still more elevated. It is close to the inferior limit of perpetual snows.

The highest habitations of men, between the 14th and the 18th degree of south latitude, are more than 15,500 feet in elevation, and little villages and post-houses are found up to 14,400 feet. Mr. Pentland quotes as examples the post-house of Poti, (lat. 16° 5′ 30″,) and that of Apo (lat. 16° 11′) in the Cordillera, between Arequipa and Puno. Many villages are up to 14,275 feet in height, such as that of Tacora, at the foot of the volcano at Chipicani, on the north-western side, (lat. 17° 51′,) between La Paz and Tacua. The most populous towns of High Peru, such as Potosi, Puno, Chucuito, are above 12,800 feet in elevation, as may be seen in the table below. The most elevated habitations in the globe, occur, then, in these countries. Not only isolated houses, but villages and towns are met with at the height of the shepherd's hut at Antisana, in the province of Quito, where Mr. de Humboldt made his magnetic experiments.

The phænogamous plants which Mr. P. found at the greatest elevation, belong to the *Gramineæ* and *Compositæ.* Upon the slope of the Illimani, they attain an elevation of 15,500 feet, and upon the Cerro of Potosi 15,700 feet; lands are cultivated to an elevation of 14,000 feet. Rye, potatoes, maize, kidney beans, and even the barley of the old world, are reared in abundance upon the shores and islands of the lake of Titicaca, at 12,760 feet of elevation. The maize of these islands has much reputation.

Mr. P. made a great number of observations in relation to the horary variations of the barometer, upon plains from 9 to 14,000 feet in elevation, which form the base of this part of the Andes. At these great heights, and up to 20° of south latitude, he has found these variations in astonishing regularity, and almost equal to those which are observed under the equator. He also made a great number of astronomical observations, with good instruments, to determine the position of several places of this country, which did not appear to be accurately placed on the map.

Note to the above.—The graphic method, in imitation of the Mexican profiles, has been applied to the chain of the Caucasus by Messrs. Parrot and Engelhardt, to the Alps of Switzerland and to the Carpathian mountains by Mr. Wahlenberg, to the mountains of Germany by Messrs. Schubler and Hoffmann, to those of France by Messrs. D'Oeynhausen and Dechen, to the Capitanerie of Minas Geraes by Mr. D'Eschwege, and to the mountain plains of Mysore, and the Ghats of Malabar, by the engineer officers attached to the triangulation of Major Lambton in India.

The elements of this graphic method are the results of barometric or geodesic levelling, the precise knowledge of distances, the astronomical determination of the points of intersection, or axes of rotation of the partial profiles, and lastly, the angle which each projecting plain makes with the meridian.

From these data, it had been deduced that the culminating points, or the maxima of the lines of crest of the principal chains of mountains in Europe, America, and Asia, were as the numbers 10, 14, 18, 24, that is to say, that they nearly followed a progression by differences whose relation was one-half; but that in the seven chains of the Alps, the Andes, the Himalaya, the Caucasus, the Alleghanis and Venezuela, the relation of the crest to the summit, that is to say, the relation between the mean height of the crests and the culminating points, is very regularly as 1 to $1\frac{8}{10}$, or as 1 to 2.

We are enabled, from the excellent work of Lieut.-Col. Tod, to give a profile of the plateau of Central India,* the Aravulli and Aboo mountains; and the labours of Mr. Pentland, the analysis of which we have terminated in this present number, throw a new light upon certainly the most interesting group of that great Cordillera which courses through the two Americas.

We have, among the results of these labours, the determination of the following *cols,* ports, or passages in the Andes of Peru:

Western Chain.

Port of Chullunquani, upon the road of La Paz to Tacua, - 15,560 feet.

* This profile will appear in our next Number.

Port between Arequipa and Puno, known by the name of Los Altos de Toledo, - - - - - - - - - -	15,530
Do. of Guatillas, foot of the volcano of Tacora, - - -	14,830

Eastern Chain.

Port between the town of La Paz and the province of Las Yungas, named *El Pachete de Pacuani,* - - - - .	15,231 feet.
Do. on the road of Cochabamba to Oruro, between Tapacari and Challa, named *El Passo de Challa,* - - - - -	14,830

We will not enter here, then, upon the question, whether by other means than the comparison of the mean height of the *cols* or ports, we might not obtain a better idea of the mean height of the crest. It is sufficient for us that this is the plan adopted by the learned physical geographer Baron de Humboldt, though, as that gentleman himself remarks, it is an abstract idea, and indeed rather vague, when there is grouping of mountains and not a continuous chain.

The mean height of the crest of the Western Chain, or 15,195 feet, subtracted from the maximum of crest or culminating point, 22,000 feet, would leave a proportion of 1 to 1.3, while the eastern chain would give

Mean height of the ports, - - -	15,030 feet.
Culminating point (m,) - - - -	25,200
Crest (n,) - - - - - -	10,170

$$n : m : : 1 : 2\tfrac{1}{2}.$$

which is nearly the same relation as the one bears to the other in the Alps of Switzerland. These results would differ very much from those of De Humboldt, who finds $n : m : : 1 : 1.8$, and would augment the progressive relation in which the Andes stand with respect to the Himalaya mountains. The sum of the two means would give 8537 feet for the height of the crest of the Andes of Peru, while for the same chain in Mexico, de Humboldt gives 1850 toises.

Result of the Levellings carried on across the Isthmus of Panama, to ascertain the relative height of the Pacific Ocean at Panama, and of the Atlantic at the mouth of the river Chagres.

Mr. Lloyd having received from General Bolivar a special commission to survey the isthmus of Panama, with the view of ascertaining the most eligible line of communication between the two seas, arrived at Panama in March 1828. Here he was joined by Captain Falmarc, a Swedish officer of engineers in the Columbian service. Anxious to lose no time in the prosecution of their objects, they proceeded on the 5th of May to commence their operations; resolving not to be deterred by the difficulties likely to arise from the rainy season, which had just set in, from personal privations, or even from the dangers to which they might expose their health. Their line of survey commenced at Panama, and was continued along the road to Porto Velo, till it came to the bed of the Chagres, a river which falls into the Gulf of Mexico. The greatest height passed over in this line was 633.32 feet above the level of high water at Panama. Their constitutions were now beginning to suffer from the continued exposure to rain; and they therefore determined, after building a secure station on the banks of the Chagres, to defer all future operations till the ensuing year, when the dry season should commence. On the 7th of February 1829, they resumed their labours, carrying on their levels from a point of the river below their former station, and 152.55 feet above high-water mark at Panama, along the course of the river to a place distant about twelve miles from its mouth, called La Braja, where the water in dry seasons is very brackish, and from which there is no perceptible current to the sea.

The result of this survey fixes the mean height of the Pacific at Panama at

352 feet above the Atlantic at Chagres. Between the extremes of elevation and depression of the general tides in the Pacific at Panama, there is a difference of 27.44 feet; but the mean difference at the usual spring tides is 21.21. At Chagres this difference is only 1.16 feet, and is the same at all seasons of the year. Hence it follows, that at high water, the time of which is nearly the same on both sides of the isthmus, the Pacific is raised at mean tides 10.61 feet, and the Atlantic 0.58 feet, above their respective mean levels, giving to the former an elevation above the latter of 13.55 feet. At low water, both seas being below their respective mean levels, by the same quantities as before stated, the Pacific will be lower than the Atlantic by 6.51 feet; so that thus, in the course of every interval from one high tide to the succeeding one, the level of the Pacific is at first higher, then equal, and afterwards lower than the Atlantic; and then again passing back by the same steps in regaining its former elevation as the tide returns.

The great chain of mountains which extends from the Andes, in South America, to the Mexican and Rocky Mountains in North America, is not, as is generally supposed, absolutely continuous through the isthmus connecting these two continents; for the northern cordillera, on the eastern side of the province of Veragua, breaks into detached mountains of considerable height, having steep and rugged sides. To these succeed numerous conical mountains rising from plains and savannahs, and seldom exceeding from 300 to 500 feet in height. Between Chagres on the Atlantic side, and Cherrera on the Pacific, the conical mountains are less numerous, and are separated by extensive plains, with only a few occasional insulated hills, of inferior extent and elevation. Thus it happens, that at the narrowest part of the isthmus a break occurs in the mountain chain, which, in almost every other part, is uninterrupted from its northern to its southern extremities; a circumstance which marks the spot peculiarly adapted for the establishment of a cross communication. Mr. Lloyd has laid down on his map two lines for a rail-road, both commencing at a point near the junction of the river Trinidad with the Chagres, and crossing the intervening plain; the one to Cherrera, the other to Panama. The latter line, although the longer of the two, would have the advantage of terminating in a considerable city. The banks of the river Trinidad are represented by Mr. Lloyd as being well suited for wharfs, especially in the neighbourhood of the spot he recommends as the commencement of the rail-road. But as the mouth of the Chagres is imped-ed by a bar, he suggests the expediency of forming a communication with the adjacent bay of Limon, which in its present state affords excellent anchorage, and which, by making certain improvements in it, pointed out by Mr. L. might, at a small expense, be rendered one of the most commodious and safe harbours in the world.

A Chronological Table of the principal Geographical Discoveries of Modern European Nations.

861 *Feroe Islands*, discovered about this time by a Scandinavian vessel.

871 *Iceland*, discovered by some Norwegian chiefs, who were compelled to leave their native country. According to some accounts it had been visited before this, by a Scandinavian pirate, Naddodd.

950 *Greenland*, discovered by the Icelanders about this period. The first colony established there was destroyed by a pestilence in the 14th century, and by the accumulation of ice which prevented all communication between Iceland and Greenland.

1001 *Winenland*, a part of the continent of America, is supposed to have been discovered by the Icelanders. It was called Winenland, or Vinland, from the abundance of a species of vine found there. The Icelandic chronicles are full and minute respecting this discovery.

1344 *Madeira*, The discovery of this island attributed to an Englishman, Robert Macham; it was revisited in 1419 by Juan Gonsalez, and Tristan Vaz, Portuguese.

1345 *Canary Isles*, discovered by some Genoese and Spanish seamen, having been known to the ancients.

1364 *Guinea*, the coast of, discovered by some seamen of Dieppe, about this period.

1418 *Porto Santo*, discovered by Vaz and Zarco, Portuguese.

1419 *Madeira*, discovered by the same navigators. It was first called St. Lawrence, after the Saint's day on which it was seen:—and subsequently Madeira, on account of its woods.

1434 *Cape Bojador* or *Nun*, doubled for the first time by the Portuguese.

1440 } 1445 } *Senegal River*, discovered by the Portuguese.

1446 *Cape Verd*, discovered by Denis Fernandez, a Portuguese.

1448 *Azores Islands*, discovered by Gonzallo Vello, a Portuguese.

1449 *Cape Verd Islands*, discovered by Antonio de Noli, a Genoese in the service of Portugal.

1471 *Island of St. Thomas*, under the Equator, discovered.

1484 *Congo*, discovered by the Portuguese, under Diego Cam.

1486 *Cape of Good Hope*, discovered by Bartholomew Diaz. It was originally called "The Cape of Tempests," and was also named "The Lion of the Sea," and "the Head of Africa." The appellation was changed by John II. King of Portugal, who augured favourably of future discoveries from Diaz having reached the extremity of Africa.

1492 *Lucayos* (or *Bahama*) *Islands*. These were the first points of discovery by Columbus. *San Salvador*, one of these islands, was first seen by this great navigator, on the night of the 11th or 12th of October, in this year.
Cuba, Island of } *Hispaniola*, or *St. Domingo*, } discovered by Columbus in his first voyage.

1493 *Jamaica* } *St. Christopher's* } *Dominica* } discovered by Columbus in his second voyage.

1497 *Cape of Good Hope*, doubled by Vasco di Gama, and the passage to India discovered.

1497 *Newfoundland*, discovered by John Cabot, who first called it Prima Vista and Baccalaos. The title of Prima Vista still belongs to one of its capes, and an adjacent island is still called Baccalao.

1498 *Continent of America*, discovered by Columbus.
Malabar, Coast of, discovered by Vasco di Gama.
Mozambique, Island of, discovered by Vasco di Gama.

1499 *America, Eastern Coasts of*, discovered by Ojéde and Amerigo Vespucci. (It is contended by some that this preceded by a year the discovery of the American Continent by Columbus.)

1500 *Brazil*, discovered 24th April by Alvarez de Cabral, a Portuguese, who was driven on its coasts by a tempest. He called it the Land of the Holy Cross. It was subsequently called Brazil, on account of its red wood; and was carefully explored by Amerigo Vespucci, from 1500 to 1504.

1501 *Labrador and River St. Lawrence*, discovered by Corterçal, who sailed from Lisbon on a voyage of discovery for the Portuguese.

1502 *Gulf of Mexico*. Some of the shores of this Gulf explored by Columbus on his last voyage.
St. Helena, the Island of, discovered by Jean de Nova, a Portuguese.

1506 *Ceylon*, discovered by the Portuguese. Ceylon was known to the Romans in the time of Claudius.

1506 *Madagascar, Island of*, discovered by Tristan da Cunha, and revisited by the Portuguese navigator Fernandez Pereira, in 1508. This island was first called St. Laurence, having been discovered on the day of that saint.

1508 *Canada,* visited by Thomas Aubert. Known before to fishermen who had been thrown there by a tempest.
Ascension Isle, discovered by Tristan da Cunha.
Sumatra, Island of, discovered by Siqueyra, a Portuguese.
1511 *Sumatra,* more accurately examined by the Portuguese.
Molucca Isles, discovered by the Portuguese.
Sunda Isles, discovered by Abrew, a Portuguese.
1512 *Maldives.* A Portuguese navigator, wrecked on these Islands, found them in occasional possession of the *Arabians.*
Florida, discovered by Ponce de Leon, a Spanish navigator.
1513 *Borneo and Java.* The Portuguese became acquainted with these islands.
1513 *South Sea.* The Great Ocean was discovered this year from the mountains of Darien, by Nugnez de Balboa, and subsequently navigated by Magellan. The supposition of the New World being part of India now ceased.
1515 *Peru,* discovered by Perez de la Rua.
1516 *Rio Janeiro,* discovered by Dias de Solis.
1516 *Rio de la Plata,* discovered by the same.
1517 *China,* discovery of, by sea, by Fernand Perez d'Andrada.
1517 *Bengal,* discovered by some Portuguese thrown on the coast by a tempest.
1518 *Mexico,* discovered by the Spaniards. Conquered by Cortez in 1519.
1519 *Magellan, Straits of,* passed by Magellan with a fleet of discovery, fitted out by the Emperor Charles V. The first voyage round the world was undertaken by this navigator; and his vessel performed the enterprise, although the commander perished.
1520 *Terra del Fuego,* discovered by Magellan.
1521 *Ladrone Islands,* discovered by Magellan.
1521 *Philippines.* This archipelago discovered by Magellan, who lost his life here in a skirmish.
1524 *New France.* The first voyage of discovery made by the French under Francis the First, one of whose ships, after reaching Florida, coasted along as far as 50° north latitude, and gave to this part the name of New France.
1524 *North America,* travelled over from Florida to Newfoundland by Verazzani, a Florentine, in the service of France.
1525 *New Holland,* discovered by the Portuguese about this time: this immense tract was for some time neglected by Europeans, but was visited by the Dutch, at various periods, from 1619 to 1644. This fine country is now colonized by the English, and every year adds something to our knowledge of its extent and its peculiarities.
1527 *New Guinea,* discovered by Saavedra, a Spaniard, sent from Mexico, by Cortez.
1530 *Guinea,* the first voyage to, made by an English ship for elephants' teeth.
1534 *Canada,* visited by Cortier, of St. Malo; a settlement having previously been made in 1523, by Verrazzani, who took possession in the name of Francis I. of France.
1535 *California,* discovered by Cortez.
1537 *Chili,* discovered by Diego de Almagro, one of the conquerors of Peru.
1541 *Labrador,* discovered by a French engineer, Alphonze.
1541 *India,* the first English ship sailed to, for the purpose of attacking the Portuguese.
1542 *Japan,* discovered by the Portuguese, Antonie de Meta and Antonie de Peyxoto, who were cast by a tempest on its coasts.
1545 *Potosi, Mines of,* discovered by the Spaniards.
1552 *Spitzbergen,* observed by the English, but mistaken for part of Greenland. Visited by Barentz, a Dutch navigator in search of a north-east passage, in 1596.

(To be continued.)

Notes on the Cherokees.

A beautiful spectacle, seldom seen by civilized people, of a nation changing a savage for an agricultural life, realized at the present moment by the Cherokees, a people of the interior of North America,—the discovery of a new alphabet, and the establishment of a constitution in the centre of a race, a short time ago deprived of all rudiments of knowledge, have excited a very general attention, and we have therefore thought proper, to gratify our readers' curiosity, to give them some information of the Cherokees and the country they inhabit. This district is situated at about 35° north latitude, and is bordered on the north and west by the state of Tenessee ; on the south by that of Alabama ; and on the east by those of Georgia and North Carolina. The absolute quantity of land over which the Cherokees claim sovereignty, is not yet well determined. Springs of the purest water are met with every where. A chain of mountains, of considerable elevation, traverses this country in the north. This portion is in consequence partly constituted of hills and partly of mountain chains. The northern and western parts offer vast and fertile plains, covered with trees of gigantic growth, and watered by clear brooks. The plains furnish extensive pasture lands, which are themselves covered with numerous flocks of sheep. Horses are also abundant, and are used for domestic purposes. Sheep, goats, and pigs, abound in the vallies and on the hills. The commerce of Cherokee is enriched by the rivers, Tenepec, Ustamala, and Ganasagi.* The climate is healthy, and the winters mild, and spring clothes the ground with numerous flowering plants. The soil is generally fertile, producing maize, cotton, barley, oats, indigo, potatoes, &c. The natives carry on a considerable commerce with the surrounding states, exporting cotton by descending the Tenepec as far as the Mississippi, and from that river to New Orleans. Orchards of apple and peach trees are said to be met with every where, and the gardens are kept with great care.

Great roads are numerous, and the natives keep inns. Rich villages are met with. Stuffs of cotton and wool are manufactured, as well as a great quantity of blankets. Mechanical arts make a rapid progress, and population increases sensibly. In 1819, an evaluation was made of all the inhabitants : there were in the west 5,000, and in the east 10,000. A new computation was made in 1825. The results were, natives 13,563, married whites 147, white women 73, African slaves 1,277.

National pride, a spirit of patriotism and of independence, are said to characterize the inhabitants of Cherokee. The religion of the country is the Christian. The sects which have most followers are the Presbyterians, Methodists, Anabaptists, and that of the Moravian brothers. Schools multiply every year. Knowledge is encouraged and rewarded. They live on terms of friendship with all, civilized or savage. No debts burden the country, and its finances are in a prosperous condition. The natives respect that system of government, which is founded on republican principles, which demands that justice should be equal for all. The legislative power resides in a national assembly and a council, and the people elect the members for a limited period. A printing establishment, a national library, and a museum have been established at Newton. There may be, in such an acconnt of the state of the Cherokees, and of the nature of the country, a little of that enthusiasm which novelty often tends to generate ; but in drawing up these facts, we have effaced some even still more smiling pictures of happiness and prosperity, which have been painted by the Americans.

* The country of the Cherokees, in the map attached to "Murray's North America," is placed beyond the western border of the Mississippi, bounded by the White river and the Illinois, between the Missouri territory and Arkansa.

Geographical Intelligence.—The commanders Bishop of the brig Manly, and Rose of the cutter Inspector, have exerted themselves in ascertaining the true position of some dangerous rocks off Newfoundland. They are situated in lat. 46° 26′ 33″ N. and long. 50° 56′ 35″ west of Greenwich, and form an irregular chain of 4000 fathoms in length, from S.W. by W. to N.E. by E. and from 100 to 150 in breadth.

Mr. Aschmun, agent of the Washington company for colonization in Africa, states himself to have met, at 140 miles in the interior of that country, with a numerous nation, very civilized, given to manufacture and agriculture, and making use of the horse in their domestic employments.

In the *Memorias Economicas da Academia real das Sciencias de Lisboa*, Mr. Souriero recommends the transplantation of the clove tree, the nutmeg tree, and white sandal tree into the Portuguese possessions in Africa.—Petitions proving the indolence of the Portuguese were read on remedying the overflows of the Mondego in the country of Coimbra.—In 1788, 55,723 thousands of sardines (the representative of the herring on these shores) were fished off the coast of Monte Gordo, and latterly only 34,825 thousands.—Besides sea salt, the Cape de Verd islands are said to furnish much rock salt. Mines are worked in the island of Sal or Sel, in those of St. Vincent and of Maco, in Brava, and lastly in the island of Bonavista.—The plants which furnish barilla in Portugal, are the Salsola Soda, S. Tragus, S. prostrata, S. sativa, S. villosa, and Chenopodium maritimum.—The commerce on the colouring material produced from the Lichen rocalla, is almost entirely fallen off.

We learn from Toulon that the sloop *Favourite*, and not as formerly stated *Caroline*, commanded by Mr. La Place, captain of frigate, having received her orders from the Academy of Sciences, sails immediately on her voyage of circumnavigation.—The sloop Dordogne is also about to depart immediately for a voyage of circumnavigation. The Academy of Sciences has been desired to give its instructions to Captain Mathieu, who has been appointed commander.

Principle in Statistics.—A commission of the Academy of Sciences, composed of MM. Silvestre and Coquebert-Montbret, have examined a very interesting work of M. Auguste Duvau, on the statistics of ancient Touraine. The author wrote this essay to show, under a more favourable point of view, aud as he thinks more conformable to truth, a portion of the French territory which is well known to him, and which he has with concern seen classed amongst those whose civilization has made but moderate progress. M. Duvau disputes many of the assertions of which he speaks, and insists principally on the necessity of distinguishing the natural qualities peculiar to different parts of the territory. It is under this point of view that the commissioners have considered the work of which they report, and the excellent reflexions which they make on this subject, merit the attention of all writers and all statesmen who occupy themselves with statistical researches.

Indeed, it is necessary to subject to administrative divisions in the enumeration of facts, when our object is to collect the statistical documents which interest the government of a state : but when we have in view the applications to the different branches of human knowledge, such as meteorology, agriculture, hygiene, and even civil economy, the administrative divisions are indifferent, or may induce error. Other considerations require a different manner of treating and dividing the subject. It is preferable to examine especially the natural properties, and their influence on the products of the territory, and on the condition of the inhabitants. According to this method, similar objects will be associated under the same point of view, thereby imitating the method of naturalists. The commissioners develope this principle, which they apply to the work of M. Duvau.

NATURAL-HISTORICAL COLLECTIONS.

On the Ascent of Spiders in the Air; communicated to the Institute, in June 1829, *by* J.-J. Virey.—It has been long since sought to explain how the Araneides attach their webs at extended distances, and cast, so to speak, a bridge of cords from one side of a stream to the other, or on the branches of distant plants. Some say that the long filaments, left to float on the wind, become agglutinated to different bodies, or to other webs, after which the spider gives them a convenient tension; and that by means of these threads it transports itself across the intermediate spaces. Lister and other authors have contended, that the animal springs to a certain distance, or ejects a glutinous thread, by which it is attached to the desired place, from whence it can throw other threads in different directions, and then mount or descend at will.

But there are other observations very embarrassing to explain. Every one has remarked in autumn, especially in the earliest frosts, those white webs which cross the air at different heights, and which are called by the people *gossamer*. We recognize in them cobwebs whitened probably like hemp-cloth by the prolonged action of the air and moisture. These filaments, transported by the winds, raise with them little spiders, which they disperse abroad, and which have been examined by many German observers, Strach, Buhlmann, Flugg, &c. and especially by Gravenhorst, who has described them under the name of *Aranea obstetrix*, and of a species of *Epeira* less characterized. There are authors who explain this transport of the webs of aerial spiders, either by the influence of evaporation, or by electricity. John Blackwall has published extended observations on this subject.* He shows that these webs, originally formed on the surface of the earth, contain the remains of insects, blades of grass, &c.; but he has not given, as we think, a satisfactory explanation of the phenomenon of the aeronautical ascent of these filaments. Bowman † has even seen a spider raise itself in the air; but besides the agitation of the wind, of which it could avail itself, he suspected that there was some action analogous to attractions or repulsions, capable of sustaining this insect at a height many feet perpendicular above the ground.

We have, moreover, obtained proof of the spontaneous ascent of little spiders especially, (for the larger ones have more difficulty in effecting it,) without any web previously existing in the air to sustain them, and without agitation of the wind, in a closed chamber. But it is requisite that this fact be supported by evidence, and we proceed to detail some experiments repeated with all the care which this curious subject deserves, and which any one may perform at pleasure.

We had often previously observed the ascent of little spiders in the air; but presuming that unperceived threads supported them, although we could not conceive to what object such delicate filaments could adhere, nor how these expert rope-dancers could have attached them, we only saw in them the dexterity of tumblers. However I was already assured that, to the distance of about two feet, a spider could dart a thread towards any point, attach it, and run in a moment along the line. They must have ejaculatory tubes in many of their mamillæ, since they eject these threads independent of the others upon which they are advancing, and which they are emitting at the same time.

Further, different kinds of spiders perform sudden leaps, so as not to need the support of any thread. But I have not remarked that by means of these leaps they are able to rise in the air by describing a parabola like grasshoppers, fleas, and other insects whose legs are long. Thus the *Lycosæ*, *Thomisi*, *Philodromi*, and other *Citigradæ* which jump briskly, the *Dolomeda*, or the *Saltigrada*, and the *Phalangita*, with long fore feet, make rapid leaps, in every direction, to great distances and in the absence of any filament.

To observe very distinctly the spontaneous ascent of little spiders, it is convenient to take young individuals of the *Epeira diadema*, yellow with a black spot,

* Trans. Linn. Soc. tom. xv. p. 449.

† Mag. of Nat. Hist. 1828.

and very common in spring time. They may be held in one hand, preventing them with the other hand from falling to the ground. After hesitating some time on the thread which they have commenced, we observe them at first deviate from the perpendicular line, and then at length take a more or less uncertain flight, to direct themselves on mounting in the air, either obliquely or perpendicularly. Care must be taken, in the first instance, by passing the hand exactly round the animal, that no thread exists except that below the spider, which is incapable of supporting it. These observations should be made in a closed room, where the calm air can receive no agitation, and where we may be sure that no spiders' threads can be present to assist them. Moreover, for greater precaution, the spiders may be brought from without in little closed bottles. By these means we have often repeated and varied these experiments, before many persons, and making use of different species of spiders. The largest bound with so sudden a jerk that there is no time to examine how they disappear; whilst on the contrary, the small individuals escaping less quickly, one may pass the hand before them, to ascertain whether a thread be darted by them, or whether, so to speak, they fly away without support as hardy aeronauts, of which we are convinced.

Reflecting on the means by which these insects ascend, it seems to me very probable, that with the assistance of the eight approximated feet, which the animal can cause to vibrate rapidly, *it swims in the air*. One may conceive that these members, rowing by fours simultaneously on each side, strike the air like wings, and easily elevate the little insect, which is itself so light. Indeed this seems to be the only possible process. Moreover the extreme rapidity, or the inconceivable agility of these feet in motion, like the vibration of the wings of birds or dipterous insects which flutter in the air, prevents us from always distinguishing their motions.

The objections against this explanation do not destroy the reality of a fact which all the world may certify; and, besides, there is no impossibility that the feet beating the air, (like the swimming feet of aquatic insects strike the water,) may guide, in any direction of the atmosphere, beings so light, and furnished with members so long and agile as these little spiders. Many *Diptera* have not longer nor larger wings than these feet united on each side of the spider, and the *Pterophori* have the wings as much separated as the feet.

It is more probable that these little spiders *fly with their feet*, than to conjecture the existence of electrical influences, or the agitation of the air, which we have disproved by direct observation. The instinctive vibratility of the feet in spiders, (a vibratility similar to that of which we observe some traces in those of the *Phalangita* after death,) appears to be abundantly sufficient to produce their singular ascent or leaps in the air. With a similar facility they can descend obliquely, or rise to the summit of a tree, or to any other distant object, to attach their webs.

But is this the only example of animals with flying feet? They may be found in many others, since the wings and the fins in mammalia, birds, and fishes, are most of them nothing but modifications of feet. It is similar with the pteropodous mollusca, &c.

Nature, then, modifies the organization according to the functions with which she endows them, in the repnblic of every world.—*Bull. des Sciences Naturelles, Oct.* 1829.

On the Plumage of the Dipper, (Cinclus aquaticus.)—The following observations are communicated by our valued correspondent Mr. Macgillivray, whose attention has been long directed to the minute peculiarities of the feathers of birds. The readers of the Edin. New Phil. Journ. will recollect a valuable paper by this gentleman on the general subject, the sequel of which, for unknown reasons, has never appeared.

The peculiarities observed by me in the *Cinclus aquaticus* are the following:

Land birds generally, and especially the *Passeres*, have certain spaces of their skin from which no true feathers arise, and upon which there are merely a few down feathers.

Aquatic birds generally, and especially the *Urinatores*, have no spaces from which true feathers do not arise; and besides being covered with true feathers, the whole surface is covered with a dense coat of down feathers.

Now the dipper resembles the *Passeres* in having spaces from which no true feathers arise; but it also resembles the *Urinatores* in having a complete covering of downy feathers, so that the spaces left entirely bare in the *Passeres*, are abundantly covered in it.

The plumage of the dipper further resembles that of the *Urinatores*, in being short, close, and compact. Most land birds have bristly feathers at the base of the beak, which in some species are very remarkable. The sea birds have none; and in this respect also the dipper is an aquatic bird.

This bird moves under water precisely in the same manner as true aquatic birds, viz. by flying. The plumage of its head and neck bears a striking resemblance to that of the common auk and guillemot in colour and texture. Its beak and mouth have also some resemblance to those of the latter bird; but its feet are precisely the same as those of many passerine birds.

The above facts, although they furnish no physiological reasons for the aquatic habits of the dipper, yet indicate a striking analogy in the structure of its envelope to that of the birds more peculiarly fitted for inhabiting the waters.

On the Egg of the Ornithorynchus.—In No. III. of this Journal, (p. 124,) we were betrayed, by the hyperbolical style of the French reporters, into an assertion which now appears to have been made with an undue degree of confidence. The account given of the discovery of eggs of the Ornithorynchus, is not of a character to establish it as a fact in natural history. We extract from Professor Jameson's Journal, a particular statement of the circumstances, which we believe to be from the pen of Professor Grant.

" Your informer probably goes too far, when he says that I have seen and examined the egg of an Ornithorynchus. I have examined the shells of two eggs in the possession of Mr. Leadbeater here, (London,) and brought from New Holland as those of the Ornithorynchus. You are aware that M. Murdoch, and other travellers, have maintained that they have seen the eggs of this animal, and that Mr. Hill declared, that, in dissecting a female, he found a small yellow egg in the left ovary. Geoffroy St. Hilaire has lately confuted the details of Meckel about the mammary glands, and considers these organs of the Ornithorynchus as of the same nature with the odorous glands of the squirrels. The day before I left Paris, in September last, that venerable anatomist mentioned to me, that he was perfectly convinced that the Ornithorynchus is a true *oviparous reptile*, from his examination of its structure, and particularly from its organs of generation. As you might expect, Geoffroy St. Hilaire felt a deep interest in my news about the eggs at present exhibited in London and Manchester, as those of this animal, and he entreated me to send him soon whatever information I could obtain regarding them, or to procure for him a specimen.

" Two of these eggs are in the possession of Mr. Leadbeater, F. L. S. of Brewer Street here, and two are preserved in the Museum of Manchester, as I am informed by him. The whole four were brought from New Holland by Holmes, a collector of objects of natural history, who has resided many years in that country, and who is known to some naturalists in London. They were brought along with a number of Australian birds to Mr. Leadbeater, who has a splendid collection. Mr. Holmes was shooting on the banks of the Hawksburgh River, a great way up the country, when he saw an Ornithorynchus rise a few feet before him, and escape into the river: he saw the animal distinctly, and knew it well. On examining the spot where it had been sitting, he found a depression about nine inches diameter in the sand, and the four eggs in question lying in that hollow.

" The eggs are certainly not those of a bird, but they very closely resemble in form and size those which I have found in many Saurian and Ophidian reptiles, not a tenth part of the size of an Ornithorynchus. They have not a thick and a narrow end like most birds' eggs, but have a cylindrical form, suddenly rounded at the extremities, and are of equal thickness at both ends, precisely like those in the oviducts of several reptiles before me. The shells only are preserved, and one of them is broken, which shows its inner surface. They have a uniform dull white colour, and are much more thin and translucent than birds' eggs of the same size. They measure $1\frac{3}{8}$ inch in length, and $\frac{6}{8}$ths of an inch in breadth. When we examine the outer surface of the shell with a lens, in place of finding the uniform opacity and compact texture of a bird's egg, we observe that the calcareous matter is so deposited in the membrane, as to present a beautiful reticulated or cellular appearance, not by the formation of actual cells, for the surface is quite smooth and uniform, but merely by the white opaque earthy matter having so disposed itself in the transparent membrane, as to appear like so many minute cells, with a transparent centre. The inner surface of the broken shell does not present this reticulated *appearance*, the white earthy matter being there deposited in separate particles, and giving the whole a minute granular appearance, when viewed through a lens.

"This is not the kind of information you expected to receive about the eggs of this remarkable animal, which Lesson considers as a bird, Cuvier as a quadruped, and Geoffroy as a reptile, and I am sure it is not that kind which I should have been delighted to have been able to communicate to you."

New British Habitat for the Convallaria verticillata ; *by* JOHN BALFOUR, ESQ. *President of the Plinian Society, &c.*—Our zealous friend, Mr. Balfour, has lately communicated to the Plinian Society a new habitat, which he discovered last August, for the *Convallaria verticillata*, or narrow-leaved Solomon's Seal, which this gentleman considers to be decidedly the rarest of British species. Only one locality of this plant was before known, viz. Den Rechip, a deep woody valley between the hills of Stormont, Perthshire, about four miles north-east from Dunkeld, where it was found by Mr. Arthur Bruce. The station in which Mr. Balfour discovered it is more than twelve miles from Dunkeld, in the woods of Craighall, Baron Clerk Rattray's estate, about three miles from Blairgowrie. There it grows in some quantity, far from any garden, and in a situation where it seems distinctly indigenous. The plant is not found in England, and therefore this is the second station for it in Britain. It occurs frequently in Lapland, in the Pyrenees, &c.

Discovery of a New Insect of the Genus Pterostichus ; *by* W. C. HEWITSON, ESQ. *Entomological Curator of the Nat. Hist. Soc. of Newcastle.*—I send you the following brief notice of an entirely new insect, of the rare genus *Pterostichus*, and, until lately discovered here, unknown to Britain. It affords another striking proof of the extreme locality of insects occurring for a short time in considerable abundance near Newcastle, though not yet detected in any other district. It frequents the woody deans in this neighbourhood and has not been found in any other situation,—inhabiting beneath stones, being, very active when disturbed, and though plentiful on the 18th of October last, when I had the pleasure of first discovering it, and of taking upwards of twenty specimens in one hour, yet on the 6th November it had almost disappeared. It ranks amongst the largest of our Adephagous insects, and is a valuable addition to the British cabinet.

Our correspondent, Mr. Hewitson, has sent us a list of insects, *desiderata* in his cabinet. We are anxious to promote exchanges between collectors, as the only mode of forming museums, particularly in the entomological and botanical departments, and we earnestly invite our friends to forward to us lists of their rare duplicates and *desiderata*, that we may become the medium of interchange. It is not possible for us to communicate otherwise than by letter,—our space is incompatible with the publication of the lists. However, by comparing them, we may be able to inform the collector where he may supply his wants. We hope to receive from Mr. Hewitson a description of the *Pterostichus* which he has discovered.

Botanical Notes contained in a Letter from G. A. Walker Arnott, Esq., F.L.S. &c. *to the Plinian Society.*—Now that the Plinian Society must have resumed its labours in the cause of Natural History, I beg leave to return it my best thanks for the copy of its transactions (1828-9,) I have lately received from it. Perhaps, however, by much the better mode of showing how much I appreciate the gift, is to state that I have carefully perused it, and therefore intend to take this opportunity of correcting a mistake of which I have heard elsewhere I have been the cause. I allude to Veronica filiformis being a British plant.

Two plants are usually confounded under the above name: that which I have myself picked up in the south of France, and last spring at Henfield in Sussex, (where however, it had been previously observed by my friend and excellent botanist Mr. Borrer), and which I have distributed as the true V. filiformis, is identical with that found by Dr. G. Johnston in Berwickshire. This is V. fiiliformis of nearly all practical botanists and gardeners. It is Veronica Persica of Poiret;—Veronica, &c. Buxbaum Cent. 1. p. 26, t. 40. f. 2; it is V. Byzantina Sibth. *mot*; and lastly, it is V. agrestis β byzantina Smith and Sibth. Hor. Græca. tab. 8, which rare work I had an opportunity last spring of carefully consulting on this and other subjects. This plant I now believe with Sir James, to be merely a luxuriant state of V. agrestis. The sepals (calycine segments) are ovate.

But the original authority for the V. filiformis is Vahl (Enum. pl. 1. p. 82), who made his description from Tournefort's Herbarium, this being "Veronica orientalis, foliis Hederæ terrestris flore magno," Tourn. Coroll, 7. It is consequently what Buxbaum figures Cent. 1, p. 25, tab. 40, f. 1; and is noticed by Smith in the Linn. Trans. 1. p. 195. This then is the true V. filiformis of Vahl, Willdenow, Smith, and Marschall.—Bieberstien, Hor. Taur. Cauc. I. p. 15. The calycine segments or sepals are elliptic, lanceolate, obtuse, slightly three-nerved. Capsule obcordate, reticulated with veins.—Seeds slightly urceolate. It has not yet been found out of Asia: it was not even met with by Sibthorpe in Greece.

The species of Melampyrum noticed also in the same page, (page 4 of the Plinian Transactions,) is, I fear, a bad species. I judge of a single poor specimen shown me as found by Dr. Johnston, and which is subsequently named (p. 33, and in Brewster's journal for October 1829—p. 358), M. montanum. Although M. pratense be usually characterised with bracteæ, toothed at the base, yet that is merely a character of secondary importance: That species being amply, and only distinguished from M. sylvaticum by its corolla, which is *toto cælo* different in the two. Dr. Johnston's plant differs in no way from M. pratense but by its smaller size and entire bracteæ; but even Smith, whose opportunities of examining numerous varieties in the living state for many years previous to his death, were extremely limited, says in his Engl. Flora. III. page 125, that these parts are "more or *less* toothed at the base;" a variable mark such as this must be only taken as an auxiliary. I have only further to add, that M. pratense is extremely common in Ireland with the bracteæ entire, (and is then often improperly confused with M. sylvaticum), and is thus not different from Dr. Johnston's plant, but by being usually of a larger size than the more common state, whereas it is the reverse in M. montanum of Johnston.

I send along with this a few species, such as I have still duplicates of, of Cistus and Helianthemum: they are chiefly from the south of France; and I hope the Society will do me the honour of accepting them for their museum.

Connected with them, the following two or three remarks on the British species may perhaps interest some of the members.

1. The first species in Smith's English Flora is Cistus marifolius; this he states to be C. marifolius Lin. I have not yet had an opportunity of examining the Linnæan herbarium on this genus, but assuredly our British plant is not C. marifolius of the 1st ed. of Linnæus,—that being the same with C. marifolius Cavan. ic. 2. t. 143, and also of Barrel. ic. t. 441, which Smith improperly refers to our species; but with these exceptions, I agree with Sir James in all the synonyms he has adduced to his C. marifolius. But it is obvious that if, as I

suspect, Linnæus originally meant the plant of Barreliere and Cavanilles, the specific name of "*marifolius*" must be retained to it, as has been done by Decandolle, and our British plant ought then to be called Cistus, or (as I keep up the genus Helianthemum of Tournefort), Helianthemum *canum.* Under this name it will be found in Decandolle's Prodromus 1. p. 277, N. 67; and, I may remark, that I agree to the other synonyms brought under this species by Mr. Bentham in his Cat. Pl. Pyr. Smith, indeed, states, that "C. canus of Linnæus is a different plant," but Linnæus' description belongs to ours, (at least to a variety of ours which has the leaf hoary on both sides); and the herbarium of Linnæus in some cases throws no light on what he originally intended, having taken up many of his species from indifferent figures published by others. It is even possible that Smith had in view C. *incanus*, a true Cistus, and widely different from this or any other plant found in Britain. Helianthemum marifolium Dec. (Cistus marifolius Cavan.) is a very scarce plant, and only found in the south of Europe.

2. C. guttatus Lin., or Helianthemum guttatum of authors. On this I shall not trouble you with any remarks, further than that from Nos. 25 to 29 inclusive. of Decandolle's species are mere varieties, and perhaps scarcely even merit that name.

3. Cistus or Helianthemum ledifolium. This species I was not so fortunate as to meet with either growing, or in any herbarium at Montpellier, which *habitat* alone, however, is given by Linnæus. Linnæus describes his plant as *glabrous*, so also do Willdenow and Decandolle, but Decandolle doubts if it ever were found in France. Smith again says of the English plant, that it is downy (pubescens in the Flora Brit.): Now Linnæus, in his Mantissa, constituted a C. niloticus from Egypt, which he only made to differ from his C. ledifolius by being hairy or pubescent. It is strange that Sir James Smith no where takes notice of this C. niloticus, although, from what I have said, it must be clear that the British plant belongs to it, and not to C. ledifolius. Of the true Hel. niloticum, but agreeing wiih the British H. ledifolium, I possess a specimen from Foz in Provence, and therefore I suspect that the smooth plant, C. ledifolius Lin, may after all turn out to be a mere accidental state of Hel. niloticum, raised from seeds in a garden in a colder and moister climate, under which two circumstances all the species of this genus lose much of their pubescence.

4. C. surrejanus. Perhaps several plants occur under this name. The principal character depending on "petals lanceolate" is absurd, and applies equally to an accidentally deformed state of several species in the south of Europe. Of the British plant in question, a few specimens found lately by my friend Mr Christy have the leaves as white underneath as in the Hel. vulgare (Cistus Helianthemum Lin.) This, when sent to Sir James Smith, a short period before his death, was affirmed by him to be the true plant, adding that it even had "*the beautiful character of having the leaves dotted beneath!*" but I can positively say, that such was invisible to me when I examined Christy's specimens. As to Smith's other characters, I can see nothing in them to distinguish the plant from some states of Hel. vulgare, that are more common in the south than with us; and had that state of it, called by some Hel. nummularium, with leaves hairy but nearly green on both sides, been known as a British plant, I would rather have referred to it, Smith's C. surrejanus, by his description.

5. C. Helianthemum (Hel. vulgare. Dec.) is a well-known plant, much subject to variation, according to the exposure, aridity, and nature of the soil, as the judicious Willdenow has long ago observed.

6. C. tomentosus (Hel. tomentosum, Dec.) About this I ought to be cautious of speaking, having never yet possessed a specimen from this or any other country named from authority; nor, indeed, have I ever seen one that possessed the character of "hoary stipules." Many plants I have in my herbarium, with all the other characters given to C. tomentosus, particularly the "calyx all over hoary;" but every one of these I refer without hesitation to Hel. vulgare, al-

though such be contrary to Sir James's character. Now, this mark of "hoary stipules" does not even exist in any of the allies of H. vulgare that I have yet met with,—the nearest approach being to what is sometimes cultivated in our gardens as H. tomentosum, (but which is really H. croceum, a species from Spain and Barbary ;) even there, however, the stipules are green, though slightly pubescent, and certainly ciliated. Nor does the accurate Hooker take notice of this character in his Flora Scotica ; but, on the contrary, says he can see no difference between it and H. vulgare. Smith himself, likewise, when he first published the species, says, that the principal difference is in the greater hoariness of the whole plant ; that this is subject to vary in cultivation ; and that *good* characters are yet wanting. Upon the whole then, I am rather inclined to think, that one must not trust to this character from the stipules, and that the plant is identical with, and "not even a well-marked variety" of H. vulgare.

7. C. polifolius. Smith's remarks here are interesting : he states the pubescence to be starry, (by which it differs ftom C. apenninus Lin., where he says it is simple) : the calyx slightly hairy, and its outer leaves fringed. Now this, agreeing well with a specimen from Brentdowns in my herbarium, does not at all apply to Hel. polifolium, Dec., a very scarce plant, which I only have from Laconi in Sardinia, in which the calyx is glabrous and shining : but what is remarkable, Smith's plant is certainly identical with Helianth. apenninum, Dec., and of many other authors. Therefore in Decandolle's prodromus, Hel. polifolium (No. 105) must resume the name of H. splendens, given to it by Lamarck ; and H. apenninum, Dec. (No. 101) receive the name of H. polifolium. This species is not then, as Smith states, confined to Britain, but is an extremely common plant in many places on the Continent, extending from Fontainbleau to Montpellier, and throughout Spain and Italy. But what becomes of the true C. apenninus ? Linnæus says of it, "foliis lanceolatis hirsutis," and Smith, that it has "a simple pubescence, and hoary calyx, without hairs on the ribs," a double character that I have never yet found united on any of the white flowered species of this genus. Perhaps Bentham is right in making them all varieties of Hel. apenninum or H. polifolium.

The Entellus Monkey. (*Semnopithecus Entellus.* F. Cuv.)—Although there is reason to believe that this is one of the most common Monkeys both of the Peninsula of Hindoostan and of the Islands of the Indian Archipelago, we are not aware that any other specimen than that which was lately exhibited in the Zoological Society's Gardens had previously been brought alive to this country. A stuffed skin, but of a much smaller individual, in the Museum in Bruton Street, was also, we believe, unique in England. On the continent of Europe specimens appear to be almost equally rare. The species was first made known by M. Dufresne, in 1797, from a skin in his possession, which was shortly afterwards figured by Audebert in his large work on the Monkeys, whence it was adopted by later zoologists. After an interval of more than twenty years the arrival of a living individual, of small size and immature age, at the Jardin du Roi in Paris, enabled M. Fréderic Cuvier to publish a second original figure, more valuable than the first as having been taken from the life. The same naturalist has subsequently given a still more striking and characteristic likeness of the adult animal, taken from a drawing sent from India by M. Duvaucel. These figures and the observations which accompany them constitute the sum of all that has hitherto been known to science respecting this very remarkable and interesting species.

But it seems to have escaped the observation of naturalists that the animal in question had been most accurately described as a native of Ceylon by Thunberg in his travels in Europe, Asia, and Africa, published in Swedish at Upsal in 1793, and almost immediately afterwards translated into German and English. It is true that he has confounded it with the Wanderoo; but this error extends no farther than the assumption of the name of that species, which he cites doubtfully, and with which his description has scarcely any features in common. The country name by which he designates it, that of Rollewai, appears more certainly to belong to it; for the same appellation is used by Wolf in his account of his residence iu Ceylon, first printed at Berlin in 1782, and afterwards in English at London in 1785, and is evidently applied to the same species. Its coincidence with the name given by Allamand to the Diana appears to have misled the editor of the latter work; but the descriptions both of Thunberg and Wolf differ so completely from that species, which is known to be a native of the western coast of Africa, that there can be no risk of their being regarded as the same by any scientific naturalist. The name of Roloway, as applied to the Diana, must either be a purely accidental resemblance to that of the Ceylonese animal; or, which is the more probable conjecture, must have been transferred from it to the African, by the ignorance or carelessness of the showman from whom M. Allamand received it. The similarity of sound, connected with absolute identity both of locality and habits, would tempt us slso to associate with the present species the Rillowes of Knox's Historical Relation of the Island of Ceylon, were it not that there are some points in his description of those animals which could scarcely be reconciled with such a combination. It is more than probable that many of the earlier accounts of the large gray Monkeys of Bengal and the Malabar coast, which are spoken of by travellers as objects of veneration to the natives, and which have been usually referred to the Malbrouck of Buffon, are in reality applicable to the animal now before us. The Malbrouck, there is every reason to believe, does not inhabit India, but is, like all the other Cercopitheci, a native of Africa.

The genus Semnopithecus of M. F. Cuvier, of which the Entellus offers a truly characteristic example, is distinguished from the other Monkeys of the Old World by several remarkable characters, affecting not only its outward form but also some essential parts of its internal organization. In the degree of their intelligence, the form of their heads, and the general outline of their proportions, the species which compose it seem to occupy an intermediate station between two other purely Asiatic groups, the Gibbons of Buffon, which are the Hylobates of modern systematists, and the Macaques, of which the Wanderoo may be regarded as the type. Their bodies are slightly made; their limbs long and slender; their tails of great length, considerably exceeding that of the body; their callosities of small size; and their cheek-pouches, in those species which appear to possess them, so inconsiderable as scarcely to deserve the name. The character, however, which at once distinguishes them from the Cercopitheci, is found in their dentition, and more particularly in the form of the crown of the last molar tooth of the lower jaw, which, instead of four tubercles, one at each angle of the tooth as in the latter genus, offers five such projections on its surface, the additional one occupying the middle line of the tooth, and being placed posteriorly to the rest. The Gibbons and the Macaques are also furnished with this additional tubercle.

In the shape of their heads, and the expression of their physiognomy, the Semnopitheci bear so close a resemblance to the Gibbons, that it would be difficult to decide from an inspection of the head alone to which of the groups any particular species ought to be referred. In the earlier stages of their growth the forehead is broad and elevated, the cavity of the cranium proportionally large, and the muzzle but slightly prominent. But as they advance in age the forehead gradually diminishes in size, contracting in a remarkable degree the dimensions of the cavity within, and the muzzle is prolonged to a considerable extent. These changes, which are common to the whole tribe, but are peculiarly striking in the present genus in consequence of the prominence of their foreheads in the young state, are accompanied by a corresponding change in the habits of the animals. When taken at an early age they are readily tamed, become playful and familiar, are extremely agile, although generally calm and circumspect in their motions, and learn to perform a variety of tricks, which they execute with no little cunning and address. After a time, however, their playfulness wears off; their confidence is succeeded by mistrust; their agility settles down into a listless apathy; and instead of resorting as before to the resources of their ingenuity for carrying any particular point, they have recourse to the brute force which they have acquired in its stead. At length they become as mischievous, and sometimes even as dangerous, as any of those Monkeys which in their young state offer no such indications of good temper and intelligence.

The Entellus is too distinct a species to be confounded with any other. It is of a uniform ashy-gray on the upper parts, becoming darker on the tail, which is grayish brown, of equal thickness throughout, and terminated by a few long hairs running out into a kind of point, but not forming a tuft. The under surface of the body is of a dingy yellowish white; and the fore arms, hands, and feet are of a dusky black. The fingers of both extremities are very long, and the thumbs comparatively short. The face, which is black, with somewhat of a violet tinge, is surmounted above the eyebrows by a line of long stiff black hairs, which project forwards and slightly upwards. On the sides of the cheeks and beneath the chin it is margined by a beard of grayish white passing along the line of the jaws, and extending upwards in front of the ears, which are large and prominent, and of the same colour with the face. The hairs of the fore part of the head appear to diverge from a common centre. The height of our specimen, which was not yet adult, when in a sitting posture exceeded two feet; and his tail, which he rarely displayed at its full length, but more usually kept curled up in a single coil, measured nearly three.

Both Thunberg and Wolf have given very particular and amusing accounts of the habits of these animals in their native country, where it appears that they are not uncommonly to be met with tame in the houses of the inhabitants, in which they are also, even in their wild state, if not welcome, at least frequent visitors. The details furnished by the latter author are, however, too manifestly apocryphal to be received as authentic in the present state of science. It seems nevertheless certain that such is the respect in which they are held by the natives, that whatever ravages they may commit, the latter dare not venture to destroy them, and only endeavour to scare them away by their cries. Emboldened by this impunity, the Monkeys come down from the woods in large herds, and take possession of the produce of the husbandman's toil, with as little ceremony as though it had been collected for their use; for, with a degree of taste which does them credit, they prefer the cultivated fruits of the orchard to the wild ones of their native forests. Figs, cocoa-nuts, apples, pears, and even cabbages and potatoes form their favourite spoil. The numbers in which they assemble render it impossible for the sufferer to drive them away without some more efficient means than he is willing to employ: he is consequently compelled to remain a quiet spectator of the devastation, and to submit without repining to his fate.

These Monkeys appear to be peculiarly susceptible of change of climate. M. Thunberg's specimen died of cold even in the temperate latitude of the Cape; and neither the Paris specimen nor our own long survived their arrival in Europe.—*The Gardens and Menagerie of the Zoological Society*, No. IV.

New Species of Wild Swan. Extract from a letter to Capt. Thomas Brown, F.R.S.E. &c.—"By the dissection of a Swan in our museum, (Messrs. John and Albany Hancock's,) and of another now in the museum of this town, Mr. R. R. Wingate has been enabled to point out sufficient distinctive characters to establish an entire new species of Wild Swan. Mr. Selby of Twizel House is going to write a paper upon the subject, which will be shortly read at the Natural History Society of Newcastle.

"The chief distinctions consist in the formation of the trachea, having a slight difference in the external appearance, and being of a smaller size. It is intended to be named Anas Cygneus Bewickii, after our distinguished townsman."

Additions to the British Flora.—We are informed that *Reseda alba* has been discovered by the Rev. Mr. Tozer, between Marazion and Penzance, in Cornwall. We believe also that *Myosotis collina* has not been made known as a British plant, although it was discovered by Dr. Greville four years ago. In the size of its flower and habit of growth, it resembles *Myosotis versicolor*. The Scottish botanist will find it abundant in the King's Park, Edinburgh, on the sunny bank eastward of the basaltic columns named Sampson's Ribs. It is the earliest British species.

Naturalization of Insects.—A communication was laid before the Wernerian Society on the 9th ultimo, by James Wilson, Esq., on the *Saturnia luna*, which has been reared by Mr. Sommer of Altona, from eggs imported from North America. This beautiful moth, greatly admired by collectors, was sent hy Mr. Sommer to P. Neill, Esq.; but it is unfortunate that no history of its habits accompanied the specimens.

The subject afforded to Mr. Wilson an opportunity of making some ingenious remarks on the distribution and naturalization of insects. "Why," said he, "should we not behold the gay butterflies and moths of foreign climes fluttering around those exotic plants which shed such a splendour over our parterres?" It certainly would afford a new interest to our hot-houses and green-houses, were these beautiful insects associated with the plants which constitute their natural food.

Discovery of Human Bones in ancient formations; *by* M. Boue.—The valley of the Rhine is covered with an alluvial deposit, a marl-clay called *loss*, which rises to a height ranging from 200 or 300 feet to 600 feet above the level of the sea. This deposit contains terrestrial and fluviatile shells, similar to those of animals which still exist in that district, and the bones of quadrupeds, belonging principally to extinct species.

It was in this marl that Mr Boué discovered, in 1823, behind the Aâr in Baden, human bones at different elevations, and in places where nothing indicated that there had ever existed any cemetery. Moreover, the bones were so fast in the rock, that it took much labour to disengage them, and obliged Mr Boué to leave many which were too deep seated in the marl. Their bed appeared never to have been disturbed, and contained some fresh water shells. Further, the bones, instead of being united, as they are found in ancient burial-places, were scattered in every direction, partly broken, and situated deeper below the surface than it is customary for men to deposit the dead.

As the marl which contained these bones, was encrusted by tertiary limestone and variegated sandstone, M. Boué, convinced that all these formations were of the same age, and that no human bones could be found in such ancient deposits, imagined that those which he had discovered, belonged to some extinct animal, whose skeleton bore great resemblances to that of man.

My astonishment was great, he remarks, when M. Cuvier, to whom I presented these relics, declared that they were human bones, and must have belonged to some ancient sepulchre.

Since this period, M. Boué has revisited the same places, and without wishing to speak decisively, conjectures that the fact may be attributed to an inundation of the river behind Aâr, or even of the Rhine. Moreover, says he, many geologists have already remarked that, by means of pluvial waters, the inclined surface of these marls is covered with a true crust, capable of solidification.

M. Boué, in the conclusion of a communication presented to the Academy of Sciences, related another interesting fact connected with this subject,—that of the human skulls, which Count de Razon Morosky has found mixed with the bones of quadrupeds of extinct or equatorial species, in the calcareous detritus which covers the magnesian limestone of the Alps, or which fills irregular cavities of dark loam. The form of these crania is remarkable, presenting a flatness of the frontal bone analogous to that which exists in those savages who have the custom of compressing this part of the head. Similar skulls have, however, been discovered in many other parts of Germany. They appear to have belonged to a people, who inhabited this country at a period on which history is silent.—*Le Globe*.

NATURAL-PHILOSOPHICAL COLLECTIONS.

Extract from the Analysis of the Labours of the Royal Academy of Sciences during the year 1828; *by* Baron Fourier.

At the sitting of the 23d March 1828, M. Poinsot presented to the Academy a very important notice respecting the Theory and the precise determination of the Invariable Plane of the Area in the System of the Universe.

It is known that, in the motion of a system of bodies which react in a given manner upon each other, if there be projected upon a plane the area traced around a fixed point or focus, by the vector radii drawn from this focus to all the equal particles of the system, the sum of these projected areæ remains constant, notwithstanding the variations which each of them undergoes, from the connection and reciprocal action of the different bodies; and it is in this that the so well-known principle of the preservation of the areæ consists.

In thus considering the areæ upon the different planes which may be drawn through the same focus, it is found that there exists a plane distinguished from all the others by the following property: If the areæ be projected upon one of the planes perpendicular to this unique plane which we have said to be distinct from all the rest, the sum of the projections is always null. It is thus found, that the projection of the areæ upon the single plane in question is the greatest possible. This property had already been remarked by geometricians; they had selected this plane for simplifying their calculations in determining the motion of certain systems, and, for example, in the case of the motion of a solid body turning freely around its centre of gravity. The author adds, it is this plane which M. Laplace has considered in our planetary system, and to which he has given the name of Invariable Plane. He has endeavoured to determine the position which this plane ought to have had at the commencement of 1750, and his formulæ have given for that period the inclination of the plane to the ecliptic equal to 1°.7689 and 114°.3979 for the longitude of its ascending node. M. Poinsot remarked that this great geometrician, in establishing his analysis, only considered the areæ described around the sun by the different planets considered as so many points of which each is charged with the entire mass of the planet and of its satellites. Now, it is well known, that M. Poinsot has discovered a new theory of the motions and areæ, in which these kinds of quantities are with him only the geometrical expression of the couples or forces of rotation, which are at present exercised in the system. All geometricians are acquainted with these beautiful and ingenious researches which have contributed to the improvement of statics, and which at the same time possess the advantage of being clear and profound. . . . .

He now concludes from his theory of motions that the truly invariable plane is nothing else than that of the area which would result from areæ simultaneously described by the particles of the system, were all these areæ composed together in the manner of simple forces applied upon a point, and that, consequently, to determine the true invariable plane, it is necessary to combine together, not only the areæ which M. Laplace has considered, but also other areæ which his analysis does not comprehend, viz. those which result from the particular motions of the satellites around their principal planets, and those which arise from the rotation of all these bodies and of the sun itself upon their respective axes. M. Poinsot remarked, that the plane of this resultant area is the only one of which it can be affirmed that it remains motionless in the heavens, or that it always remains parallel to itself, whatever may be the changes which the succession of ages may induce in the motions, the figure and the mutual position of the different celestial bodies. He adds, that if only a part of these simultaneous areæ be considered together, it cannot in that case be said that the partial area which results from them is invariable in magnitude and in its position in space; whence it follows, that the plane determined by M. Laplace may vary, and that thus it is not calculated to make known the changes which may in time supervene in the position of the planetary orbits and equators. The author therefore concludes that, to obtain this result and thus furnish future astronomers with the means of comparing in a precise manner the observations separated by long intervals of time, it is necessary to have recourse to the plane which he proposes, it being the only one which is invariable. He names this plane the Equator of the Planetary System.

Such is the principal result of the new theory which M. Poinsot has presented to the Academy. As to the determination of this equator of the solar system, the author remarks that it depends, not only upon the masses of the different celestial bodies, but also upon the motions of inertia of these bodies with relation to their axes, quantities which are as yet unknown to us. The author also observed, that the question treated by him has two very different objects, the first is an important theory, which it is necessary to rectify for the accuracy and improvement of science; the second is a particular application which supposes the measure of certain quantities which time alone and observation can make known to us. There results from this, says the author, that the plane in question must differ sensibly from that which M. Laplace has determined, because, if the areæ due to the revolutions of the satellites, or even to the rotation of the planets, are quantities so small that they may be overlooked with respect to the others, the case is different with the area resulting from the sun's rotation, which is a large quantity, and ought uot to be omitted in any case.

Supposing, in the first plaee, the sun to be homogeneous, M. Poinsot finds, that the area resulting from the rotation of that great body upon itself, is upwards of fifty times greater than that which the earth describes in the same time by its revolving motion in its yearly orbit. If, as is very probable, the density is not uniform, but increases from the surface to the centre, in proportion to the depth, the author finds that the area in question still amounts to two-thirds of the above value. And, even in the supposition that the sun's density augments from the surface where it is null, to the centre where it is infinite as the ordinate of a hyperbola approaching the asymptote which is parallel to it, this area described would still be half the quantity which it is found to be in the case of the sun's being homogeneous. Thus, for this hypothesis, which appears extreme, the resultant of the areæ, determined without reckoning this quantity, differs as much from the true, as if there had been overlooked in the calculation at least twenty-five globes such as our own, which had circulated like the earth at the same distance from the sun, but in a plane inclined from seven to eight degrees to the plane of our ecliptie. The author concludes that this omission alters in a very sensible manner the position of the invariable plane, because it is easy to see that it changes by several minutes its inclination to the ecliptic, and by several degrees the longitude of its ascending node, and that, consequently, it is not less necessary in application tnan in theory, to attend to this part of the areæ which result from the sun's rotation. It is certain that the only strictly invariable plane is that which the author determines. As to the modifications which the constitution of the solar system and the form of the moving bodies might authorize, it would be necessary to found them upon a detailed discussion of the various elements. The consequences could only be approximative and subject to all the limitations which might have been introduced into the calculus.

M. Poinsot proposes to unfold all these considerations in a memoir which he intends soon to read to the Academy.

(To be continued.)

On the Action of Potassa on Organic Matters; by M. Gay Lussac.—M. Vauquelin, by treating pectic acid with potash in a crucible, converted it into oxalate of potassa. This experiment suggested to me the idea of submitting ligneous matter, which has an analogy to pectic acid, to the same treatment, and I obtained the result I expected.

Five grains of cotton were put with 25 grains of pure potash and a little water, into a platina crucible, and heated over a spirit lamp much beneath redness. The cotton resisted the action of the alkali at first, but ultimately softened, the mixture melted without undergoing carbonization, and hydrogen was disengaged. During the tumefaction the mixture should be continually stirred. When it had settled down, the mass was dissolved in water, and rendered slightly acid by nitric acid. It then gave an abundant precipitate with nitrate of lead, and this, operated upon by sulphuretted hydrogen, produced very fine crystals of oxalic acid. With nitrate of lime, a voluminous precipitate of oxalate of lime was obtained.

Wood sawdust, with the same treatment, gave the same result.

Sugar, with 4 or 5 times its weight of potash, became, when heated, at first browu, then white, and gave much oxalic acid.

Starch formed a very glutinous mass with potash, which long retained this state. More alkali occasioned liquefaction, the mixture swelled, and oxalate of potash was produced.

Gum and sugar of milk were also converted into oxalic acid with the disengagement of hydrogen.

The most remarkable transformation is that of tartaric acid into oxalic acid. There is no swelling, no blackening, and (which merits particular attention) so little evolution of hydrogen, that it may be considered as due to extraneous vegetable matter. When the hydrogen is to be collected, the experiment may be made in a retort to which a tube of glass has been attached, which is to be plunged beneath a layer of water into mercury to prevent absorption. The retort being heated by a bath of mercury or oil, it will be readily observed that a temperature of 400° F. at most is sufficient to form the oxalic acid.

Citric and mucic acid produced also much oxalic acid. I have also obtained it from succinic acid, but the benzoic acid resisted the action of the potassa, and remained unaltered.

Acetate of potash heated with excess of potash became converted into carbonate. A little oxalic acid was obtained, but it is very probable that it was due to extraneous vegetable matter.

Colza oil, notwithstanding a great excess of potash, could not be brought into fusion, and but very little oxalic acid was obtained.

Amongst animal substances, silk, treated with potash, gave oxalic acid with disengagement of hydrogen. Uric acid evolved ammonia. The residue was very white; being dissolved in water, and saturated by nitric acid, hydrocyanic and carbonic acid were disengaged; nitrate of lime then produced an abundant precipitate of oxalate of lime. Gelatine gave a similar result. Indigo gave no oxalic acid.

Carbonate of potash used instead of caustic potash gave no oxalic from tartar; nor did lime and starch produce any oxalic acid. Soda may be used instead of potash.

From these experiments, it appears that a great number of animal and vegetable substances, acted upon by caustic potash or soda, are transformed into oxalic acid. It is to be remarked that the formation of this acid precedes that of carbonic acid, and precisely under the same circumstances as when sulphur and potash, for instance, produce hypo-sulphurous and sulphuric acids. Thus a vegetable substance, heated moderately with potash, gives oxalic acid, but when more strongly heated, carbonic acid.

As very different substances produce oxalic acid, it is necessary that other products should be formed. Many bodies evolve hydrogen which may come from themselves, or from the water they contain, and afterwards carbonic acid. Animal matters, besides these two products, give also ammonia and cyanogen. Water must also be formed with both animal and vegetable substances. These products, or some of them, are sufficient to explain in general the formation of oxalic acid, but in some particular cases there ought to be other products obtained. Thus tartaric acid gives no sensible portion of hydrogen, and yet its composition being $2\frac{1}{2}$ proportions of hydrogen, 4 of carbon, and 5 of oxygen, we cannot explain its transformation into oxalic acid by the occurrence of any of the known products.

In fact, during the operation, the mixture remains perfectly white. If all the carbon entered into the oxalic acid, it would require 6 proportions of oxygen, and consequently water ought to be decomposed to furnish 1 proportion. If only so much oxalic acid were formed as is proportional to the oxygen in the tartaric acid, then 2-3ds of a proportion of carbon would remain, which might form a particular compound with the hydrogen; and for 1 proportion of tartaric acid, $1\frac{2}{3}$ of oxalic acid would be produced. In place of this last quantity, I have obtained $1\frac{1}{3}$ oxalic acid, but I have not discovered any hydrogenated compound. Finally, it was possible that a peculiar acid had been formed by the carbon, oxygen, and hydrogen. This point deserves particular examination, and I should have undertaken it in the vacations, if I had had time, but hope to resume the subject shortly.

I shall conclude by describing a very elegant method of transforming tartar into oxalate of potassa. It consists in dissolving rough tartar in water, with a proper quantity of potash or soda, and making the solution pass by means of a pump in a continual current through a thick tube of iron or bronze heated to 400° or 450° F. The pressure need not be more than 25 atmospheres, for no gas will be disengaged. A valve is to be placed at the opposite extremity to that at which the solution enters, and charged with sufficient weight to obtain this pressure; it will then only be opened by the pressure exerted by the injection pump. I have not as yet tried this process, which is also applicable to other substances, but I see nothing which can prevent its success. According to some experiments which I have made, less than a proportion of potassa for a proportion of neutral tartar will be necessary.—*Ann. de Chimie.*

Distinctive Characters of Tannin and Gallic Acid.—To determine the different properties of these substances, M. Pfaff employed them of the greatest purity, and he obtained the following results. In a dilute solution of gold, gallic acid gives a blue greenish colour, which appears brown by reflected light, and the gold is perfectly reduced. Tannin merely reduces the gold to a lower state of oxidation, and the liquor becomes purple. Gallic acid a faint yellowish tint in the solutions of titanium. Tannin precipitates orange-red flocculi. Tannin precipitates tartarized antimony white, but gallic acid occasions only slight turbidness after a considerable time. Gallic acid renders the caustic alkalies brown; the colour which it produces with the carbonated alkalies is at first yellow, with a brownish tint, but it becomes soon of a deep green. Tannin is precipitated by the pure and carbonated alkalies, and the liquor becomes brown, without changing to green. The salts of morphia, strychnia, quina, and cinchonia, are not precipitated by gallic acid, but they are by tannin. In its combination with the alkalies, tannin seems to undergo a change, which approximates it to gallic acid. The scum of coffee owes its property of turning the white of egg green, with the influence of the air, to the gallic acid which it contains; and the white of egg appears to produce this effect by the carbonate of soda which enters into its composition. M. Pfaff did not find any gallic acid in the plants which contain emetin and veratria.—*Schweigger's Annals, Journal de Pharmacie,* Aug. 1829.

On the Copper-Coloured Light Reflected from the Dark Part of the Moon's Disc.; by Dr. Burney.—In the evenings of October 30th and 31st, the non-illuminated part of the moon's disc, when near the horizon, reflected a *dull copper colour*; a circumstance that often happens while the sun, or rather the earth, is passing through the southern signs of the ecliptic, but seldom, if ever, while passing through the northern signs. By considering the relative positions of the sun and moon with that of the earth, and the small angle subtended by the latter during the first four days of the moon's age, when the phenomenon is exhibited to the best advantage, the dull copper colour seen on the moon's opaque body in clear weather, particularly when near the horizon after sunset, appears to be effected by means of the solar rays reflected to the regions of the moon, from the extensive water in the Ethiopic Ocean and the Great South Sea, according as the earth advances in its annual motion round the sun: as it is well known the reflected solar rays from water are extremely bright, and as they proceed through a clear atmosphere in the direction of the moon, it is probable that they produce a faint light upon the dark part of her disc. In the opposite season of the year, when the sun's declination is north, there is more heat in this latitude, and consequently more vapours in the atmosphere, which intercept the incident and reflected solar rays, and do away their effect; nor is the moon's angular position in the heavens so convenient to receive them as in autumn and winter.

Cold in southern latitudes as far as 56 or 57 degrees, is said by late voyagers to be a mere chimera, and that snow is scarcely ever seen on the ground in these parallels, although reverse to nature in comparison of the low temperature and rigour of the winter in the same parallels in the northern hemisphere; therefore, snow on the ground in South America, or the Cape of Good Hope, or New Holland in any part of the year, cannot be the means of conveying the sun's reflected rays to the regions of the moon; nor is the snow in North America so situated during our winter, as to cause light from the earth to be reflected from the dark part of the moon's disc, as has been supposed by some modern philosophers.

The reflected light from the unilluminated part of the moon in her first quarter, as before mentioned, is sufficient to establish the fact of the existence of an attenuated lunar atmosphere, which, according to the ingenious calculations of the celebrated M. Schroeter of Lilienthal, cannot be much less than a mile and a a half in height. If the moon were a mere cinder, as some would have her to be, and without any atmosphere, is it possible that the light she receives from the earth could be reflected to it from the dark part of her disc?—*Phil. Mag.*

Mr Faraday's Experiments on Flint-Glass for Achromatic Experiments.—A paper by Mr Faraday was read at the Royal Society on the 19th November, giving a short account of the experiments made at the expense of government to obtain more perfect glass for optical instruments. The paper commenced by stating, that, although glass had been brought to ample perfection for domestic purposes, yet for optical instruments it was far from being perfect. This fact was too well known; and it was a singular circumstance, that the first telescope maker (Mr. Dollond) had not been able to obtain a perfect disc of the circumference of four and a-half inches for an achromatic telescope in the last five years, nor one of five and a-half inches in the last ten years. The want of an improved glass for optical instruments was so much felt, that, in 1825, a committee was appointed to make experiments, in order to ascertain if an improvement could be made. His Majesty's government afterwards ordered every facility to be given, and stated, that the expence incurred in the experiments should be paid out of the treasury. A furnace had been erected in the Falcon Glass Works, and subsequently one at the Royal Institution, where the experiments had been carried on with the greatest assiduity. The paper now read was intended as a summary of these proceedings. The experiments gone into were briefly glanced at, and discoveries had been made which had brought the manufacture of glass for optical purposes to nearly a perfect state, the faults so long complained of, viz. of the glass being wavy, reely, &c. being remedied to a great extent. The most perfect homogeneous glass obtained by these experiments was found to act perfectly. The paper went into minor details. The experiments are still going on. —*Edin. Journal of Science*, No. III.

New Principle in Albumen.—M. Couerbe has discovered a new principle in albumen by exposing to a cold of 32° Fahr., and a few degrees below it, concentrated solution of white of egg. At the end of a month the mass became thicker, and yielded a membraneous net work, which is solid, white, translucent, insipid, and inodorous, and easily reduced to powder. Muriatic acid is the best solvent of it, and when water is added, it becomes of an opaque white, and deposits a powder of a very high degree of tenacity.—See *Ann. de Chim.* vol. xl. p. 323-325.

On the Natural Metallic Compounds which cover the Surface of Antiques; by M. Becquerel.—Mr. John Davy found in the sea an ancient Greek helmet, whose surface presented remarkable decompositions: it was covered with a crust of carbonate of lime, below which were found a multitude of little octahedral crystals of pure shining copper; the remainder of the decomposed part was formed of a sub-carbonate and a sub-chloruret of copper.

These decompositions are easily explained after the recent observations of M. Becquerel on the mode of action of electrical forces of low intensity. (See No. IV. of this Journal, p. 309.) The calcareous deposition being once formed in certain portions of the surface of the helmet, the liquid enclosed below it, and with difficulty communicating with the external fluid, was able to saturate itself with copper by slow degrees; on the other hand, the exposed portions of the helmet being submitted to the constant action of the sea water, the negative electricity disengaged during the action was driven into the interior of the metal; immediately the part situated under the crust became the negative pole of a little pile which commenced to act on the dissolution of the copper in contact with it. According to the electricity of the pile, we have metallic copper in octahedral crystals, or crystals of the protoxide of the same metal, as in the apparatus contrived by M. Becquerel to form similar bodies. Mr. John Davy has also discovered an antique leaden sling, covered with crystals of carbonate of lead, whose formation is still more easily explained, according to the ideas of the author.

M. Becquerel has done more, he has produced on a plate of lead, after some days, by means of electro-chemical processes, a decomposition analogous to that which the old sling presented. He has caused it to become covered with crystals of carbonate of lead.

M. Becquerel has been curious to visit the medals and other antique objects deposited in the Royal Library; but he has not been able to make the observations he desired, on account of the coating having been removed from them. He remarked, as it has been previously observed by antiquaries, that there is an evident relation between the nature of the formation in which these metals are discovered, and that of the decomposition which they undergo. He indicates the nature of the substances which colour them in every instance, and explains the whole admirably according to his theory.

It is desirable, says M. Becquerel, that the interior of mines should be visited, for the purpose of examining the metallic compounds which they contain. There is reason to believe that our present knowledge of the mode of formation of these bodies, would lead to curious ideas on the nature of the forces which are now in activity on the surface of the globe.

Observations on the Ioduret and the Chloruret of Nitrogen, &c.; by M. Serullas.—The results which M. Serullas has obtained, are as follows:

1. The ioduret of nitrogen decomposes water, producing the iodate of ammonia.

2. Ammonia is formed in most cases by the decomposition of the ioduret of nitrogen; which at first induced the supposition that this alkali entered into the composition of the fulminating ioduret.

3. The chloruret of nitrogen, submitted to the action of different substances, as sulphuretted hydrogen, phosphorus mixed with carburet of sulphur, sulphur,

or the deutoxide of arsenic, also furnishes ammonia in its decomposition, which always takes place with detonation.

4. The fulminating silver of Berthollet, regarded as an ammoniuret or an azoturet, presents the same results; it gives ammonia, of whose reproduction there can be no doubt, seeing that, in certain circumstances, there is a disengagement of nitrogen without a reaction capable of decomposing the ammonia; it is, according to M. Serullas, an azoturet of silver.

5. On introducing some per-chloruret of phosphorus into a flask full of dry sulphuretted hydrogen, hydro-chloric acid gas is disengaged, with ebullition, and a transparent colourless liquid is shortly formed, which M. Serullas considers to be composed of phosphorus, chlorine, and sulphur, in definite proportions.—*Universel, Aug.* 1829.

The same gentleman has recently communicated to the Academy of Sciences a memoir, entitled, "on the action of different acids on the neutral iodate of potassa;—acid iodates of this base, or bi-iodate and tri-iodate of potassa;—chloro-iodate of potassa;—new mode of obtaining iodic acid:" from which we gather the following results:

1. There exist two iodates of potassa.

The first is produced by the incomplete saturation of chloruret of iodine with potassa, under the form of a double crystalline compound, which, on being separated, dissolved and crystallized, gives the bi-iodate.

The other results from the action of one of the following acids, sulphuric, nitric, phosphoric, hydro-chloric, and fluo-silicic acid, on the neutral iodate of potassa; or it may be better obtained by treating directly a great excess of iodic acid with potassa.

2. In the incomplete saturation of chloruret of iodine with potassa, a double compound is formed, in definite proportions, of the chloruret of potassium and of the acid iodate of potassa.

3. There exists no acid iodate, nor chloro-iodate of soda.

4. One may, with great advantage, substitute for the process of Davy, to obtain iodic acid by the oxide of chlorine and iodine, that of precipitating the soda from the iodate of this base, by means of fluo-silicic acid.

On the Undulatory Theory of Light.—M. Ampère laid before the Academy, some time since, two memoirs, relative to important questions respecting the theory of light, which he has since published, under the following title: *Memoir on the curved surface of the waves of light, in a medium whose elasticity is different according to the three principal directions, in other words, that in which the force produced by elasticity takes place in the direction of the displacement of the molecules of this medium.* These questions originated in the researches of a member of the Academy, whom a premature death snatched from the sciences before he had accomplished his undertaking.

In his first memoir, M. Ampère directly determines the surface of the luminous wave in crystals, in which the velocity of light is different according to the three straight lines at right angles to each other, which have been called the Three Axes of the Surface of Elasticity. By proceeding from the common equation to all the tangent points, M. Fresnel had deduced that of the surface of the luminous wave, on the supposition that this equation does not pass the fourth degree.

M. Ampère's second memoir contains the demonstration of a theorem, which M. Fresnel had only announced, confining himself to showing that this theorem leads to the equation which he had given for the luminous wave. M. Ampere takes quite a different method; he deduces M. Fresnel's theorem from the preceding equation, which he demonstrated directly in his first memoir. The theorem in question ought to be considered as the most simple enunciation of the laws of the propagation of light in crystallized media. These laws being confirmed by observation, are, properly speaking, data of experiment. There results from them a means of comparing and appreciating the various hypotheses which have been formed respecting the nature of light, for it is necessary that these general laws of the propagation of light could be deduced from these hypotheses. This, in fact, is what results from the labours of M. Fresnel and M. Ampère's memoir. They prove, that the laws in question results from the hypothesis, which consists in considering the phenomena of light as produced by the vibrations of an elastic fluid. It is found, that the direction of these vibrations is perpendicular to that of the luminous ray. This latter part of the hypothesis was long rejected by some persons, because they established their calculation upon the supposition that the different parts of elastic fluids act upon each other only by being alternately compressed and expanded.

M. Fresnel considered these fluids under a different aspect. He regarded them as composed of material points, acting upon each other at a distance. He shewed that there might be in them a communication of vibratory motions, even when the fluid might only be susceptible of condensations and dilatations as small as might be conceived, so that on considering them as null, the direction of the vibrations ought, at this limit, to remain perpendicular to that of the luminous rays. Now, this view appears to be confirmed by ulterior researches. M. Ampère concluded from this, that before the hypothesis in question can with propriety be considered as uncertain, it is necessary to deduce the general laws yielded by experiment from a different physical notion, which no person has yet done.

On the Crystallization of Barley-Sugar; *by* Thomas Graham, A.M., F.R.S.E.—The change in appearance, arising from crystallization, which sticks of barley-sugar undergo in keeping, is always instanced as a case of chrystallization occurring in a solid body, without solution, and independently of external agents. The barley-sugar certainly does not then become a hydrate; and probably at the completion of the change is exactly of the same weight as before it began. But from an observation I have made, it would appear that the presence of a little moisture is necessary for the change, and probably that every portion of barley-sugar which suffers this change has been successively loosened and held in solution by that small portion of water, which begins to act on the outer surface of the stick and travels inwards.

Two fresh sticks of barley-sugar, dry and transparent, were introduced at the same time into separate phials: one of them with a stick of caustic potash, and the other by itself, corked up, and laid in a drawer. The barley-sugar, in company with the caustic potash, which would preserve it perfectly dry, did not undergo the slightest alteration in six months, but remained as transparent as at first. The barley-sugar in the other phial was scarcely altered during the first four months; but during the last two months, which were colder and damper, it became opaque on the surface, and the crystallization thereafter was propagated inwards to a considerable depth.

The effect of a small quantity of moisture in enabling solid amorphous matter to crystallize was observed very distinctly in the case of another substance. A quantity of sulphate of soda was rendered anhydrous by heat, and became a heavy powder. Placed in a confined atmosphere, kept purposely humid, the powder slaked like lime, swelling to several times its original bulk. It regains in two weeks its usual combined water (twelve atoms), and was then dry, and not in the slightest degree crystalline. Two days afterwards the powder was found a mass of crystals of the usual form of sulphate of soda, so dry as not to adhere to the blade of a knife; and it was not till after weighing that I satisfied myself of the presence of uncombined moisture among the crystals nearly to the extent of an additional atom. Here a small quantity of water allowed the powdery particles to right themselves, and adopt a crystalline arrangement which they were incapable of assuming without it.

On Chrome Orange Colour.—It is singular, that, although no other colour has been so much run upon for a couple of years in cotton yarns, no account of the mode of raising this beautiful tint, so far as I can learn, has hitherto been published; yet the process is universally known, and followed by dyers.

The first object is to procure upon the yarns a good body of chrome yellow, of the ordinary and familiar tint of chromate of lead. For this purpose, the goods are well charged with protoxide of lead, which is done by dipping them in solution of acetate of lead, and then decomposing the salt by lime-water, of which the lime takes the acetic acid, and leaves the oxide of lead in the cloth. Every trace of lime must then be got rid of by washing.

It is necessary to have nothing but oxide of lead in the cloth; for, with acetate or nitrate of lead as the mordant, the colour will be uneven. The goods are then passed through a bath of bichromate of potash, which instantly strikes the chrome yellow with the oxide of lead.

The orange is raised by throwing the goods so prepared into lime-water at or near a boiling heat. Lime, at that temperature, appears to be capable of partially decomposing the chromate of lead, taking half the chromic acid from a greater or less portion of that salt, and reducing it to the state of dichromate of lead.

The dichromate of lead is itself of a full red colour, and is best prepared according to the original process of Mr Badam's (*Annals of Philosophy*, N. S. vol. ix.), by digesting a solution of the yellow chromate of potash upon carbonate of lead at a boiling temperature, in the proportion of one atom of the former to two atoms of the latter, stirring up the solid matter very frequently, as the action is far from energetic.

Caustic potash likewise converts the chromate of lead into the dichromate; but, from its strong disposition to dissolve the oxide of lead, as well as to withdraw chromic acid, did not answer with us for forming the dichromate.

It occurred to Mr R. Ruathen, while engaged with this subject in my laboratory, to try if the dichromate would stand the glazing heat of a potter's kiln, which it was found to do, and to form a pretty good red on ordinary kinds of stoneware.—*Brand's Journal*, Dec. 1829.

New Vegeto-Alkalies obtained from Cinchona—Dr Serturner, in re-examining the products obtained by chemical means from the cinchonas, finds that the precipitates produced by alkalies from the acidulated infusion of these barks contains, besides cinchona and quinia, other vegeto-alkalies, which are to be considered as modifications of the former. The new bodies recall to mind the case of opium, in which narcotine exists simultaneously with morphia. The new substances, and especially that named by M. Serturner *chinioïdia*, exist in the alkaline precipitate, in intimate combination with a resinous subacid substance, which is not injurious, but is of no advantage. It is very difficult to separate these two substances, and M. Serturner succeeded only when he used the charcoal obtained when croconic acid is prepared by Liebeg's process. This substance, combined with animal charcoal, completely decolours the solution of the of the alkaline matter in sulphuric acid (diluted with 3 or 4 parts of water), but it is necessary afterwards to act on the thick solution with alcohol, to separate earthy salts.

The new vegeto-alkalies exist in the red and yellow cinchona with the quinia and cinchonia. The chinioïdia has more alkaline power and capacity of saturation, and also more medical power than any other vegeto-alkali in the cinchona, but it resembles them by its insolubility in water, its colour and taste. Its alkaline reaction on known vegetable colours, and its intimate state of combination with the brown extractive matter are remarkable. Its salts are very fusible by heat, and become viscid like some balsams.

According to M. Serturner, in febrifuge power, chinioïda is as superior to quinia and cinchonia as these are to ordinary bark. It is to this alkali that many cinchonas are indebted for their medical powers. M. Serturner has, in many cases, given his new medicine in doses of 2 grains three times per day; the patients take a little vinegar after each dose, for the purpose of saturating the gastric juice, which, by its alkaline nature, would else decompose the salt; from 12 to 24 grains have, in all the cases, sufficed to prevent the return of the fever, whilst patients, in the same neighbourhood, treated with the sulphate of quinia, had frequent returns of the disease.—*Hufeland's Journal.*

CATALOGUE RAISONNÉ.

Flora Javæ necnon Insularum Adjacentium. Auctore CAROLO LUDOVICO BLUME, Med. et Phil. Doct. Equite Ordinis Leonis Belgici, &c. &c. Adjutore JOANNE BAPTISTA FISCHER, Med. et Chir. Doct. cum tabulis Ærique incisis. Fascic. 17 et 18. J. Frank. Brussels, 1829.

However much we may be inclined to advocate the adoption of the natural system of plants, in general or particular botanical works, we must acknowledge that in illustrating fasciculi it has the disadvantage of presenting too much uniformity, originating in the close similarity which plants of the same family bear to one another in their external appearance, as well as in their more minute structure. This prevents the admission of a great diversity of striking plants adapted to catch the eye, but it cannot at all affect the opinions of the botanist; and after looking carefully through the illustrations of Blume's work, we can give our unbiassed opinion of their great merit. The drawings are good, and the delineations accurate. Much attention has been paid both in preserving the character of the species, and in exhibiting, when possible, the plant in its different stages of inflorescence and of fructification. The colouring is that of the school of Redouté, soft and natural, generally preserving with constancy and truth the minute variations in tint which are presented by the vegetable world.

Occasionally the brown tint of the leaves, and slight corrugation of the petals, would lead one to think that they were drawn from dried specimens; but this can but be of secondary importance. The phytological plates are not coloured, but are of great utility; and the few faults which the work presents, are fully compensated by the care and judgment with which the whole is conducted. Having thus given a tribute of praise, due to a work which must cost its editor much labour and expense, and which belongs to that class of productions that reflect credit on the government or public under whose patronage they appear, we can only add that the present two fasciculi contain the families of the Myriceæ, (RICHARD,) of the Balsamifluæ, and the Juglandeæ. The first two families only present one species each, the myrtle of Java, and the gigantic Liquidambar altingia. Among the Juglandeæ there are two new species of Engelhardtia, E. rigida, a beautiful tree found in the mountain of Salak, about 2500 feet above the level of the sea, and E. serrata, from Western Java, where it attains a height of from sixty to a hundred feet.

Observations on the Ancient Roads of the Peruvians. By JOHN GILLIES, M.D. M.W.S. &c.—*Edin. New. Phil. Journ.* No. XV. Jan. 1830.

These roads, usually known by the name of Cameno del Inga, or Road of the Incas, were visited by Dr. Gillies, in the valley of the Uspallata, in January 1825. They were in good preservation, and one which Dr. G. measured was 15 feet in breadth. Its surface consisted principally of the soil, gravel, and small stones of the district. No shrubs had made their appearance, although very probably they have been rarely trodden since the discovery and conquest of these countries by the Spaniards, now more than 300 years ago. This renders the line of road particularly evident, and it may be traced as far as the eye can reach, in one continued line, proceeding in the direction by compass of north by west. Dr. Gillies thinks that the Uspallata branch must have been originally formed for the purpose of communicating with the Araucanian Indians, and the other nations inhabiting Chili, and tribes which inhabit the country along the eastern side of the southern cordillera of the Andes, and from thence to the Southern Atlantic Ocean and Cape Horn, all of whom are of quite a different race, and speak a language very different from the Quichoa, or language of the Peruvian Indians.

Geological Survey of the Island of Jersey. By LIEUT. NELSON, Royal Engineers, Corresponding Member of the Plymouth Institution.—*Quarterly Journ. of Science*, No. II. Jan. 1830.

The Jersey rocks may be referred to three classes; 1. that of the argillaceous schists; 2. that of such as are distinguished by the presence of feldspar; and lastly, that of the breccia, composed of both.

The feldspar rocks overlay the breccia and argillaceous schist, alternating with the last, which is also overlaid by the breccia.

We strongly suspect that there is some mistake in this statement. In the first place, because if the feldspar rocks overlay the breccia, how can they alternate with the schist, which is stated to be below this rock? And secondly, from the account given of the feldspathic rocks, we find Nos. 13, 41, 42, 45, 52, to be feldspar, quartz, and hornblende, (sienite;) and No. 114, chlorite slate, and Nos. 50, 51, and 53, varieties of granite, 15 and 17, feldspar and schorl. The age of these rocks must evidently be greater than that of grewacke or of breccias.

Porphyries of various characters, with feldspathic bases, occur along the coast at different points, where veins (dykes) of greenstone are also met with. Sienite is found at Mont Orgueil, La Hogue Bie, and Mount Madou, &c. and granite half way between Plemont and Greve de Lag, to X Bay.

The breccia consists of five varieties,—argillaceous, sienitic, and porphyritic pebbles, in an argillaceous matrix,—and argillaceous and sienitic d°. in a sienitic matrix. The islets of Chansey appear to be entirely constituted of granitic rocks, which decompose in circular blocks. The rock is said to be stratified. There is a wood-cut of the columnar appearance assumed by porphyry in Trinity Valley, and several others of much interest. The communication is carefully got up.

Systema Mycologicum, sistens Fungorum orsines, genera et species, huc usque cognitas, quas ad normam methodi naturalis determinavit, disposuit atque descripsit ELIAS FRIES. Vol. III. Sectio Prior. 8vo. 1829.

The Fungi hold the lowest rank in the vegetable kingdom, and have been among the last to receive that scrutinizing investigation which other tribes have mostly obtained in this analytical age. The Synopsis Fungorum of Persoon, the father of modern mycology, published 30 years ago, was the first work which threw any sort of light upon the "vermes of the vegetable kingdom." Since that period, a host of indefatigable Germans have given them no quarter; and often while the French thought only how to make an Agaric, a Boletus, a Truffle, or a Morelle, form some new article in the *Almanach des Gourmands*, the aforesaid invincible philosophers were propagating *Mucors*, and discovering unknown plants upon every rotten stick in their dark forests. To the Germans, and to their more northern brethren, we now owe most of our information. and Professor Fries, in the work we are now noticing, as well as in others, stands unquestionably at the head of living mycologists. It is true that Persoon, in his old age, is publishing a *Mycologia Europæa*, but it is vastly inferior to the *Systema Mycologium*, and creeps on slowly, while a half volume is only reqiured to complete the latter work. When we say that the present section contains the *Gasteromyci*, and that the execution is in every respect equal to that of the former volumes, we say all that is necessary to recommend it to public notice.

On a Prismatic Structure in Sandstone induced by Artificial Heat; and on certain Prismatic Rocks found in Nature, including the Columnar Sandstone of Dunbar. By J. MACCULLOCH, M.D. &c.—*Quarterly Journ. of Science*, No. XI. Jan. 1830.

In a late Number of this Journal we had called the attention of the scientific public to two striking illustrations of the prismatic form in mountain rocks, produced by the action of heat. In the present memoir, Dr. MacCulloch mentions an additional case which has fallen under his observation, in the hearth-stone of a blast furnace, which was split into polygonal compartments, specimens of which are in the possession of the Duke of Northumberland. He further elucidates the question, by reference to the columnar ironstone of Arran, of sandstone below basalt in the island of Rum, and the prismatic rock at Dunbar.

Notice regarding the Salt Lake Inder, in Asiatic Russia. By Lieut. J. E. Alexander, K.L.S. &c.—*Edin. New Phil. Journ.* No. XV.

John C. G. Herrman, a German botanist, left St. Petersburgh some years ago, for the south of Russia, and has never since been heard of. The notes contributed in this paper, are from the manuscripts of this naturalist, which are now in the hands of Mr. Prescott of St. Petersburgh.

This great magazine of salt is situated at about 26 versts in the Kirghise desert, in lat. 48° 30′, and long. 69°. It is elevated above the level of the river Ural, and the shores are surrounded by low hills of sandstone, on which there is a scanty vegetation, bearing a strong resemblance to that of the Caspian Sea, and of the salt and sandy steps around it. The lake, which lies as in a basin among the hills, is twenty versts in length, and nine broad, and is oval in appearance. The bottom is an immense stratum of salt, covered to an inconsiderable depth with water. The saline stratum has several orifices in it: down one of these, (sixteen inches in circumference,) a plumb line was lowered, and no bottom was found with 180 feet of cord. The water, impregnated with salt which rests on the solid stratum, is so shallow, that one can traverse the lake in every direction, either on foot or horseback. At the end of summer the water is also dried up, and the lake is covered with salt as white as snow recently fallen, and of great purity.

On the presence of Iodine, Potash, and Magnesia, in the Bath Waters. By Mr. Charles Cuff.—*Philosophical Magazine,* No. LXXXVII.

On the general existence of Iodine in Springs. By A. Henderson, M.D.—*Ibid.*

Dr. Daubeny was led, a short time ago, to direct his attention to the chemical constitution of springs, and issued a circular, inviting remarks on the subject. Among the first results of his inquiries, was the discovery of iodine and bromine in certain mineral waters in Great Britain. We ourselves had preceded Dr. Daubeny in these researches in one locality, and Mr. Murray, we have since found out, preceded us. Dr. Turner also, several years ago, discovered iodine in a spring in the vicinity of Edinburgh, and Mr. Cuff has further corroborated the existence of the same substance in the Bath waters. On the Continent, Mr. Balard met with this body in the saline marshes of the south of France. Mr. Angelini found it in the saline water of Voghera. Mr. Canta, professor of chemistry at Turin, ascertained its presence in the sulphureous waters of Castel Novo d'Asti. Mr. Canta also found it in several other springs in Piedmont and in Sardinia, all of which he remarked were situated in tertiary rocks. Mr. Brongniart is, however, of opinion, that these springs issue from the sandstone with saliferous deposits, which is not at a great depth below these tertiary formations. Iodine has, in one case, been found in the mineral world, in a mine of native silver in Mexico.

Dr. Henderson states, that by evaporating a great quantity of water, he has found traces of iodine not only in warm and saline springs, but also in every common spring in which there are traces of the chlorides of calcium and sodium.

Viaggio in Savoja, &c. Journey in Savoy; or a Description of the Ultra-montain States of H. M. the King of Sardinia. By David Bertolotti. Vols. I. and II. Turin.

This work fills up a lacuna, by giving a description of a country which exhibits nature at the same time in her most fearful and most graceful attitudes, and which contains the highest mountains in Europe. It is a species of statistical geography of Savoy, exposed in 71 letters, in each of which the author describes the places which he successively visited. His style is generally too poetical, but he avoids monotony by illustrations from history or tradition. The work is accompanied by the analysis of the mineral waters of Savoy, and a statistical table of the population of th kingdatom.

Jahrbuch für den Berg-und-Huttenmann. Annals of the Mines for the year 1829. Published at Freyberg, under the direction of the Council of Mines, by Reich. In 8vo. 246 p.

This annual is the third year of the almanack first published at Freyberg under the name of "*Kalender für den Sæchsisch, Berg-und-Huttenmann.*" It contains a statistical account of the mines of Saxony,—an account of the improvements made in the art of mining,—details in the varieties of minerals found during the course of the year 1829, and many interesting notices for those who are engaged in mining occupations.

Anfangsgründe der Mineralogie. Principles of Mineralogy. By William Haidinger In 8vo. 312 p. Leipzig, 1829.

This elementary work has been published by Mr. Haidinger for the use of persons attending his lessons of mineralogy. His aim has only been to be useful to those beginning the study of mineralogy, and there is therefore little novelty in his work. The order is pretty nearly the same as that adopted by Professor Mohs in his course of lectures, and to which the author conformed himself in the lessons which he delivered in Edinburgh in 1827. The work is terminated by notices on some of the most important species, and upon the rocks which they form by their associations.

Wilson's Illustrations of Zoology, (*just published.*) Blackwood. Edinburgh. 1830.

We have been favoured with an early examination of the last number of this elegant work. It comes forward, our readers may recollect, as the legitimate and acknowledged offspring of the Edinburgh University, and only excites the wish that there were many such fair children. It is not, however, entirely dependent upon this collection for the maintenance of its existence, as the present number will testify. This fasciculus contains four plates, three of which exhibit the minute accuracy of Mr. Wilson's own pencil, the other being both drawn and engraved by Mr. W. H. Lizars, whose skill needs no attestation. This latter plate alone, the gray American wolf, (*Canis Lupus Occidentalis*, Richardson,) is from a specimen in the Edinburgh Museum. The second and third engravings present views of the male of a species of grouse, (*Tetrao Richardsonii*, Douglas,) found by Mr. David Douglas among the mountainous districts of the River Columbia, and other parts of the Rocky Mountains in North America.

The fourth plate exhibits the first year's plumage of the Scarlet Ibis, (*Tantalus Ruber*,) in contrast with the brilliant plumage of the parent bird, pourtrayed in a previous number. The remarkable difference which the sombre attire of the young presents, is thus described by Mr. Wilson :

" The young of the Scarlet Ibis, when fully fledged, has the head, neck, and upper part of the breast, of a pale brown colour, passing on the lower part of the breast into white, which latter colour also characterizes all the lower portions of the plumage, and the under coverts of the tail. The back, scapulars, wing-coverts, primary and secondary quill feathers, and tail, are dark glossy brown. The feathers on the thighs are white. The bill is pale yellowish-brown. The legs and feet are nearly of the same hue, and the claws are horn colour."

A condensed view of the origin and natural history of domestic dogs, from the detail published in the 5th and 6th Nos. of the Quarterly Journal of Agriculture, forms an interesting addition to the descriptive portions of the text. Indeed, throughout the whole work, the amusing and instructive is thus pleasantly blended with the necessary details of science. But we delay our observations on this important work,—important from its high descent, until we can give a minute examination to the whole.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

EDINBURGH.

Royal Society.—Jan. 4. The business of the evening was a paper by Dr. Knox, entitled, " Observations on the structure of the stomach in the Peruvian lama. Of this valuable and interesting paper, we have, through the kindness of the author, been able to give a full account in the present number.

Jan. 18. There was a large attendance this evening to hear a paper by Sir George Mackenzie, on the Fundamental Principles of Geology. Owing to the length of the paper, only part of it was read at this meeting, and no observations were made.

The Secretary announced the reception of communications from Dr. Hibbert, on the Geology of the volcanic district Laach, in the Prussian Rhine Provinces ; from Dr. Knox on the dentition of the Cetaceæ, with an attempt to fix the rank which the Dugong holds in the animal kingdom ; and from Dr Edward Turner, a chemical analysis of Wad.

Society of Antiquaries of Scotland.—Jan. 11. Interesting donations were made. The original letter of the Edinburgh Volunteers, offering their services against Prince Charles Edward ; a collection of old English, and a few Grecian and Roman coins, and a great number of books. A letter was likewise read from General Ainslie, giving an account of his exertions to extend the Society's correspondence among the French Antiquaries.

There was also exhibited a beautiful intaglio of Hercules strangling the Nemean Lion, worn as a seal by John Duke of Lauderdale.

Dr Brunton resumed the reading of Colonel Millar's Essay, " On the site of the battle of Mons Grampius." The conclusion of the essay was deferred till the next meeting of the Society.

Wernerian Society.—Jan. 9. Dr Greville read a communication, " On the various economical uses of sea plants." (Vide present number, p. 345.)

The Rev. Dr. Scot of Corstorphine next read a learned and interesting paper, " On the rams and badgers, with the skins of which the Israelites covered the outsides of their tabernacles.

Specimens (bred in Europe from imported eggs, by Mr. Sommer of Altona) of the Saturnia Luna, a rare North American moth ; as also of the cocon and eggs of the animal were exhibited. Some notes on its natural history, by Mr. James Wilson, were read by the Secretary, (Vide present number, p. 382.) Mr Wilson intimated an intention of submitting some remarks on the distribution of animals, to the Society, at an early opportunity.

The Secretary reported to the Society the reception of a new volume of transactions from the Royal Society of Berlin.

Royal Physical Society.—Wednesday, Jan. 6, 1830. Mr Deuchar presented a copy of Col. Imrie's Essay on the Geology of the Grampians.

Captain T. Brown, F.R.S.E., read an Essay on the Ancient History of the Horse.

Jan. 13. Mr J. Marsden read a paper on the Anatomy of Plants.

Captain Brown read an Essay on the Modern History of the Horse.

Jan. 20. Observations were read on the Helm Wind of Cross Fell, Cumberland. Communicated by Charles Slee Esq. (This paper will appear in a future number.)

Mr. H. H. Cheek communicated some observations on the Stomachs of Ruminating Animals. Remarks on this paper were made by Mr. Dick, Lecturer on Veterinary Surgery, and Mr Aitken, Lecturer on Physiology.

Mr. Ainsworth communicated two new plants as additions to the British Flora. (Vide present number, p. 381.)

Plinian Society.—Jan. 5, 1830. Specimens, illustrative of the Geology of the Neighbourhood of Montreal, were presented to the Society by Mr. Robert Armour.

Mr. Ainsworth made some observations on the specimens.

A letter was read from Walker Arnott, Esq., accompanying a donation of plants of the Pyrenees. (Vide present number, p. 377.)

Mr. J. Balfour stated, that the opinion of the Society relative to the Veronica filiformis had been similar to that of Mr Arnott.

Jan. 12. Mr J. H. Balfour communicated the notice of a new British habitat for the Convallaria verticellata. (Vide present number, p, 376.)

Mr. J. P. Dyett read a paper on Earthquakes.

Jan. 19. Mr. J. H. Balfour made a communication on the plants found in the Wood in the neighbourhood of Blairgowrie, with specimens.

Mr Jerdon read a paper on the Geology of some Parts of Fifeshire.

LONDON.

Royal Society.—Nov. 30, 1829. This being the anniversary, the President, Davies Gilbert, Esq., M.P., &c., delivered a long and eloquent address, in which he took notice of the loss which the Society had lately sustained in the death of Sir Humphrey Davy, Dr Wollaston and Dr Young, on whose labours and brilliant career he entered at some length. Many other members, individuals highly entitled to respect and regard, were also mentioned among the deaths of the past year. The learned president afterwards delivered the two medals, the one to Mr Charles Bell, the other was announced as having been conferred on Mr Mitscherlich.

Meeting of Dec. 17. Davies Gilbert, Esq. in the Chair. The second part of Mr Faraday's paper on the Manufacture of Glass, for Optical Purposes, was read. Many donations of books, &c. were laid on the table.

Meeting of Jan. 14. Captain Kater in the Chair. A paper on the Internal Structure of the Ear, by J. W. Chevallier, Esq. was read, accompanied with illustrative drawings. Numerous presents were made to the Society; Chevalier Aldini, inventor of the Fire Proof Dress, was present.

Geological Society.—Nov. 6, 1829. A paper was read on the Tertiary Deposits in the Vale of Gosau in the Salzburg Alps; by the Rev. Adam Sedgwick, Pres. F.R.S., &c., and Roderick Impey Murchison, Esq. Sec. G.S., F.R.S.

Nov. 20. The reading of a paper on the Tertiary Formation which range along the Flanks of the Salzburg and Bavarian Alps, being a continuation of the memoir on the Valley of Gosau; by the Rev. Adam Sedgwick and Roderick Impey Murchison, Esq. was continued.

Dec. 4. The reading of the paper by the Rev. Adam Sedgwick and Roderick Impey Murchison, Esq. begun at the last meeting, was concluded.

A paper on the Discovery of the Bones of the Iquanadon and other large Reptiles, in the Isle of Wight and Isle of Purbeck; by the Rev. William Buckland D.D., V.P., G.S., F.R.S., &c., was then read.

PROVINCIAL.

Plymouth Institution—The very excellent principles on which this Institution is founded, and the arrangements into which it has been able to enter, from the effectual support given to it by a numerous and talented accession of members, vouch to us, that by extending inquiry, disseminating knowledge, and exerting a spirit of scientific and literary emulation, it will be of real utility to that part of the United Kingdom in which it has been established.

A Course of Lectures are delivered each Session, in which the learned members appointed to officiate lecture on their particular branch of inquiry in succession, furnishing a series of lectures on different subjects, and a constant change of professors.

The following lectures, for example, still remain to be given.

Feb. 4. Rev. J. Punnett. Society—Its Claims on the higher Classes of the community.
Feb. 11. Rev. S. Rowe. Poor Laws.
Feb. 18. Mr J. Prideaux. Chemical Properties of Water.
Feb. 25. Mr J. N. Bennett. Political Constitutions.
March 4. Mr H. Woollcombe. Crimes and Punishments.
March 11. Mr W. S. Harris. Electro-Magnetism.
March 18. Rev. R. Lampen. Age and Writings of Pope.

We hope to be able to give occasionally notices of the proceedings of this Institution, the first volume of whose transactions is, we believe, already preparing for the press, and will probably be published early in the ensuing year.

The office-bearers for the years 1829-30, are as follows:
President. Mr H. Woollcombe.
Vice-Presidents. Dr Blackmore; Rev. R. Lampen; Mr A. B. Johns.
Treasurer, Mr H. Gandy.—*Secretary*, Mr R. W. Coryndon.
Curators. Library, Rev. S. Rowe. Apparatus, Mr W. S. Harris. Museum, Mr Gabriel. Athenæum, Dr E. Moore.

FOREIGN.

Academy of Sciences.—Meeting of Monday Nov. 2, 1825. Messrs Isidore Bourdon, Breschet, Roux, and Richerand, presented themselves as candidates for the seat vacant by the demise of Mr Pelletan.

Mr Gay Lussac reported on the experiments of Mr Aldini, on the efficacy of the means employed by him to preserve fire-men from the action of flames.

Mr Geoffroy St Hilaire presented portraits of the two Siamese, and of Christina-Ritta.

Mr Hericart de Thury sent a letter on the opening of two wells in the town of Lyons.

Meeting of Nov. 9.—Mr Bellandef sent bones of palæotherium, found in argillaceous beds beneath the *calcaire grossier* (Parisian limestone,) Mr Cuvier stated, that the jaw presented belonged to a lophiodon, and not a palæotherium.

Mr Cauchy presented a new memoir on the solution of numerical equations.

Mr Dureau de la Malle, presented to the Academy remains of fossil animals, found six leagues from Angers, in a bed of Parisian limestone.

Meeeing of the 16*th Nov.*—Mr Larrey was elected to the seat vacant by the death of Pelletan.

Mr Deshayes addressed to the Academy a work on the fossil shells of the environs of Paris.

Mr Robert sent to the Academy fossil bones, belonging to the anoplotherium, from the beds beneath the Parisian limestone.

Mr Geoffroy St Hilaire read a letter from Bory St Vincent, on the proceedings of the expedition in Greece.

Mr Samson presented to the Academy an anatomical preparation, in which the lymphatic vessels were filled with blood.

Mr Poncelet read part of a memoir on the flowing of liquids through rectangular orifices.

Mr Cordier made a very favourable report on the Geological Collections made during the voyage of the Astrolabe.

Mr Dumeril made, in his name and that of Messrs. Boyer, Magendie, Serres, and Flourens, a very favourable report of a memoir on Dr Rigails, having for title "on the Mechanical Destruction of Calculi in the Bladder."

Meeting of the 23*d Nov.* General Rognat was elected to the seat, vacant by the death of Earl Daru.

Mr Cordier called the attention of the Academy to some Caverns, in which Mr Marcel de Serres considered that he had found human bones and artificial products mingled with the remains of lost animals.

Mr Dupuytren read a very favourable report on a work of Mr Breschet, on the Veins of Bones.

Messrs Audouin and Milne Edwards read a memoir containing extracts of their Zoological Researches on the coast of France.

Mr Becquerel communicated some observations on different Natural Metallic Compounds which have been found formed on antiquities.

Meeting of 30*th Nov.* Mr Dulong read the report of the Commission charged to lay before Government the best means of Preventing the Explosion of Steam-Engines.

Mr Bouchardat addressed several labours of the late Mr Vauquelin, with which the author had been connected, and which he proposes to terminate.

Mr Boué communicated to the Academy some Observations on the Human Bones found in different Formations in Germany.

Mr Robert mentioned some new discoveries of Fossils which he had made on the Plains of Passy.

Mr Geoffroy St Hilaire began the reading of a memoir on Christina-Ritta.

Mr Latrielle made in his own name, and that of Mr Dumeril, a very favourable report on a memoir of Mr Milne Edwards, entitled, a Description of some new Crustacea.

Meeting of the 7*th Dec.* The approaching departure of the Corvette, the Dordogne, for a Voyage of Circumnavigation, was announced to the Society.

Mr Beautemps—Beaupré made in his name, and in the name of Mr Freycinet, a report on the demand made by Mr Castera to the Society, to favour by its approbation the Formation of a Philanthropic Society destined, to assist the ship wrecked on the Coast of France.

Mr Navier made a favourable report on a Watch, presented for the examination of the Academy, by Mr Ribellier.

Mr Latrielle reported favourably on the fourth volume of the Species Generum of the Coleopterous Insects of Earl Dejean.

Mr Savart made, in his name and that of Mr Magendie, a favourable report on a work of Dr Delean junior, entitled, Treatise on the Employment of Atmospherical Air in the Diagnostic, Prognostic, and Treatment of the Diseases of the Ear.

Mr Puissant read a memoir, entitled, New Essay on Spherical Trigonometry.

Mr Geoffroy St Hilaire terminated the lecture of his memoir on Christina Ritta.

Mr Serullas read a memoir on the action of different acids on the neutral iodate of potash, acid iodates of that base, or bi-iodate, and tri-iodate of potash.

Meeting of the 14*th of Dec.* Mr Cordier made a very favourable report on a work of Messrs Lecoq and Bouillet, entitled Sketches and Sections of the Principal Geological Formations of the Department of Puy de Dome, accompanied with the description of the rocks which compose them.

Mr Cassini made in his name, and that of Mr Flourens, a report on a work of Dr. Briere, entitled, *Considerations Medico Legales sur l'Interdiction des Alienés*

Mr Geoffroy St Hilaire made a verbal report on the second part of the Analytical Anatomy of Dr Manec.

Mr Dupin read a memoir, entitled, Essay on the Comparative Progress of Private and Public Revenues in France and in Great Britain, from the beginning of the 16th century to the present day.

Geographical Society.—4th Sep. 1829. Mr Eyries reported on some barometrical operations in relation to the high plain of Thuringia, and to the Harz and Thuringer Wald Mountains, made by Professor Berghans.

Mr Sueur Merlin communicated some statistical documents upon St Pierre and Miquelon, and a manuscript chart, sent by Mr Brue de Garantieres, Governor of these islands.

Mr Jomard laid before the Society new specimens of the labours of the young Ethiopians, sent into France by the Consul Drovetti.

Meeting of the 18*th Sep.* 1829. Captain Dillon was presented to the Society by Mr C. Moreau. The President addressed the felicitations of the Society upon his memorable discovery of the remains of La Perouse.

The Minister of the Marine communicated a letter from the Governor of Senegal, accompanied by the relation of a journey which Mr Marres, a medical officer, made from St Louis to Bakel, by land and by water. To this narrative is added an itinerary, with the approximative indication of the distances from Dounquel to Bakel.

Mr Boune communicated the letters from Mr Bory St Vincent, and Mr Boblaye, containing topographical details for the rectification of the maps of Greece.

Mr Bruguiere sent in the conclusion of his manuscript on the Orography of Europe.

Mr Woodbridge adressed two communications relative one to an isothermal map, the other to a method which he has imagined, of expressing upon maps the divers names applied to the same places at different historical epochs.

Mr Jullien announced that Mr Everett, plenipotentiary minister from the United States, had expressed his desire of co-operating usefully with the labours of the Society.

LITERARY NOTICES.

Among the most prominent works which are about to issue from the Press, is a new edition, being the seventh, of the Encyclopedia Britannica, to be published in monthly parts, and to be edited by Professor Napier...The Rev. H. Moseley, B.A. has in the press a Treatise on Hydrostatics and Hydrodynamics...A new edition is in a state of forwardness for publication, of Rosarum Monographia, or a Botanical History of Roses, with coloured plates; by John Lindley, Esq. F.R.S. &c....Mr. Sweet has also nearly ready a second edition of his " Hortus Britannicus."...Sketches of the Medical Topography of the Mediterranean, comprising a Description of Gibraltar, the Ionian Islands, and Malta, by the late Dr. Hennen, is in preparation by his son, Dr. John Hennen.

List of New Books.

Landers' Records of Clapperton's Expedition, 2 vols. post 8vo. L.1, 1s. bds. ...Kritischer Wegweiser im Gebiete der Landkarten-Kunde. Berlin. 1 vol. 8vo. 2 rixdol....Journal d'un Voyage a Temboctou et Jeuné, &c.; par René Caillé. Paris. 30 fr....Die Europaische Turkey; by Max. Fred. Thulen. 8vo. with a Map. Vienna. 1 thlr....Voyage Militaire dans l'Empire Ottoman; par le Baron Felix de Beaujour, tom. 1mo. 8vo. Paris...Geographische Beschreïbung von Mecklenberg-Schwerin, &c.; by Gustave Lempel. 8vo. Nen-Strelitz. Statistica della Svizzera; by E. Francini, 1 vol. 8vo. Lugano...A Year in Spain; by a Young American. Boston. 8vo.

THE

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OF

NATURAL AND GEOGRAPHICAL SCIENCE.

MARCH 1830.

ORIGINAL COMMUNICATIONS.

ART. I. *Account of the Series of Islands usually denominated the Outer Hebrides.* By WILLIAM MACGILLIVRAY, A.M. &c. —*(Continued from p. 250.)*

SECT. II.—*Geological Constitution of the Outer Hebrides.*

HAVING in a preceding Number introduced the Outer Hebrides to notice, by offering some general remarks on their geographical nature and relations, I proceed to discuss their geological constitution. For understanding what I have to remark on this subject, it is necessary that the reader should have a map of tolerable accuracy before him.

We shall begin with the southern extremity of the range, formed by the small island Berneray of Barra, generally marked Barra Head in charts, and from its important position and imposing aspect, well known to mariners. This island, which is of an oblong form, and about a mile in length, consists of gneiss, and presents the appearance of a tabular mass, having a perpendicular edge several hundred feet high to the south, and dipping into the water on the northern side. The range of precipices on the southern side form some of the great breeding-places of the migratory sea-birds, of which I shall afterwards have occasion to speak Berneray is separated by a very narrow channel from the next island, Mingalay, which is much larger, higher, and presents a precipitous face to the west. Between the latter island and Barra, are seen the islands of Pabbay, Sanderay, and Vatersay. All these islands consist of gneiss, intersected by veins of granite and trap, and present few remarkable geological appearances. The three last are in part overrun by sand-drift, and all are bare of soil, and scantily clothed with vegetation. On the west coast of Vatersay are some singular caves or sinuosities formed in the rocks on the shore: the occurrence of excavations similar to which, in other parts, will afford opportunities of speaking on their formation.

The mainland of Barra, separated from Vatersay by a shallow and very narrow sound, comes next. It is about ten miles in length, of an irregular form, and presents the appearance of a group of hills of little elevation, the highest coming short of 2000 feet. In the whole of this group, we find gneiss of numerous varieties forming the fundamental rock. Masses and veins of granite, always large-grained, and veins of greenstone and basalt, are seen here and there intersecting it. The hills are rounded, tame, and uniform; their summits and sides partially covered with a thin layer of peaty soil; and the valleys formed between them narrow and scantily covered with earth. The western coast is sandy in most places, although seldom flat; the eastern rocky and indented. The northern extremity, being for the most part covered with tolerable soil, presents a more verdant appearance than is usually met with in these islands.

A small group of islands lying off the north-east coast of Barra, and the larger islands Fudia and Eriskay, are, according to Dr. MacCulloch, of the same general nature.

We now enter upon South Uist, an island about twenty miles in length by eight or ten in breadth. Its eastern coast is rugged and tortuous; the western sandy and less indented. Two lochs or arms of the sea, Loch Boisdale and Loch Eynort, run from the east coast nearly across the island. The disposition of the ground is mountainous and rugged along the eastern half. The mountains are in general low, rounded in outline, and destitute of precipices or ravines. Toward the north of Loch Eynort, they attain a considerable elevation, and one of them called Eachdla or the Great Hill of South Uist, being next to the Forest of Harris, the highest land in the Outer Hebrides, is supposed to be at least 3000 feet high. From this to the northern extremity the hills gradually lower; and from Loch Skiport to the north-west corner of the island, the ground is low, but irregular, and forming protuberances and hollows. The eastern slopes of the hills are rapid and irregular, sometimes terminating in high rocky shores. The western declivities are also rugged, but less abrupt, and finally slope away into an irregular plain, which extends along the whole western coast, and varies in breadth from one to three miles.

Separated from South Uist by a channel from two to four miles in breadth, including a long narrow island and several smaller rocks, the island of Benbecula comes next. It is of an oblong form lying across the general direction of the range, and is about eight miles by six or seven in its dimensions. This island is comparatively low, and presents but a single eminence deserving the name of hill. Gneiss is still the general rock, and granite in masses and veins is still found accompanying it. As usual, the west coast is sandy and little diversified; the east coast tortuous and rocky. Along its eastern coast, and in the channel which separates it from North Uist, are numerous islands of the same general nature. This channel, as well as that to the south, is in a great part dry at low water, one or more generally shallow stripes being left towards either side.

The next large island is North Uist, so irregular in form that description would be wasted upon it. The whole outline of this island is singularly tortuous, but more especially that of the southern and eastern sides. Two large arms of the sea enter from the east, and intersect the country in a very extraordinary manner; dividing into so many branches, that one might be puzzled to say whether land or water predominates in the greater part of it. A range of hills, irregular, tortuous, and of little elevation, runs from near the western extremity of the island to the Sound of Berneray. Hardly any of these attain an elevation of 1500 feet. Another range commences at the north-eastern corner, and runs along the coast, gradually increasing in height, until it terminates in Heval, a hill of about 1500 feet high, at the southern extremity of the island. This island is in general better covered than those to the south; but in the whole of the eastern part, from the coast to the summit of the western range, the soil is exclusively peat, often of great depth. The western coasts are more or less sandy; and at a considerable distance off the shore, are seen several inhabited islands, partly rocky and partly sand-banks, while the intervening ground, which is sandy, is for the most part left dry at low water. In North Uist the rock is still gneiss.

But here it becomes necessary to offer some remarks on the formation to which this name is applied. Gneiss, according to the ordinary definition given in geological works, is an aggregate of felspar, quartz, and mica, arranged more or less in a laminar form. Such in general is the rock of which these islands is composed; but the varieties which it presents are numberless. In many parts the ingredients, varying from minutely granular to large concretionary, are so arranged that no laminar appearance is perceptible over a great extent, although at intervals indications of seams of stratification are seen, and occasionally layers of quartz or mica running parallel to these seams present themselves. In fragments of a few inches square this rock would correspond precisely to the usual definitions of granite. In other cases the ingredients are very distinctly laminar; and then the beds or strata are equally distinct, and generally thin. Intermediate varieties occur, of all degrees. In many of these varieties, but especially in the first and most common, masses of all sizes up to a surface of several hundred feet square present themselves, in which the ingredients are in greatly larger concretions than usual, the felspar in particular often being several inches in diameter. These masses seem to form part of the original constitution of the rock in which they occur. At the edges they pass insensibly into the surrounding parts, no lines of separation, however minute, being perceptible. They never present veins running out from them into the surrounding rock; and when small they are more extended in a direction parallel to the seams of stratification than in any other. Fragments of these masses would of course pass for specimens of large-grained granite.

Another source of variation is in the mineralogical nature of the ingredients. In the more ordinary kinds of gneiss, the mica is in scales, having a direction parallel to the seams,—the felspar in grains or concretions arranged in irregular laminæ, and the quartz sometimes in similar grains, and sometimes in continuous plates. When the mica is more thrown into scaly laminæ, a great change is produced in the appearance of the rock; and so it may be remarked of the other ingredients. One of these ingredients may be nearly or entirely wanting; and thus other varieties are produced. One of them may be substituted by another substance, as hornblende or garnet; or another ingredient may be added to the original three. By far the most common of these additional ingredients is hornblende. In fact so common is it in the gneiss of these islands, that were gneiss to be defined according to its general constitution in this range of islands, the mineral in question would form one of its most essential constituents. Garnet is also a very common ingredient, and forms a predominant constituent of several varieties.

If to these sources of variation be added those presented by the changes of colour, to which the simple minerals entering into the constitution of the rocks are liable, some idea may be formed of the varieties which the gneiss of these islands assumes. The quartz, for example, may be white, bluish, grey, brownish, purplish, or dark brown; the felspar white or flesh-coloured.

If felspar, quartz, and mica alone constitute gneiss, but a small portion of these islands belongs to that rock. On the other hand, the very common compounds of felspar, quartz, and hornblende, would require to be distinguished as a separate rock formation. The same is to be remarked of the gneisses having garnet as a predominant ingredient. The circumstance of these varieties insensibly passing into each other, not merely by gradual interchange of ingredients in the direction of the planes of stratification, but also in different parts of the same stratum, is sufficient to justify their being all referred to a common type.

On the other hand, beds or strata often occur in which one or two ingredients only present themselves. Thus, a bed of what might be called mica-slate, occurs in the island of Pabbay, off the coast of North Uist, and numerous beds of characteristic hornblende-slate are to be seen in all the islands. These beds present themselves in no regular order, and therefore, whatever the mineralogist may call them, by the geologist they ought to be considered as part of the gneiss formation.

The Sound of Harris contains four inhabited islands, Berneray, Pabbay, Ensay, and Kelligray, and a multitude of smaller islands and rocks. These are all of the gneiss formation. The island of Ensay is remarkable for the numberless strata, varying from half an inch to a few feet, which it exhibits on its western shores, nearly in a vertical position.

We have now reached the northernmost of the large islands, which, however, is equal in size to all the others together. It presents five very natural divisions, of which the first is an oblong tract, about twelve miles long, extending from the Sound of Harris to Tarbert. In all parts of the Outer Hebrides, the rock is so extensively exposed, that the geologist can pursue his investigations in the most satisfactory manner; and here, where nearly one-half of the surface is bare rock, any difficulties that may present themselves must have reference to other faculties than that of vision. The eastern coast line of this portion is, as usual, tortuous and sinuous; the western less indented, being formed of sand, with tracts of rock intervening. The mountains, which entirely occupy the ground, form an irregular elongated group, of which the highest, Ronaval, Ben-Capval, and Ben-Loskentir, may be about 2500 feet high.

The mountains of the southern portion, as far as Loch Langavat, consist of gneiss, of numberless varieties, generally highly inclined, but following various directions. They are all more or less rounded in outline. Bencapval, forming a peninsular promontory on the west coast, and Ronaval, situated near the southern corner, are distinguished from the others; the former by its superior verdure and gracefulness of outline; the latter by its greater sterility and the existence of a deep hollow upon it, resembling in form the crater of a volcano. Ronaval presents some geological phenomena worthy of notice. Although the base and sides are generally of gneiss, distinctly laminar, the parts around the corry, or hollow above mentioned, consist of a granular compound of felspar and hornblende, containing garnets, often of large size, which one could hardly venture to denominate gneiss. The southern and western sides are intersected by large granitic veins. These veins are remarkable for the large size of the concretions of which they are composed, plates of mica a foot in diameter sometimes occurring, and the felspar being of equal size. In one of these veins is a garnet four inches in diameter, imbedded in quartz, among others of inferior size. Nodules, of a spherical form, of titanitic iron ore, from six inches in diameter downwards, are abundant in one of these veins. A large portion of the western side of the mountain consists of a rock in which garnet in small grains forms the predominating ingredient.

From the base of this mountain, there runs along the eastern side of the Glen of Rodell, to the length of nearly a mile, an irregular elongated mass of limestone, which can hardly be called a bed, as it bears a much greater resemblance in form to the granite veins. Near the village of Rodell I observed a distinct vein of the same substance, running across a protuberance of gneiss. This limestone is large—granular, and, when nearly pure, of a purplish-grey colour. It contains hornblende, sahlite, coccolite, mica, chlorite, diallage, serpentine, and other substances, generally in such quantity as to give the fragments the appearance of granite or syenite. The weathered surfaces are singularly rough, owing to the decomposition of the carbonate of lime, while the other substances have withstood the action of the atmosphere.

Ben-Capval, or Toe Head, is remarkable for a large granite vein, upwards of a mile in length, which runs obliquely across its eastern and southern sides, and is conspicuous at a distance of many miles. At its north-western extremity, facing the Atlantic, is a precipice upwards of 500 feet high, on which there is generally an eagle's nest, and of which the base is perforated by numerous cavities or caverns. In a projecting part of the hill near this rock is the largest cave in Harris, and probably in the Outer Hebrides. A large portion of this mountain consists of a granular rock, having no appearance of stratification. The other hills are of the more ordinary form of gneiss, until we reach the valley running across the country, the bottom of which is in part occupied by Loch Langavat.

From this to Tarbert, the rock, which is in many places granitic, has generally a more compact character, and is much less covered with soil, in so much that the most striking difference is perceptible between the hills on each side of the valley of Loch Langavat in respect to their vegetation. At the southern extremity of this lake is an eminence of a reddish colour, and for that reason conspicuous at a distance, which exhibits so singular an aggregation of minerals, as to deserve a more minute investigation than it has hitherto received. Chlorite-slate containing small grains of magnetic iron-ore, talc-slate, hornblende-slate, actynolite-rock, asbestus in various forms, and a black variety of serpentine containing anthophyllite, are found intermixed in an inextricable manner. Veins of actynolite run across the gneiss in the neighbourhood, and have been traced by me to the sea shore, in the neighbourhood of Finsbay and Ardsleav. The same formation makes its appearance along the eastern shore of Loch Langavat, at irregular intervals, and from thence extends to the shore of Borve. Various remarkable protuberances appear at the surface in the course of this irregular deposit or vein, of which that of the Dun of Borve is the most remarkable. It consists of a mass of black substance, intermediate in appearance between basalt and serpentine, and contains numerous plates of pale and dark-green mica, approaching to chlorite, together with abundance of anthophyllite and asbestus. Enormous masses of the latter occur at the northern extremity of Loch Langavat, and exhibit rocks of great beauty, having a stellular fibrous structure.

From this place to Tarbert nothing of great interest occurs excepting a vein of greenstone which runs across the country from the east coast to the farm of Shelibost. It is about thirty feet thick, rises in many places several feet above the surface, and presents at a distance the appearance of an enormous wall in ruins. The Island of Tarnsay, on the west coast, is remarkable for a great deposit of granite, the felspar of which is remarkably beautiful, of a deep flesh-colour, and may be obtained in masses of several feet in diameter. The mica also exists in very large plates, and is of a silvery hue.

At Tarbert the sea nearly meets, leaving only a neck of land about a fourth of a mile across, which connects the southern with the northern part of Harris. This latter consists of a rugged, lofty, and picturesque range of mountains, running nearly across the general direction of the range of islands. It is divided into several masses by transverse valleys or defiles. The most remarkable of these masses, Clisheim, is beyond doubt the highest land in the Outer Hebrides, and its summit is probably upwards of 3000 feet above the sea. This mountain range differs essentially from all other parts of the Outer Hebrides in the circumstance of its presenting enormous precipices, rugged glens and corries, serrated peaks and sharp ridges. Yet it does not differ in geological constitution, consisting of gneiss of the ordinary varieties, together with beds of hornblende-slate and black scaly mica, intersected by veins of granite and trap. A mass of the latter occupies the lower part of the bay of Marig, and forms the small island of that name. It consists of a granular substance apparently composed entirely of minute particles of bronzite, containing larger portions of the same substance.

The Island of Scalpay terminates this range on the east, and the Island of Scarp on the west. The latter is a mountain, separated from the others by a narrow channel. The former is low, and presents nothing of great interest, excepting a bed of potstone and serpentine, mixed with hornblende, talc, and other substances, which has attracted notice on account of its being in the vicinity of the lighthouse erected on that island.

From the forest of Harris a range of low hills runs parallel to the northern portion of Loch Seaforth, to the length of eight or ten miles, and terminates in low swampy ground.

Separated by Loch Seaforth from the Harris mountains is a remarkable and very compact group called the Park Mountains, occupying the space from Loch Seaforth to Loch Liuerbost. Some of these mountains appear to be nearly 3000 feet high, and along the eastern coast, and especially at the entrance of Loch Seaforth, present precipices, shelves, and steep declivities of great magnificence.

On the western side of the island, extending between Loch Resort and Loch Rog, is another group of rugged and barren mountains, of which the most conspicuous, Miatashal and Suaineval, cannot be lower than 3000 feet. All these mountain groups are similar in geological composition.

The shores of the Lewis are for the most part equally sinuous with those of the other islands, excepting on the north-western part, where they are low and sandy. From the west a large arm of the sea runs into the land, containing an island several miles in length, and others of inferior magnitude. One of its terminations, named Loch Rog, is remarkable, being so narrow and elongated as to resemble a deep river. It appears to occupy a great fissure formed among the hills, and was formerly the haunt of very large herrings, which however seem to have entirely deserted it. Of the other sea lochs on the west coast, the only one that deserves notice is Loch Resort, which forms part of the boundary between Harris and Lewis on the west side. The corresponding boundary on the east side is formed by Loch Seaforth, from its mouth to the place where it forms a right angle upon itself. Other lochs exist on the east coast, the most important of which, in a commercial point of view, is the Loch of Stornoway. The shores are in general rugged, excepting along the north-west coast, and part of the eastern, where there are accumulations of sand. The general rock is gneiss, as in the other islands, presenting the same appearances.

Near the village of Stornoway a remarkable peninsula projects to the eastward, terminated by high cliffs of gneiss. The isthmus of this peninsula consists of a rock very different from any that occurs in the other parts of the Outer Hebrides, being a very coarse conglomerate, consisting of pebbles of all sizes up to a diameter of three feet or more, cemented by an argillaceous substance highly impregnated with oxide or hydrate of iron. The pebbles consist of quartz, felspar, gneiss and granite of various kinds. It rests upon gneiss, and is seen forming cliffs as far as the Chicken Head, and extending along the shores southward, forming a small island near Stornoway and the prominence called the Point of Arinish, and stretching northward as far as Tolsta Head. It bears a striking resemblance to the conglomerate which skirts the Grampians on their eastern side, although the pebbles of the latter are more frequently of quartz than of any other substance.

The caves formed in this conglomerate are of a very different character from those formed in the gneiss cliffs. The former are low, and always rounded above ; whereas the latter are of all imaginable forms, and sometimes of great height. That the action of the sea has greatly influenced the formation of large cliffs of gneiss along its shores is not admissible, for this reason, that such cliffs are generally unincumbered at the base by blocks, and are there frquently scooped into caves and fissures. Now, supposing the sea to have undermined a mass of gneiss, it is evident the superincumbent part in falling would form a heap of fragments, which would effectually repel the sea, especially as the gneiss of these islands is of a nature almost impregnable to the elements. But if after some great convulsion, produced we may suppose by the upheaving of the gneiss by fluid or aeriform matter from below, a mass of that rock should settle upon the sea-shore, presenting a precipice to its waves, we can easily imagine how the latter should ultimately form caves in it. Most of the caves of the Outer Hebrides are in the form of fissures, and are very seldom perpendicular, but incline at all angles. They seldom penetrate far into the rock, although a few instances occur in which a passage may be obtained for a length of several hundred feet. In many of them large blocks are seen sticking in various parts of the fissures, and in more than one instance I have seen natural bridges of the most picturesque appearance thus formed. The effect of unequal pressure and subsidence upon the rocks would be the formation in some places of cracks, and in others the production of masses of fragmentary and comminuted matter jammed into the rock. Upon these the action of the waves would shortly operate, so as to enlarge the fissures, and wash out the loose fragments from the face of the cliffs, leaving the layer behind. Accordingly, in all the caves that I have seen, there is a flooring of great blocks of rock that have fallen from the roof and sides. Caves formed in conglomerate or sandstone are entirely different in their appearance, being rounded, uniform, and generally perpendicular. The manner of their formation is easily understood. In the whole range of islands I have not seen an inland cave but one, although numerous cliffs exist there, especially in the Forest of Harris. This cave is merely a horizontal cavity, formed by the removal of a wedge-shaped mass from the face of a precipice in the Glen of Ulladil in Harris.

The most remarkable geological features which these islands present, at least those which most attract the attention of the observer on a general glance, are the veins of granite and trap which intersect the gneiss so frequently and to so great extent. The trap veins consist of greenstone and basalt, and frequently contain zeolite and specks of calcedony. They are always perfectly distinct from the containing rock. It is remarkable of these trap veins that almost all of them which are of any size fall short of the surface, and thus generally form the beds of torrents in the glens. Whether they have originally come to the surface, and have been subsequently worn down by the action of the weather, I cannot say, but of the large veins of this kind I know only one that projects. It is also remarkable that most of them occur in the hollows between the hills, although they may also be sometimes seen in the highest position, as on the summit of Ronaval.

The granite veins are exceedingly interesting. In them the constituent minerals are always in large concretions, and generally of colours different from those of the inclosing rocks. They have no distinct walls, but gradually pass into the neighbouring mass. They must therefore be either of contemporaneous formation with that mass, or have been injected into its fissures in a liquid or fluid state. It is remarkable of these veins also, that many of them project beyond the surface, sometimes to the height of thirty feet. Besides the ordinary ingredients of granite, they contain titanitic iron ore, garnet, and other minerals. and in one of them I found crystals of beryl.

The simple minerals which I have observed in these islands are the following:

Felspar, white, flesh-coloured, deep red, gray.

Adularia, forming a constituent of granite veins.

Quartz, white, bluish, rose-red, greenish, brown.

Mica, silvery, pale green, dark green, brown of numerous tints, black.

Chlorite, foliated in granite and gneiss, slates.

Potstone ; this is probably chlorite in minute particles.

Asbestus, stelliform, ligneous, &c.

Amianthus, gray, and not so fine as that found in Shetland ; also in minute greenish veins in potstone and serpentine.

Talc, common green and blackish.

Anthophyllite, greenish gray.

Hornblende, abundant in the gneiss, and forming beds.

Schorl, in granite veins, in Lewis and Harris.

Actynolite, plentiful in Harris.

Bronzite, at Marig.

Sahlite, Coccolite, Diallage, in limestone at Rodell.

Carbonate of lime, forming limestone and stalactites.

Iron pyrites, interspersed in the gneiss.

Copper pyrites, not common.

Magnetic pyrites, in chlorite slate in Harris.

Zircon, in potstone.

Calcedony, in small specks in trap veins.

Zeolite, in the trap veins.

Garnet, very abundant, and in numberless varieties ; regularly crystallized in the granite veins, and often forming a principal constituent of the gneiss.

Titanitic iron ore, in nodules in the granite veins, not uncommon.

Beryls, crystallized, in the granite vein of Bencapval.

To these may be added porcelain earth, clay, and bog iron ore.

In the above remarks I have merely given a very general view of the geology of these islands. The details, which are highly interesting, I intend to present in a separate form, when I have completed the observations necessary for their full apprehension. It is strange that these islands should have been so little visited, or that gneiss, the most important of the primitive formations, should to the only geologist who has visited these countries, Dr. MacCulloch, have seemed so uninteresting, that he always appears anxious to get rid of it. The connection of the unstratified granitic masses with the gneiss, the general direction of the latter, the phenomena exhibited by the granite and trap veins, and numerous other circumstances, form subjects highly worthy of investigation. No country can offer such facilities for investigation to any excepting a fire-side mineralogist.

Excepting quartz rock and hypersthene greenstone, I know of no rock so indestructable as the ordinary gneiss of these islands. No one can contemplate the mountains of Barray and Harris in particular, without perceiving that they still present the very surfaces with which they first were exposed to the atmosphere. On these mountains there are no accumulation of debris, no alluvial substances, no mineral soil. The bare and bleached rock is merely covered here and there by shreds of peaty soil, in which a scanty vegetation supports itself. Great blocks sometimes present themselves, but they are in all cases traceable to the neighbouring mountains. Of diluvium I have seen none in any part of the range, although in some places, especially in Harris and Lewis, deposits of clayey matter, mixed with angular, and sometimes rounded fragments of rocks, present themselves in the glens and along the shores. Towards the bases of the mountains there is generally, however, a layer of clay of a greenish colour, containing angular pieces of stone, and apparently derived from the decomposition of the felspar, which forms so abundant an ingredient in the rocks; and in some few glens I have seen a kind of gravel, which however had always more angular than rounded fragments in it. Upon this clay or gravel, and upon the bare rock, rest the peat and sand which form the almost only soils of the Outer Hebrides. Of these I intend to speak in the next section.

(To be continued.)

ART. II. *A Monograph on the* Pisidium, *a New Genus of British Fresh Water Testacea.* By Capt. Thomas Brown, F.R.S.E. F.L.S. &c. &c.

The genus *Pisidium* was instituted by Carl Pfeiffer in his "*Land-und-Wasser Schnecken,*" published at Berlin in 1821. His generic type is the *Cyclas obliqua* of Lamarck, or *Tellina amnica* of the Linnæan arrangement, which was the only species of *Pisidium* known to inhabit Britain, until I noticed the *P. fontinale* in my paper on some new British testacea, in the first No. of this Journal, page 11, which I described as a *Cyclas,* not having then had an opportunity of examining the animal. In the end of last autumn I met with the third and only remaining species of Pfeiffer's genus near this city. I have kept specimens alive in water ever since; this has enabled me to ascertain the form of the animal, which is quite different from that of the *Cyclas.* The following are the generic distinctions of Pfeiffer:—

Erbsmuschel.—*Pisidium.*

Animal.—Instead of the tubular trachea, it has a narrow fleshy projection next the fore-part of the shell: the foot long and thin.

Shell.—Oblong, sides unequal, completely closing: in the right valve one, and in the left valve two opposite, very small primary teeth: behind and before, two thin lamellar side teeth; those of the latter cleft in the right valve, in order to receive the opposite ones.

Pfeiffer remarks if this genus is not viviparous, as is the case with the *Cyclas,* then there would be a still more marked difference between the two. He says he never succeeded in finishing an embryo in the open shells, nor in obtaining young ones from the living animal; and, therefore, concludes that they are oviparous.

From the specimens of the *Pisidium obtusale,* kept alive by me, I have ascertained that they are not oviparous, as Pfeiffer supposes, having produced their young alive, since I got them; so that the animals of this genus are undoubtedly viviparous.

The young shells are much more flat than the adults, in proportion to their size; which, at first, is so exceedingly small as to be scarcely perceptible to the naked eye, their colour being of a pale yellowish white: they have only yet attained about half the size of the parent shells.

Since writing the above, I changed the water in the glass, (6th February,) and rendered it tepid, in order to induce the animals to protrude themselves. While in the act of watching them, I found that the favourable temperature brought on parturition; and I witnessed several of the animals produce their young in a perfect state. This operation was performed by the valves of the shells being opened, and then suddenly brought together with a kind of jerk, when the fœtus was ejected from between them to a little distance from the parent shells. These young shells are somewhat larger than those produced about three months ago.

There is a considerable difference in the animals of the *Cyclas* and *Pisidium;* those of the former having a shorter and thicker foot in proportion to the size of the animal, and having a double united tube at the posterior termination of the cloak, whereas that of the latter is a single tube; which will be better understood by the following figures, giving a representation of the manner in which the animal performs locomotion. Fig. I. is the *Pisidium,* considerably magnified, and Fig. II. the *Cyclas.*

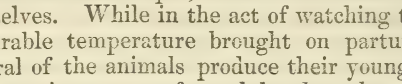

Fig. I. Fig. II.

1. Die Schiefe Erbsmuschel.—*Pisidium obliquum.*

P. testa ovata, oblique trigona, ventricosa, cornea, striata, umbone obtuso.

The animal is white, very tender, and pellucid; length of the foot three lines; breadth of the projection three-fourths of a line.

Pfeiffer, Land-und-Was. Sch. p. 124, Pl. V. Figs. 19, 20.

The shell nearly oval, with unequal sides, ventricose, irregularly triangular, and somewhat pellucid; beautifully striated concentrically, having the appearance of ribs; the external colour yellowish-gray, the internal colour bluish; the beak a little elevated, pointing towards the anterior slope; length three lines, breadth between four and five lines; thickness two lines and a half.

Inhabits rivers and streams.

Cyclas obliqua, Lamarck An. san Vert. Tom. V. p. 559.

—————— Brown's Ill. Brit. Conch. Pl. xvii. Fig. 14.

Tellina amnica, Maton and Rackett in Lin. Tr. VIII. p.

Cardium amnicum, Montagu, Test. Brit. p. 86.

The latter author found it in the Avon, Wiltshire; and in water courses, near Wareham, Dorsetshire. I have found it in a small stream, which empties itself into the Water of Leith, at Colt Bridge, near Edinburgh.

2. Die Stumpfe Erbsmuschel.—*Pisidium obtusale.*

P. testa oblique cordata, ventricosa, tenuissime striata; pellucida, fragilissima; umbone obtusissimo.

Pfeiffer, Land-und-Was. Sch. p. 125, Pl. V. Figs. 21, 22.

Shell oblique, ventricose heart-shaped, sides somewhat unequal, pellucid, very thin, with extremely minute concentric striæ; colour yellowish-white, or pale horn; the lower edges of the valves rather sharp; the beak prominent, and obtusely rounded; length one line; breadth one line and a quarter; thickness three-fourths of a line.

The animal is extremely pellucid, of a bluish-white; and has the power of projecting the foot one line. Its powers of locomotion are considerably rapid.

This is new as a British species. I found it in great abundance in a ditch, at the Wells of Weary, immediately under the columnar greenstone rocks, west end of Arthur's Seat, near Edinburgh. This habitat agrees with those of Pfeiffer, who says it is found in "watery ditches."

Pfeiffer says, "this shell, which is nearly related to the following species, was hitherto probably considered as a variety of the latter. I am not quite sure whether Lamarck's *Cyclas obtusalis* is the same as the species here described, as his description is very imperfect." He states the magnitude of the *Cyclas obtusalis* to be four, and that of the *Cyclas fontinalis* to be two millemetres; but of the shells here described again, my *Pisidium fontinale* is somewhat bigger than the *Pisidium obtusale.*

3. Die Quellen-Erbsmuschel.—*Pisidium fortinale.*

Described at page 11. of this Journal.

ART. III.—*Some of the principal facts connected with the Phenomenon of the Helm Wind of Cross Fell in Cumberland.* By CHARLES SLEE, Esq.*

THE subject to which the following facts relate, though highly interesting, has received but little attention from the scientific world. I am therefore induced to make known the circumstances connected with it, as they have presented themselves to my own observation, in the hope of giving some information as to the probable cause of the phenomenon.

The term Cross Fell is applied to an extensive mountain range, of considerable elevation, being nearly 3000 feet above the level of the sea, and running in a direction which nearly coincides with the magnetic meridian. The outline of the chain, as seen from the west, presents but few inequalities, and may at that part where the Helm usually occurs, be considered as nearly horizontal.

The western side rises somewhat abruptly, and is intersected in various directions by deep ravines. The eastern side, on the contrary, forms a gradual slope of great extent.

It often happens, but more especially in the months of March and November, that a current of air rushes down the *western* side of the mountain, with such immense velocity, that in many instances it has entirely carried away the roofs of the houses, and destroyed the crops of corn and potatoes situated near to the base of the hill.

Its effects, however, are fortunately confined within very narrow limits, a circumstance which forms the chief characteristic of the phenomenon. It seldom extends to a distance from the mountain greater than four or five miles; that is to say, the wind at this distance is not higher than it was before the Helm commenced, and continues the same after its cessation.

The most violent Helm which I ever witnessed occurred about five years ago, and during the whole time of its continuance, scarcely a breeze could be felt at the place where I reside, which is about eight miles west of the mountain. We could hear it distinctly, and the sound which it occasioned strongly resembled distant thunder.

The Helm is invariably accompanied with a peculiar-looking cloud, which rests on the summit, and sometimes extends a considerable way down the side of the hill. It generally appears about an hour before the wind begins to blow,—remains perfectly quiescent during its continuance,—and gradually disappears as the Helm abates. This cloud is called the Helm Bar; and it is that which

* Read before the Royal Physical Society 20th Jan. 1830.

enables persons situated beyond the limit of the current, to pronounce with certainty on its existence. The current is strongest near to the summit of the mountain; and on the eastern side of it, nothing more is felt than a slight breeze.

It ought to be particularly remarked that the Helm never has taken place excepting when the direction of the wind is easterly; but there does not appear to be the slightest connection between the velocities of the general and the partial currents; for, as I have before stated, the Helm may be raging with great violence, whilst at the distance of eight miles scarcely a breath of wind can be felt.

I have not yet had an opportunity of observing how the barometer is affected by the action of the current near to the base of the mountain, though I am exceedingly desirous to make the experiment, and for the following reason. In the first place it is well known, and I have often verified the fact, that when currents of air are passed rapidly over surfaces, instead of pressing upon them, as might be expected from reasoning on the subject, they actually diminish the atmospheric pressure, and exert, if I may be allowed the expression, a negative normal force. The experiment of the two cards, which has of late attracted the attention of scientific men, shews in a very striking manner the action of this force; and were this phenomenon explained, it would evidently account also for the fall of the mercurial column when a current is passed over the surface of the fluid in the cistern.

The reasoning which Professor Leslie has employed in the Supplement to the Encyclopædia Britannica, to account for the fall of the barometer during high winds, is in this case totally inapplicable.

Suppose, then, a barometer placed at the bottom of Cross Fell before the commencement of the Helm; what will be the consequence when the current begins to blow? We know that the particles of air will impinge obliquely on the mercury in the cistern, and the force of each may therefore be resolved into two others, one perpendicular and the other parallel to the horizon: the first, of course, will tend to raise, and the second, from what has just been stated, will tend to depress the column in the tube. The question is therefore reduced to this, viz. which of these forces will predominate? The answer can, in my opinion, only be determined by experiment, and I hope ere long to be able to ascertain the point by this means. There is usually, but not in all cases, a sort of drizzling rain in the vicinity of Cross Fell during the occurrence of the Helm, and this leads me to suspect that the barometer stands low at the time.

I have no theory to offer, by way of explaining the Helm, inasmuch as some of the facts relative to it, appear to me hardly compatible with the laws of matter and motion. Such, for instance, as the perfect repose of the Bar where the current is strongest; such also is the very circumscribed limits within which it exerts its action. It does not appear to have any dependence on the presence of the sun; for it happens during the night as well as during the day.

The circumstance of the Helm only occurring when the wind is easterly, has led me sometimes to conjecture that an accumulation of air takes place on the eastern side of the mountain, which after a time overcomes the weight of the superincumbent atmosphere, and forces itself over the summit, and down the opposite side.

But if such were the case, why is not the cloud dissipated by the elastic force of the accumulated mass? Besides it is not easy to see how so gradual a slope, as is the eastern side of the range, can act as a barrier to the moving fluid; at least how so large a mass of air can be collected as would be necessary to account for the Helm.

I believe similar phenomena have been observed in other parts of the world; but as I never met with any book containing a description of them, I am ignorant both as to the analogy which may exist between them and the one to which this paper relates, and the theory or theories which have been advanced for their explanation.

ART. IV. *On the growing power of Russia, and her late Acquisitions, especially those in Asia.* By JAMES BELL, ESQ.—*(Concluded from p. 340.)*

THE religious prejudices are all in favour of Russia, and with such a preponderance on her side, the probability is, that the whole will become a part of the Russian empire. Once in possession of Constantinople, the Greek republic will be a mere phantom compared to the Russian colossus, and will naturally merge into that power whose creed and religious opinions are similar to her own. Constantinople is too important a city to be the capital of a merely secondary power; and were it in the hands of a naval independent empire, able to assert and support its independence, it might, when it pleased, shut the Bosphorus and the Hellespont, and cut off all communication between the Mediterranean and the interior seas of the Euxine, and the Sea of Azoff, and thus stop the Russian commerce. This would not serve the Russian purpose at all; and it would be better for her to allow the sultan to resign as her humble vassal at Constantinople, and keep the keys of the Bosphorus and the Hellespont in her own hand, than allow a European naval power to possess Constantinople. The fact is she will take it herself. It is too precious a station to be in any other hands than her own, and by means of it she will become the most formidable maritime power Europe ever beheld. The Russian cabinet is perfectly aware of this, and has been long endeavouring to be as powerful at sea as on land, and the possession of Constantinople will assuredly accomplish her wish. Possessed of this, and the immense forests of Asia Minor, on the coast of the Euxine, with all the shores sf Macedonia and Greece in her power, and thousands on thousands of Greek sailors at her nod, she will be enabled to create a navy which will give her the command of the Mediterranean, and the commerce of the Levant, and the interior seas of the Euxine, the Palus Mæotis, and the Caspian. Under her sway Constantinople will rise to greater eminence than ever it possessed since the days of its sagacious founder Constantine, and become the grand depot of all the commodities of Europe, Asia, and Africa. This is no imaginary picture: it is just what Constantinople is fitted to be under an enlightened power that has sagacity sufficient to appreciate its value, and improve the advantage of its possession; and to imagine that Russia will allow its possession to step out of her hands, whilst she has the power to take it, and as much to retain it, is to suppose her totally destitute of all that political intelligence and sagacity which have hitherto marked her conduct. The same fate will befall Asiatic Turkey, and the miserable inhabitants of that once delighful, rich, and populous region, are sighing to be rid of the yoke of the oppressors, and would welcome a Russian army, or indeed any army that bore the face of European, to achieve their deliverance; and I cannot see any other power than Russia which can so conveniently do it. And though we may deplore the stride of Russia towards universal monarchy, and the loss of that political balance which it has been so long the labour of statesmen to preserve, yet it cannot be prevented, and the barbarity of the despotism which has ruined Western Asia, is quite sufficient to stifle all considerations at its overthrow, shield the aggressor from the charge of injustice, and throw a plausible veil over the motives which produced the attack. Aye, and until that event be accomplished, not a ray of political, moral, or evangelical light will be permitted to dispel the gloom, which, with baleful wings, has long brooded over that once enlightened and glorious country. Every selfish feeling, whether arising from commercial or political jealousy should be banished on this point, and merged in the general wish for the good of mankind; and although the Russian government is a despotism, a young and vigorous despotism, and although her own political aggrandizement be the prevalent if not sole motive of her conduct, yet still it is an enlightened despotism. It is not a despotism inimical to human improvement in the arts and sciences. It does not persecute or oppose religious freedom, nor hinder the mechanic or cultivator from reaping the fruits of their respective labours. It is still a better, a more liberal despotism, than those of Spain and Portugal. It is not worse than Austrian, and it is infinitely preferable to an Asiatic despotism. She has done more for the good of her subjects, in art and science, in moral and religious instruction, than any of the Catholic powers have done, or are willing to do. She has done more, in these respects, than what we have done for the Hindoos, if we believe either Mill or Buckingham; and therefore, on every moral consideration, on every principle of benevolent feeling, we are bound to wish the liberation of Western Asia, even though it should not be accomplished in the way we wish it. Even on selfish commercial principles, it will eventually be better for us that Russia should possess the whole of Turkey, than it should remain as it is. By the opening of the Bosphorus to the Black Sea, we shall enjoy, in common with others, the commerce of that sea. By means of it, and the mouth of the Phasis, our manufactures will obtain a shorter, quicker, easier, and consequently cheaper passage into interior Asia, than by the round-about-way of India and the Persian Gulf. In proportion as the Russian conquests advance to the south, and in proportion as a strong and vigorous government is established, and efficient protection given to the industry of the native population, the means of subsistence will undergo a reciprocal increase, and create a greater demand for European goods, and ours amongst the rest. If Russia gain possession of Turkish Asia, the result will be the same, and caravans and travellers will no longer, as at present, be exposed to plunder, extortion, and robbery, by bands of robbers, Toorkmans, and Koords. Every Turkish pasha is a kind of privileged robber in his own district, and caravans and travellers are always liable to successive extortions in their way through the pashalicks that lie successively in the road to the place of destination. The *firmans* of the sultan are of no avail to the one or the other, as they are secure of impunity from the weakness and avarice of the government. Under a Christian government like that of Russia, all these inconveniences will be done away, and travellers, whether commercial, literary, or scientific, will be at full freedom to explore every part of those regions which have long been interdicted ground to Europeans.

Respecting Persia a similar fate to that of Turkey is awaiting her. The people and government, if some travellers may be credited, are if possible worse than those of Turkey; and I would desire the reader of this, to consult Frazer's work, where he will find ample proof of both facts. The late contest has completely exposed the weakness and misrule of the Persian government. The boasted improvement of Abbas Mirza in the army, by means of English officers, have vanished into air, and it is now found that the Persians will no more learn military discipline than the Turks, and that all our efforts to teach them, and render them fit to resist the increasing encroachments of Russia, have been equally unavailing, and our subsidies have gone merely to increase the coffers of an old, avaricious, mean-spirited prince. If at present Persia is no match for Russia, the case will soon be much worse, on the demise of the present worthless royal incumbent. A struggle for the carcase of a ruined monarchy amongst his numerous sons will take place, and that miserable region be again involved in all the horrors of a civil war. It is the great source of the ruin of all oriental dynasties, that the rights of primogeniture are not known in

Asia. Hence every son of a sovereign thinks himself as much entitled to the throne as another, and the people are of the same opinion. Hence the crown is never obtained but by him whose sword is longest; and where there is no fixed order of succession in the family, either the successful heir puts all his rivals to death, or mutilates them, or a candidate of another family or tribe starts up, and extirpates the reigning family. This is the invariable case. Hence the numerous short-lived dynasties and civil wars of Asia. The present dynasty is hated by all the natives but its own tribe, and in Gheetan and Koordistan the inhabitants and chiefs are sighing for a change of masters, and the latter told Fraser, that if one thousand Europeans from any quarter, no matter where, should appear in Khorassan, they would be joined by 20,000 Koords. It is quite needless to enlarge on the subject. The fact of the weakness, misrule, oppression, and poverty of Persia, is so well established, that it needs no argument to prove the utter inability of that country to cope with Russia; and there cannot be the smallest doubt but a political convulsion will ensue on the death of the present sovereign, and that Russia will take advantage of the struggle to seize another portion of territory. Each future struggle, either for a contested throne or with Russia, will progressively weaken her, till Russia seize the whole, and incorporate it with her own dominions. It is matter of wonder to me, that any who are at all acquainted with the deplorable state to which Mohamedan misrule has reduced Asia, and the total want of any real power in any Mohamedan state to oppose a European invasion, should think it an impossibility for Russia to conquer Turkey or Persia. I believe her perfectly able to overturn all the Mohamedan states in Asia. The only difficulties are merely physical, as the length of the road, the nature of the country, difficulty of communication, and of obtaining provisions in a wasted, and, in many respects, an unproductive country. Another difficulty is the want of money to carry on a war of conquest in distant countries. But as long as there are Israelites in Europe, Russia will not want money, and Russia is cautious in her advances towards the object of her ambition. She never conquers one part till she has strengthened and improved her former conquest; and I can easily conceive that in this way she may continue her slow but sure path of conquest, till she reach the Indus, and that she will reach it in time I have no doubt. That she will meet with many obstacles in the line of conquest thus far is undeniable; but they are not insuperable, and as she has taken care to fortify her rear by forts, posts, and settlements of soldiers, artisans, and mechanics, they will finally be overcome. Respecting her conquests in Independent Tartary, we see from Klaproth that in his opinion, and it is probably that of all the intelligent men in Europe, she will finally conquer all the Tartar tribes south of the Oural and north of the Oxus. That a considerable portion of time will elapse before this be accomplished is certain, but it is equally so that Russia intends it;

and suppose she should finally obtain her end in their subjugation, it cannot surely be matter of regret to a liberal mind. The conquest will be a service to humanity, as these nomadic states have carried on a constant war of plunder, whether with each other, or with the provinces subject to Persia or Russia. Such a conquest would put an end to that extensive trade in slaves which has continued for centuries in Middle Asia, even before the arrival of the Usbecks. Khyvah and Bokhara are the great slave-markets, and to these places captives are brought by the Kirguis and Karakalpaks from the Russian dependencies, and by the Toorkmans and Usbecks from Persia, Badakshan, and the Afghan territories, for sale, where slave-merchants from all quarters attend to buy the captives, and many merchants at Khyvah and Bokhara go regularly twice a-year through the Toorkman camps and villages to purchase their prisoners. It is the universal practice of all the Mohamedans, to consider all unbelievers as slaves, when once taken prisoners, be they Christians or Pagans. Not less than 150,000 Persians were in slavery in the dominions of Khyvah; for as the Usbeck Tartars are all Sonnites, they think it meritorious to catch as many Shuahs as possible, and either keep them for slaves, or sell them as such. Hardly a house in Khyvah or its dependencies but has 12 or 15 slaves, all Persians. In Bokhara alone the number of Russian slaves in 1796 was about 60,000, and a large but untold number at Khyvah; and Frazer was assured that there were from 12,000 to 15,000 Russian slaves at Khyvah in 1822. The empress Catherine, a little before her death, sent to Khyvah and Bokhara to require the khans to restore her Russian subjects; but they contemptuously told her to come and take them. And when Mouravief, the Russian envoy in 1820, made a similar request to the khan of Khyvah, desiring him to restrain the wandering tribes under his controul from taking Russians captive and selling them for slaves, he told them that the Russians were all *unbelievers*, and that the practice was lawful, and that he would not hinder it. More lately there were estimated 40,000 Russian slaves in Bokhara, and Mouravief stated that in Khyvah were 30,000 Persian and 3000 Russian slaves. All the Toorkman tribes that roam to the north of Astrabad and Khorassan, are constantly employed in making inroads into these provinces for slaves, and have rendered them almost a desert waste, and the Persians are not able, from the insufficiency of their government, to repress them; and they and the Usbecks have been the destruction of almost all the north-east part of the empire for more than three centuries. Now would it not be a blessing to the miserable inhabitants of Khorassan, if these plundering hordes were reduced to a state of complete subjection by whatever power? Would it not be a benefit to the industrious cultivators of the soil,—to the inhabitrnts of the towns and villages, who prosecute trade and commerce, such as they are,—to the poor Bucharians, the aborigines of Southern Toorkistan, who have from time immemorial been an industrious, manufacturing, peaceable people,—if the whole of Independent Tartary, as it is called, were conquered, and put under the active controul of a strong, efficient, and enlightened government, so that the cultivator, the artisan, the mechanic, and the merchant, might enjoy in peace and security the harvest of their toil? And what power will, and what power can do it, but Russia? What a boon to humanity, what an eventual blessing would it not prove to society and to themselves, if these idle, lazy, thriftless, plundering tribes, were compelled to betake themselves to the cultivation of the soil, or the rearing of cattle, to acquire habits of order and honesty, and the rudiments of civilization, and the arts of life. There is not one who has the least regard to, or love of his species, who has enjoyed the benefit of moral instruction and example, of religion and industry, but would wish it. And however important it may seem, to check the ambition of such an aspiring power as that of Russia, to set bounds to her conquests, we must on every principle of humanity, of love to mankind, and above all, of the religion we profess to believe and practise, wish success to Russia in the prosecution of her schemes to reduce the barbaric hordes of Toorkistan, and put a stop to a system so replete with mischief and misery as the slave trade of Khyvah and Bokhara. We have exclaimed against the African slave trade for more than forty years, and have reprobated the system in all its branches, and made unwearied, though alas! too unsuccessful efforts to put it down, and are doing so still; and therefore, to be at all consistent, we must be pleased with the progress of a Christian power in putting down Mohamedan influence, whether in Europe or Asia, and putting a stop to that slave traffic, so congenial to the precepts of the Koran, and carried on by all the followers of the false prophet. And even if it should be said that the slave traffic is not peculiar to the Mohamedans, nor originated with them, but existed long prior to that religion, but that it rose out of a rude and barbarous state of society,—that it was from time immemorial among the Scythian tribes,—even on that supposition it would still be a blessing, an incalculable advantage gained to humanity, could these rude and lawless tribes be put under the ban of powerful political coercion. Independence, no doubt, is an invaluable privilege; but if that independence is productive of mischief to themselves and all around,—if such independence is totally inconsistent with the welfare of their industrious and civilized neighbours, then such an independence is a curse. It is nothing else but the independence of armed robbers, who use it for no other purpose than to plunder their neighbours, and make slaves. Such states must be excluded from the pale of a civilized and political society; and it is impossible for any to commiserate their political annihilation. On this question we must lay aside all our political partialities, our selfish commercial jealousies of the growing power of Russia, and exercise the feelings of cosmopolites and Christians, and fairly put the two evils in opposite scales; (for in the most of cases, we have only the choice of a lesser evil.) Whether is it better, on the whole, that the political power of Russia should so far preponderate, as to annihilate the Mohamedan states of Europe and Asia,—swallow up the independent nomadic states of Toorkistan, and put an end to the great Asiatic slave trade? or that the political state of things should continue on the old footing, and the power of Russia be kept in check, having arrived at its *ne plus ultra?* I think there is no candid person but will prefer the former to the latter; for, on the continuance of the old political *status quo,* no amelioration will ever take place, or indeed can, in the state of Asia. On that supposition no ray of light, of whatever kind, will ever be permitted to irradiate the moral or political gloom of regions lying in the shadow of death, but ignorance must still be allowed to brood, with raven wing, over the benighted inhabitants. But on the former supposition, the power and influence of Mohamedan despotism being removed, Christianity and civilization, with all their concomitant blessings, will at least not be hindered *as at present* from entering these darkened abodes, and the unhappy natives at least enjoy the *chance* (if the expression be allowable) of merging from their present state.

It is one consolation seldom enjoyed in perusing Asiatic history, that the inhabitants of Kokan, an Usbeck khanate on the upper Sihoon, differ widely from their plnndering brethren of Khyvah and Bokhara, in that they neither make slaves, nor sell them, nor possess them; they neither plunder nor steal, and that amongst them the traveller is perfectly safe.

The Russians will probably be soon in close contact with Central Asia on the north-west and western sides, if they succeed in their intended scheme of reducing the whole of the Usbeck khanates; but as the Chinese government always keeps a diligent look-out, it will take good care to prevent all occasion of quarrel between their Kalmuck subjects and the Russian Tartars, and so give no pretence for Russia to intermeddle. The Mohamedans of Kashghar, it is true, do not love the Chinese government; for, indeed, they love no government but one of their own faith, and have raised more than one rebellion in Kashghar; but they have hitherto been quelled. It has been asserted that these rebellions, and particularly the last, under a chief who styled himself Jehan Ghir, have been fomented by Russian agents, employed for that purpose under disguise at Yarkund; and Mr. Moorcroft mentions one at that place by whose intrigues he was prevented from reaching Yarkund. The surmise may be fact; but it is impossible, in the dearth of all communications from these regions, to say whether it be true or false. But it is not probable that the Mohamedans of Kashghar will prefer the Russian yoke to the Chinese; and the knowledge of their conquests over the most of Mohamedan states will irritate them still more against these declared enemies of the faith of the prophet. But it is impossible to speculate on dark futurities; and it will probably be a long time ere the Russians set foot, as a military power, within the bounds of the *Celestial Empire;* and the Russians will have plenty of employment nearer home, in settling, and organizing, and strengthening their new acquired domains, before they think of crossing the Altai or the Beloor.

Our India Company, and their friends, have been long alarmed at the prospect of an invasion of India, first by Buonaparte, and latterly by Russia. It is on this account that the political progress of Russia has been viewed with no ordinary feelings of anxious jealousy. Not a step can Russia make eastward or southward but what is viewed with dread, as always bringing them nearer India; and our continental rivals, who know that we are exceeding sensitive on this subject, have taken good care to quicken and increase it, by always telling us of every new conquest of Russia on the sides of Persia and Toorkistan, and how much nearer they are now than formerly to the shores of the Indus, and are evidently anticipating in their imagination the presence of the Russian eagle on the frontiers of Hindoostan. I have already stated my reasons for believing the conquest of Persia as no difficult matter, and my belief that, at no very distant period, the Russian conquests will approach, if not approximate, the Indus. There is no immediate danger of a Russian army marching from the Araxes on the west, or from the deserts of the Kirguis on the north, to the banks of the Indus. The march is as possible as that of Alexander or Nadir Shah; but by no means so probable or so easy, at least, as the latter. In present circumstances such an expedition would be enormously expensive to Russia, and would not pay so well as the march to Tairis or Adrianople. Before ever Russia can ever think of such an expedition, she must have her Persian and Tartarian conquests consolidated; she must have her rear well secured in case of a repulse, an event by no means improbable; as otherwise, with a hostile population behind, and an army flushed with victory advancing on her rear, without fortresses and provisions to shelter and support them, complete destruction would be inevitable. In prospect of such an event, in the present extended case of our military force, it would be no very difficult matter for our army to cross the Indus, and secure the mountain passes of Afghanistan on the west, and those of the Hindoo Khoo on the north. With these passes well secured, under the command of brave and intelligent officers, well acquainted with the geography of the country, and all the mountain passes through which an army could penetrate,—it would be our business, in case of such an event, to secure the friendship of the Afghan tribes and chiefs previously, and in conjunction with them seize all the accessible posts and passes, and I am confident not a Russian would be able to cross the Hindoo Khoo, nor the mountains of Solyman. With a well disciplined army on the western bank of the Indus, and a chain of well chosen communications with our advanced posts on the mountains, to support them if attacked, we would effectually secure ourselves from all fears of an invasion. I have no doubt of the ability of a Russian army to cross (but not with heavy artillery) the Hindoo Khoo or the Solymanic range, if unopposed, for that has been often done, both by Mongols, and Tartars, and Afghans; (but then these practicable passes were not defended against the invaders.) But I maintain, if the passes be secured by men and officers qualified to defend them, and prevent the enemy, by any military stratagem, from turning the rear of the passes, no Russian army can cross them. The dream of an Indian invasion will not be realized, if ever, for many years to come; and if, by that time, we are not prepared to prevent their approach in the manner I have supposed, and by seizing the passes of the Indus, the fault is our own, and we shall deserve to lose a conquest we had valour to achieve, but had not wisdom and prudence to preserve.

Note on the Slave-Trade of the Phasis.

To the disgrace of Christianity, the natives of both Georgia and Mingrelia, though professing the Christian faith, were the most dissolute of mankind, and made no scruple to sell their children and vassals to the Mohamedans of Turkey and Persia. Mingrelia alone supplied an annual exportation of 12,000 slaves to the bazaars of Constantinople. In Chardin's days, a Mingrelian ambassador arrived at Constantinople with a train of 200 persons, and sold them day by day till none were left but his secretary and two valets; and Chardin allows that a Mingrelian, in order to obtain his mistress, sold *twelve priests* and his *wife* to the Turks. The population of Mingrelia, at one time, was ridiculously estimated at four millions by the missionary Lamberti, and that the Suavi, or mountaineers, could furnish 200,000 soldiers, a single tribe of the many that inhabit the Caucasus, and yet Kinnier adopts the numbers of Mingrelian population above given from Lamberti. Chardin allows only 20,000 for the population of Mingrelia. Such is the absurdities of travellers!

Note on the Geography of the Isthmus between the Black Sea and the Caspian.

Since the treaty of Gulistan in 1813, between Russia and Persia, many maps of the Caucasus and the adjacent countries have been published at St. Petersburgh. In 1819, a Russian map, entitled "A Detailed Map of Georgia, and the Countries which have been re-united to it, by Lieut.-Col. Verchorski," 12 sheets, with a table of contents, was printed. But that performance is a shapeless mass, without graduation, and without the indication of mountains, or mountain ranges. It is of that kind which represents the Caucasian country as one vast plain, without the smallest elevation. Another map, of one sheet, is better executed, published the same year, and is entitled, "A General Map of the Countries situated between the Black and Caspian Seas, with the New Frontier Line between Russia and Persia delineated, reduced from the most recent maps, by Major-General Khatov." A defective copy of this sheet has been inserted in the travels of Chevalier Gamba in Georgia. In 1826, there appeared a new map of the Caucasian countries, under the French title of "A large Map of Georgia, and a part of Persia, by Major-General Khatov, published from the general depot of maps at St. Petersburgh, in 7 great sheets, 3 half sheets, and 2 small sheets." A part of that large map, considerably enlarged and rectified, was re-published in 1827 in Russian, under the title of "*The Theatre of the War with the Persians.*" These two maps of 1826 and 1827, are the best that have yet been published of Georgia and the Persian frontier, as settled in 1813 by the peace of Gulistan.—*See Nouveau Journal Asiatique*, No. II. p. 148.

ART. V. *Additional Observations on the Whidah Bunting.* By CAPT. THOMAS BROWN.—*(Continued from p. 334.)*

PLATE X.

FOR the better elucidation of the varied and remarkable changes of this bird, I have considered it necessary to give four figures, in place of three as originally intended.

The lower figure represents the bird in an attitude which it not unfrequently assumes when on the ground, and was taken on the 14th September 1829. It will be observed, at that period the long tail feathers had not yet made their appearance, and the short tail, $2\frac{1}{4}$ inches long, with which it is represented, seems only to be supplied to the animal as an interim one, to assist it in its flight, and may be termed the *interim tail;* for these feathers drop off about the 16th October, when the long tail feathers have grown to about six inches in length. The double row of ash-coloured feathers on the head had not then begun to appear. The bill was also more naked of feathers at its base, than when the bird is in its full plumage.

The upper figure shews the bird in an intermediate stage between the summer and winter plumage.

On the 10th of January the deep-burnt terra-sienna colour on the jugulum, had changed very little in form, but was of an ochre yellow. The head, nape, and throat, were mottled, alternating with black and ash-coloured feathers. On the 15th, the jugulum had softened down to a very pale cream yellow: the feathers, however, had not changed, but the colour had left them by absorption. The transition of the colour of the back part of the neck or auchenium, had undergone a much less perceptible diminution of shade: the bill had altered materially both in shape and colour.

The upper figure was drawn on the 19th January, at which date all the jugulum and ventral feathers had fallen off; the former being replaced by pale wood-brown feathers, and the latter by those of a yellowish white. The upper mandible had a considerable notch on its mesorrinium, or ridge. Both mandibles were thickly covered with a white mealy substance, like those of parrots. The auchenium had not yet lost its deep tone.

On the 10th February the large lower remiges, which are to be seen overhanging the tops of the primary wing feathers, in the upper figure of Plate X. fell off.

On the 11th the bird had nearly arrived at its pale cinereous state. The general tone, however, was less clear than last year at the same date, and the small black patch on the crissum, which is to be seen in Plate VIII. and the upper figure of Plate X. had quite disappeared. The epigastrium, venter, and crissum, were then of the most immaculate whiteness, more so than they have been at any former period: the higher ridge of the upper mandible had become much flattened.

ART. VI. *Remarks on the Genera* CALLITRICHE *and* ELATINE. By G. A. WALKER ARNOTT, F.L.S. &c. *(In a Letter to the Editors.)*

CALLITRICHE.—It is known to most of your botanical readers, that Sowerby continues at present the English Botany: six numbers have appeared. In one of these, Tab. 2606, is a figure of "Callitriche autumnalis," with a description by Dr. Hooker. I take this opportunity of observing that the species there figured, is neither the plant of foreign authors, nor does it accord with the description given by Smith in the English Flora. Of this Dr. Hooker was I believe aware, and he has judiciously drawn up his description from similar specimens to those figured and transmitted to him by Mr. Borrer, from a ditch at Amberley in Sussex. I likewise am indebted to the same botanist for specimens which enabled me to ascertain its difference from the true *C. autumnalis,* a plant that I have myself gathered abundantly in the only known Scotch locality, the loch of Clunie.*

To the description of Mr. Borrer's plant, I can add little to what has been already said by Dr. Hooker: it seems to be more allied to some states of *C. verna* than either is to *C. autumnalis,* but from both it is I think very distinct, by its much more delicate appearance, and by having the fruit always on very distinct peduncles, and not subsessile, as in the two others. This circumstance must at once suggest the specific name, and indeed it is the *C. pedunculata* of De Candolle, said hitherto to have been found only at Fontainbleau and Angers in France.

I shall now give the specific differences of the three species; and as they are not exactly the same with those given by other botanists, I shall subjoin a few observations, by means of which I trust they may be better understood.

1. C. verna; *fructiferous peduncles very short, with two bracteas at their base; fruit regularly tetragonal, each portion obtusely carinate at the back.*

Of this many species have been made, but the only differences

* In your last Number, p. 376, it is stated that Mr. Balfour had discovered a new locality for the *Convallaria verticillata,* hitherto supposed to be confined, in this country, to the parish of Clunie. The clergyman of that parish, however, (Rev. Mr. MacRitchie,) has long made me acquainted with the station in Craighall woods. I may here also take notice of the two new additions to the English flora, mentioned at the bottom of p. 381. Of the *Reseda alba,* I have long possessed specimens from a very different part of the English coast; it was originally discovered by Mr. Christy; but though it be the *R. alba* of De Candolle, it is not so certainly the plant of Linnæus. It appears, however, to be the *R. undata,* Lin., and I do not feel certain that *R. fruticosa,* Hort. Kew. is different. As to *Myosotis collina,* its essential character is to have the segments of the calyx short, and when in fruit very patent: what I have seen on Arthur's Seat has the segments of the calyx connivent, and is not distinct from *M. arvensis.*

between them is the shape of the leaves. Duby enumerates five varieties in France, four of which I have myself observed in Scotland: 1. with the stem elongated and all the leaves obovate; 2. with the lower leaves linear and the upper ones oval, which is the *C. dubia*, Thuil.; 3. with the stem very short and all the leaves oval, found in muddy ditches that are nearly dried up,—this is *C. æstivalis*, Thuil.; and 4. with all the leaves linear. This last I have not yet observed in fruit, but it has not at all the appearance of the two following species. In all these varieties the upper leaves appear to be three-nerved.

2. C. pedunculata; *fructiferous peduncles more or less elongated, without bracteas at the base; fruit regularly tetragonal, each portion obtusely carinate at the back.*

HAB. Ditch at Amberley, Sussex, between the Castle and the Wild Brook.

In this species the fruit is about the same size as in the last. The leaves in all Mr. Borrer's specimens are single-nerved and linear, agreeing in this respect with what I have lately received from Sardinia. M. De Candolle, however, says that the upper leaves are oblong and three-nerved in his plants.

3. C. autumnalis; *fructiferous peduncles very short, without bracteas; fruit irregularly tetragonal, each portion broadly and acutely winged at the back.*

HAB. Loch of Clunie, at the landing-place close to the Castle. Outlet of Llyn Maclog, Anglesea, (Mr. W. Wilson.)

What Petiver's plant is, found near London, I have no means of ascertaining. This species is very easily distinguished when growing: the leaves are all linear, of a dark green colour, while the fruit, which is double the size of that in the two other species, is of a very pale yellowish green tint. Like the last, it flowers and fructifies below the surface of the water, but the dorsal wing, as broad as that part of the fruit which actually contains the seed, at once distinguishes it.

Of this genus De Candolle describes the seeds "cum carpello concreta," by which, I presume, he means to say that they are at all points closely attached to, and incorporated with the carpell. Richard (Dict. Class. III. p. 60.) states that the ovulum is attached to the upper and inner part of the cell, while Mr. Brown, (if I rightly understand the note in Hooker's Flora Scot. Part II. p. 258.) and certainly Mr. Lindley, make the seeds peltate. To understand the subject better, I may observe, that from the axils of the leaves of the plant proceeds a small peduncle, at the summit of which is placed a quadrangular depressed pistillum, with two long subulate and glandular stigmata. As the fruit proceeds towards maturity, the four angles of the short germen expand, upwards, at the back, and downwards, each into a somewhat reniform lobe, whose point of attachment to each other is scarcely larger than in the germen state, and therefore appears now situated in the centre of the inner side of the lobe: each portion of the fruit may thus be called peltate. In *C. autumnalis,* it frequently happens that one or even two of these are abortive, and in this species the fruit seldom or never presents the uniform quadrangular appearance that exists in the other two. This peltate structure of the fruit has been in general very imperfectly noticed, and indeed in some bad figures the axis of the fruit is represented as long as the lobes, instead of being remarkably short: in other figures the stigmas are represented as arising from the top of the fruit, instead of from the middle of the inner side at the apex of the short axis.

On opening one of the portions of the fruit, I have not found the seed incorporated with it on all points, nor yet decidedly peltate. My observations chiefly confirm those of Richard, the seeds being attached at a point corresponding to the apex of the axis of the fruit, so that in the young state the ovulum must have been pendulous, or more strictly speaking suspended. In the ripe state also, they may be called by the same term, as by far the greater portion of the seed is below its point of attachment. Although, however, the ovulum and seed are suspended in the cell, yet the great mass of the ovulum, is in the younger state, situated at the base of the fruit, which might induce an incautious observer to suppose that the seed was really erect: this, however, is merely the chalaza and kernel, which, according to Mr. Brown's accurate observations, have in all plants an opposite direction to those of the testa, or outer covering of the ovulum.

In the ripe fruit the albumen is thin and fleshy, enveloping the embryo, and at first may be mistaken for a portion of the episperm. The embryo itself is cylindrical, occupying the whole length of the seed, slightly incurved and obtuse at each end: the radicle, as might be inferred from the situation of the kernel in the ovulum, is superior; it occupies nearly the whole length of the embryo. The cotyledons are semi-cylindrical, closely applied, short, but very distinct. If a plane were to pass through the curvature of the embryo, it would be at right angles to the cleft of the cotyledons, so that in botanical language the cotyledons are incumbent, or the radicle dorsal.

Such are the principal facts I have to notice regarding the fruit of this genus. With respect to the flower, I can by no means agree with those who describe it as having two petals: what have been so called, only exist in *C. verna,* and I think their position is decidedly against the idea of their being parts of the flower. In all the species a peduncle is present, (the fruit being in no instance sessile,) though this peduncle is usually so short that it is concealed by the lower portion of the fruit, and only visible when the lobes of the fruit are removed. Now, the situation of these supposed petals is not at the top of this peduncle, but at its base; they are therefore more strictly bracteas. There is neither a true calyx nor corolla, as far as I can perceive. What some have called styles, I have above termed stigmata, on account of the glandular or papillous appearance along one of their sides. This structure, existing in *mercu-*

rialis and others of the *Euphorbiaceæ*, (to which the genus *Coriaria* ought certainly to be approached,) has induced Richard to refer *Callitriche* to that order ; but surely its place among the *Halorageæ* is much more conformable with its external appearance. May the strong rib that passes up the back of each cell in *C. verna* aud *pedunculata*, and the winged appendage of *C. autumnalis*, not indicate an approach to an adherent calyx ?

Elatine.—In Vol. XIV. of English Botany, a plant is figured at Tab. 955, and described by Sir James E. Smith as *Elatine hydropiper*, which, however, more lately in his English Flora, he saw reason to separate from the true *E. hydropiper* of Linnæus. His description I need not give here, but may state that the only parts of it introduced into the specific character, though capable of distinguishing it from *E. hydropiper*, are not sufficient to separate it from another and a very different species, and with which, accordingly, Smith does confound it. Very ample characters are, however, given in the detailed description. The new name given by Smith, and to our surprise adopted by Mr. Lindley, apparently without the least examination into its merits, is that of *E. tripetala*, and the plant he and Mr. Lindley confound with it is *E. triandra* of Schkuhr, Hoffmann, and others. But, in his description, he expressly says that the flowers are alternate, and on pedicels about the length of the leaves, while *E. triandra* has been both described and figured with the flowers sessile and opposite. Whatever stress may be put on the opposite or alternate position of the flowers, certainly much consideration ought to be given to the great length of the flower stalk in the English plant. Smith cites under his Vaillant's Tab. 2. f. 1., and he is quite correct ; but it is remarkable that, so long ago as 1808, the very same plant was described and figured by Bellardi, in the Turin Transactions, under the name of *Birolia paludosa*, and by De Candolle, at the same time, in his Icon. Rar. Tab. 43. f. 1. as *Elatine hexandra*, with a reference to the same figure of Vaillant. It can hardly be supposed that Smith was unacquainted with the work of De Candolle, and I therefore am at a loss to conjecture why he has made no reference to it in the present instance. Of course, the specific name given by De Candolle must be adopted.

I have above noticed the *E. triandra*. This is a very curious plant, and departs from the character of the genus as given by Sir James, and by most other authors: it has but three stamina, that is, their number is equal to, not double that of the petals, which Smith makes essential to the genus. De Candolle states, with doubt, that they may be equal in number ; Mr. Lindley, in translating De Candolle's definition, very properly leaves out the mark of doubt; but he copies another and a very objectionable part of the character, when he says that there are four stigmas, and a capsule with four cells and four valves, which applies only to two out of the four hitherto known species.

The character of *E. triandra* is to have leaves opposite, flowers sessile, and opposite stamens, and petals three; but there is a plant found originally in a remote part of America, but now observed throughout all the United States, which I have been often surprised that no one has compared with *E. triandra:* I allude to the *Crypta minima,* Nutt. In this the flowers are equally sessile, and sometimes (?) opposite; the stamens and petals varying from two to three. In both, as in all the genus *Elatine,* the seed is cylindrical, obtuse at both extremities, curved, longitudinally striated, with rows of transverse impressed punctures. Nuttal appears to have been aware of the affinity of *Crypta* with the genus *Elatine* in general; but his observations seem to have been made alone on *E. alsinastrum,* and his idea of the generic character taken from old books: I am not, therefore, surprised when he says that the difference of habit of the two genera is considerable, nor at the other remarks he has made at p. 228, of Vol. I. of his Genera. Nuttal (Vol. II. Additions) describes the calyx of his plant as two leaved: Schkuhr figures his *E. triandra* in the same way, although with three petals and stamina, remarking that there is a vacancy left for the third calycine segment. The first plants seen by Nuttal well deserved the specific name of "*minima;*" but since the plant has been better known, I have received specimens from the neighbourhood of Boston, from my friend M. Greene, which equal in size any of the opposite leaved species of *Elatine.* I may now draw the conclusion that *Crypta minima* is a congener, and very closely allied, indeed, to *E. triandra.* But are these to be separated from *Elatine?* I think not: there is no difference in habit; and the circumstance of the reduction of the number of stamina, is weakened by their acknowledged variation in the genus. The *Peplis? diandra,* Nutt. whatever becomes of it, must not be confounded with *Crypta minima,* as has been done by M. Guillemin in the Dict. Class. Vol. XIX. p. 194.

The above observations on *E. triandra,* I regret to say, I have been obliged to make from Schkuhr's figure and description, having never been able to obtain specimens of the plant; and had Schkuhr's accuracy not been well known, I might have been induced to suspect some mistake; the more so, that there does exist, in my own and various other herbaria, a plant extremely similar, and which has been often confounded with the *E. triandra;* but this new species has eight stamina, and answers, in all respects, to Linnæus's character of the genus. I propose to call it *E. nodosa,* in allusion to the remarkably sessile globose axillary fruit.

The characters of the species of *Elatine* are now as follow:

Sect. I. Stigmata linear short, leaves verticillate.

1. E. Alsinastrum; *leaves verticillate, flowers sessile verticillate.*

Sect. II. Stigmas mere points, leaves opposite.

§ 1. Stamens twice as many as the petals.

2. E. hydropiper; *leaves opposite, oblong; flowers alternate, on peduncles that are half as long as the leaves, with eight stamens and four petals; calycine segments short and erect.*

Accurately figured by Lamarck, Ill. Tab. 320, f. 2. In this species the calyx is only quadrifid, and not divided to the base; the lobes are so very broadly ovate as to be almost orbicular.

3. E. hexandra; *leaves opposite; flowers alternate, on peduncles about the length of the leaves, with six stamens and three petals; calycine segments spreading.*

I have not observed this to vary in the number of the parts of the flower, though I think it extremely probable. It is a much smaller and more delicate plant than the last, and the calyx is much more deeply divided. When growing in a muddy and nearly dry situation, the upper surface of the leaves becomes very visibly rough with minute dots, as described by Smith; but when in water, the leaves are as smooth as in *E. hydropiper:* the leaves are rather more attenuated at the base into a petiol than in the last. *E. hydropiper* seems to be by much the least common of the two; I only have it from the neighbourhood of Paris: but *E. hexandra* I have from Paris, Fontainbleau, Strasburg, Gentoud, and Burgundy.

4. E. nodosa, Nob. *leaves opposite, oblong, very much attenuated at the base; flowers sessile alternate, with eight stamens and four petals; calyx deeply divided, segments patent.*

This species, readily distinguished by its sessile alternate flowers, (in one specimen only have I seen one instance of the flowers being opposite,) is figured, I feel certain, by Schkuhr for the true *E. hydropiper.* It is, however, as slender as the last species. I have it from the neighbourhood of Strasburg, and from Nice.

§ 2. Stamens equal in number to the petals.

5. E. triandra, *leaves opposite, oblong, attenuated at the base; flowers sessile, opposite, with three stamens and petals; calycine segments two..*

6. E. Americana, Nob. *leaves opposite, oval; flowers sessile, alternate, with from two to three stamens and petals; calyx two leaved,* (Crypta minima, Nutt.)

Nuttal, in a work to which I have no access at present, states this, as far as I recollect, to have the flowers sometimes opposite; but, in all the specimens I possess, they are decidedly alternate. In the short oval shape of the leaf it resembles more *E. alsinastrum* than the other species. This is usually supposed to be *Peplis americana* of Pursh.

As to the natural affinities of this curious genus, placed by De Candolle with (?), and by Mr. Lindley, with certainty, among the *Caryophylleæ,* I shall say nothing at present: in the seed there is no albumen, but a long cylindrical erect embryo, with short cotyledons and a long radicle, which is inferior, and points towards the hilum: it has lately been made the type of a new order, including *Bergia* and a South American genus, by Cambessedes in the Mem. du Musée; but I am not inclined to go with him into many of the ideas he has there expressed.

SCIENTIFIC REVIEWS.

Histoire Naturelle des Poissons. Par M. le Baron Cuvier, et par M. Valenciennes. Paris. Levrault. Tom. 1, 2, 3, et 4. 1829.

Some branches of science connected with the moral and religious traditions of former nations, have advanced with the intellect of man, and run the same career as civilization,—shining with a new light in times of peace and prosperity, and sinking into neglect in the dark ages, or during the political struggles in which the populous hordes of hardy nations descended in torrents to invade happier climes, where the Muses held an academic sway, and cultivated intellect erected temples to science;—others, claiming no further attention than the necessity in which they originated, remained a long time stationary. As the products of the chace would vary with the country, so different shores, and the habitable banks of large rivers, would furnish fish of different kinds to the industrious natives, but comparisons would never have been instituted between the productions of opposite climes; and while the art of fishing would have received many improvements with the increased stability of nations, it was not till the ambitious Greeks extended their empire, that ichthyology became a science. In subsequent times, the poets of voluptuous Rome celebrated the treasures which the ocean had yielded up to pander the patrician's appetite. As the various tribes descended from the high plains, following the course of the rivers, and spreading themselves along the banks of the Hoan-Ho, the Ganges, the Euphrates, or the Nile, their attention would naturally be called to animals inhabiting a different element,—curious in their structure and habits, and demanding more immediate attention from their economical uses; and thus it is quite probable that the knowledge which the Chinese and Javanese had accumulated on the scaly inhabitants of their rivers and seas, was derived from the same experience of an olden time as was transmitted by the Egyptians to the Phenicians, and from them to the Greeks.

The period between this first progress of knowledge in nations who outstripped their contemporaries in civilization and in learning, and the time when Aristotle, following the victorious arms of his pupil, was furnished with every assistance in the accumulation of facts, and at once gave a scientific form to the materials of former ages, and, with the giant grasp of genius, partly uplifted the veil of organization, forms one of the most important eras in the history of ichthyology. From that period to the days of Cuvier,—who has concentrated the whole knowledge, which long and able study of the animal kingdom has given to the modern historians, of the structure and affinities of the varied forms of animal life, on the neglected unknown inhabitants of the waters,—the progress of the science has been constant but slow; not perhaps more so as a whole than other branches of natural history, yet though it never claimed the importance which was given to the study of the larger forms which adorn the earth's surface, or tower in aerial flight above the loftiest mountains, yet it had become a matter of regret, that when in very modern times a map had been drawn up for the delineation of the animal kingdom, neither the place which the fish should occupy, nor the manner in which they should arrange themselves, could be decided upon.

The period of Gesner and Aldrovandi, and the commencement of our knowledge of foreign fish, extended by the travels of Sloane, Catesby, Marsigli, Vlaming, Plumer, &c. with the newly acquired knowledge of the Chinese and Javanese works on fishes, gave origin to the methodical arrangements of Ray and Willoughby, and led to the publication of the great systems of Artedi, of Linnæus, the two Gronovius', Hasselquist, Kleen, and of their successors Pennant and Pallas.

The great scientific voyages of Commerson, Sonnerat, Banks, Solander, Forskal, Thunberg, and Bloch,—the additions made by Risso, Rafinesque, Viviani, Montague, Buchanan, Quoy and Gaimard, and Lesson and Garnot, were at the very first outset the foundation of a philosophical method of investigation, which assumed a greater developement and a more important aspect with each successive research. We are not, we think, arrogating too much for our own country, when we say that the philosophic zoology of the 18th century sprung from the labours of Cheselden and Hunter, and that their researches first gave the impulse to the successful genius of Camper, of Haller, Monro, and Vicq D'Azyr. This is the school whose labours have, in the 19th century, been followed up by those of Blainville, Oken, Goldfuss, Spix, Carus, Meckel, Kuhl, Desmoulins, Sir E. Home, Tiedemann, Rudolphi, Humboldt, and the more splendid generalizations of Geoffroy St. Hilaire and of Serres.

We cannot say of the much celebrated author of the work we are now discussing, that he had any particular predilection for that branch of the animal kingdom upon which he is now throwing so much light. From the imperfect glance which we have taken of the progress of ichthyology, it will be perceived that it was gradually and irresistibly tending to assume a classification of some stability, and that only the labour of a methodical and persevering mind was wanted to render the natural history of fish as complete as that of any other branch of the animal kingdom; and there was an intellectual pleasure that remained for the naturalist who should trace the beautiful relations by which the creative power had linked the sparkling and various-coloured images of the deep, and connect the fantastic shapes of small and lively creatures, or the more bulky forms of large fish, that sport and feed in the continental waters, and in that vast oceanic plain that covers nearly two-thirds of the terrestrial surface.

It was the accurate investigations made into the anatomical structure of other branches of the animal kingdom,—it was the light which the knowledge of organization had thrown upon the natural relations of animals,—a knowledge which no man in the present day had studied more widely, or with more success than Cuvier himself,—that alone could lead to a perfection in the classification of any one tribe of animals, equal to that which the author hopes to attain in his arrangement of the fishes.

By his situation at the head of one of the most splendid Museums of Natural History,—by those relations which long and successful labours in the natural sciences have given him with philosophers at home and abroad,—and by the splendid voyages which have lately been undertaken through the liberality of the French government, whose treasures have also been poured into his lap,—independently of other circumstances, Cuvier was the only man, in the present day, adapted to lay the foundation of so splendid a scientific edifice. No matter how much or whence the assistance, whether the name of Valenciennes, or a host of others, stands on the title page of this work, it is not one of a kind that can be rappidly produced by the same individual, who, a few years back, was the author of the description of the fossil kingdom,—who has penned the historical tribute to the most eminent naturalists for the last half century,—and who, after giving the first treatise that embraced the organization of the whole animal kingdom, is now writing the history of natural sciences. One man, it can only be remembered, plans the temple, while hundreds of labourers are engaged in its erection.

Since the commencement of the work new sources of information have sprung up ; and, in the fourth volume, we find that Mr. Valenciennes, in a journey made during the past year, (1829,) to London and to Berlin, received in both capitals an earnest proof of the interest which the friends of natural history take in the enterprise. The curators of the British Museum gave (?) to him the fish brought from the North Pacific Ocean by Mr. Collier, surgeon to Captain Beechey's expedition ; from Mr. Alexander Johnston he obtained permission to copy the paintings executed at Malacca, under the superintendance of Major Farquhar, and which belong to the Asiatic Society, and from Mr. Horsfield the drawings made by Dr. Finlayson, surgeon of the expedition to Siam, and deposited in the Museum of the East India Company. Mr. Gray also showed him the numerous drawings belonging to General Hardwicke, and of which many, by the pencil of the late Dr. Buchanan, represent the species described in his work, but not figured. Mr. S. Bennett exhibited to him the fish from the seas of Sumatra and the Sandwich Islands, which are in the collection of the Zoological Society ; and, lastly, he obtained from Mr. Yarrel interesting observations on the species frequenting the coasts of England. At Berlin he saw the fish sent from Mexico by Mr. Deppe ; and the undetermined fish of Bloch were intrusted to him by Mr. Lichtenstein, to be again submitted to examinations and comparisons, in order to obtain their true synonymes.

Two other naturalists, employed by the Museum, Messrs. Laurillard and Bibron, were sent to the coasts of the Mediterranean to complete our knowledge of the numerous fish of that sea.

Mr. Laurillard occupied himself at Nice fishing constantly for six months, and assisted by the influence of Mr. Risso.

Mr. Bibron went into Sicily, where he endeavoured to obtain the fish mentioned by Mr. Rafinesque, and where he had also the pleasure of finding many new species.

Mr. Kiener, another naturalist of the Museum, who was travelling with the Duke of Rivoli, made a considerable collection at Toulon.

A great number of new species were sent home, accompanied by drawings, coloured at the expense of Mr. Alcide D'Orbigny, at this moment employed by the Museum in the states of Buenos Ayres and Chili.

Mr. Ricord sent in species from St. Domingo; Mr. Le Sueur, from the river of Ouabache; and Mr. d'Espinville, French consul at New Orleans, has sent specimens from the waters around that town, and, more particularly, from the Lake Pont-Chartrain. Dr. Ravenell, at Charlestown, also procured some beautiful species from the fresh waters of Carolina.

By the successful results of the expedition of Captain D'Urville, Messrs. Quoy and Gaimard have been enabled to complete, by new collections made at New Guinea, at New Zealand, and other distant shores, those which they had already sent from the Cape and from Port Jackson.

Mr. Rifaud, who had established himself in Upper Egypt during several years, collected, with the greatest care, the fish of the Upper Nile, and brought back figures and skeletons, which were so much the more interesting to Mr. Cuvier, as by them he was enabled to institute comparisons with those of Senegal, brought home by Mr. Perotet, and which belong to the same genera, and oftentimes to species very much alike.

Messrs. Mertens, Ketlitz, and Postels, who accompanied the Russian expedition of circumnavigation under the command of Captain Lutke, also exhibited their numerous drawings of the fish of Kamschatka, and of other coasts and rivers of the Pacific Ocean.

The commission sent into the Morea by the French government has also just sent home its collections. Mr. Bory St. Vincent, seconded by Dr. Pector, an excellent Grecian scholar, collected, with much care, the names which the fish bear at the present day on those coasts, and which, in many instances, may lead to the knowledge of their ancient nomenclature.

The first volume of the fish of Brazil, by Messrs. Spix and Martius; and the Ichthyological part of the Journey of Mr. Ruppel; and that of Mr. Ehrenberg in Nubia, in Abyssinia, and the Red Sea, have lately appeared; and Fr. Faber's history of the fish of Iceland is also a work which will be of the greatest use.

The first volume of the *Histoire Naturelle des Poissons,* contains an historical view of the progress of ichthyology from its origin to the present day, a general idea of the nature and organization of fish, and their methodical arrangement into natural families. The second volume begins the specification of these divisions, commencing with the perch tribe, and each volume is illustrated with a certain number of engravings.

We extract from the author's observations, on the nature of fish, the following beautiful comparison between them and birds.

" The aerial being discovers with facility an immense horizon : its subtile ear appreciates every sound, every intonation, which it re-produces with its voice. If its beak is hard, if its body is covered with a kind of down, to preserve it from the intense cold of the high regions which it visits, it finds in its legs all the perfection of the most delicate touch. It enjoys all the sweets of conjugal and paternal love, and it fulfils all its duties with courage. The parents defend each other, and also their offspring,—a most surprizing art presides in the construction of their habitations. When the season is come they work together and without remission ; while the mother hatches the eggs with an extraordinary patience, the father, from an impetuous lover, becomes the most tender husband, and delights with his songs the melancholy of his mate. The bird even in confinement attaches itself to its master ; it submits to him, and executes, by his order, the most neat and delicate actions ; it hunts for him like the dog, and returns at his voice from the greatest height in the air ; it imitates even his language, and it is with some degree of difficulty that we are compelled to refuse it a kind of reason.

The inhabitant of the water does not attach itself. It has no language, no affection ; it does not know what it is to be husband and father, or to make an abode for itself. In time of danger it hides itself under the rocks of the ocean, or rushes down into the depths of the sea ; its life is monotonous ; its voracity leads to its sole employment, and it is only thereby that we are able to direct its motions by certain signs from above. Yet these beings who possess so few enjoyments, have been adorned by nature with all kinds of beauty, variety in their forms, elegance in their proportions, diversity of colour : they have every thing adapted to attract the attention of man, and it seems that it was this attention that nature was desirous to excite. Reflecting the lustre of every metal and precious stone, refracting the colours of the rainbow, in bands, in spots, in undulating, angular, but always regular and symmetrical lines, and always in shades admirably arranged and contrasted ; for what purpose have they received these gifts—they who hardly see one another in depths where light can scarcely penetrate, and who, could they gaze on one another, can scarcely be supposed to feel any kind of pleasure by relations thus established ?"

With reference to himself, Mr. Cuvier says his only wish is, that the work which he has undertaken may not be found unworthy of the illustrious writers whose labours he has continued, nor of the assistance and encouragement which he has received from so many friends of natural history ; and all his efforts will be devoted to render the work an epoch in science. In terminating our notice, we cannot but allow the excellent foundation of these hopes, and say that we contemplate its completion with all the enthusiasm of true lovers of natural history ; though, in casting a parting glance at the subjects of these numerous octavos,—while we dwell upon the use which the study of their organization and habits may have of throwing light on obscure physiological doctrines,—how far it may assist in developing our knowledge of the fossil kingdom, and tracing the progress of creation, how much it may tend to give certainty to our knowledge of structure, and assist in marking the relations of the animal kingdom, or of what use it may be in an economical point of view,—still we cannot help feeling that, with so little diversity of habits and structure, the pursuit of prey or escape from the destroyer, constituting the only occupation of their life—determining the choice of their abodes—the principal object of their variety of form—their continual want, that which alone, excepting in the season of love, agitates and carries them through their monotonous existence—coupled with the impossibility of ever studying the habits of the greater number of species, ichthyology will never present the same beautiful traits of character—the same magnificent features of habit and passion—as the study of birds or quadrupeds. Man loves to dwell with the nestling songster of the grove—to recal to his memory the stormy petrel—the wandering albatross, or the bird of the night—to skim the desert with the ostrich or emu—or to soar in imagination with the condor, above the snow-clad mountains of the New World. And in quadrupeds, whose habits are still more various—where there is so close an approximation to the intellect of man, so much ingenuity shown in the construction of abodes, in the pursuit of prey, or in avoiding an enemy—where the features of their geographical distribution are so striking—where the forms are oftentimes so magnificent, or approach so nearly to the human,—there can but be a still deeper and more rapturous interest connected with their study, which, by leading to a cultivated and intellectual veneration of the universal Creator, constitutes in itself one of the greatest advantages of a knowledge of the natural sciences.

The Botanical Miscellany. By William Jackson Hooker, LL.D. F.R.A. & L.S. &c. Vol. I. (Part III. unpublished.) Murray. London. 1830.

This is one of the first periodical works devoted to botany, which has appeared since the publication of "Konig and Sim's Annals." Its object is to include figures and descriptions of such plants as recommend themselves by their novelty, rarity, or history, or by the uses to which they are applied in the arts, in medicine, and in domestic economy, together with occasional botanical notices and information.

It would be as impossible for us to notice the various interesting communications and descriptions, which have appeared in the first volume, as to lay the treasures of the deep at our readers feet. Flora has been denominated the fair, and this is one of her fairest offsprings: its beauty must therefore be exceeding. The vast mass of materials which have been accumulating on the hands of one of the most active of our British botanists, and the numerous facts contained in a select and extended correspondence, have been brought forward in support of this meritorious undertaking, and it only remains for the public to preserve the character which it has obtained of seeking merit even at the expense of every other consideration.

Enthusiastic admirers of botany, having the greatest respect for the talents and energy of the editor, it would be a mere matter of congeniality of feeling with us to dwell on those features of excellence contained in a work of this kind, and which are not visible to every gross eye; or to pourtray in the glowing imagery of living colours the advantages to be reaped from the possession of such a mine of botanical wealth.

But as in our judgments, however severe, we never like to be cruel, so in our praise we think it folly to be too lavish; and as that which possesses intrinsic worth only requires to be known, the best encomium on the "Botanical Miscellany" will be an allusion to a certain portion of its contents.

The first part opens with a drawing by Dr. Greville, whose pencil will very probably transmit to posterity the figures of more acotyledonous plants than that of any other man living,— of the "most noble of all mosses," the *Spiridens Reinwardtii,* from the volcano of Tidor in the Moluccas; and a Bryum from the Andes, named after our valued friend Dr. Gillies, who discovered it near the foot of the mountains in the vicinity of Mendoza. These are followed by descriptions of new and rare plants, principally from South America, and collected by W. Cruikshanks, Esq. of Valparaiso, and by Dr. Gillies, who, during a long residence in the extra-tropical parts of America, exerted himself in studying the natural history of many unexplored districts, collected with discernment and enthusiasm, and has brought home an almost exhaustless mass of materials, the botanical part of which are destined to afford some of the most interesting materials of this publication. The mahogany tree, on account of its importance, is noticed at considerable length; and the part is completed by some interesting botanical communications, among which is a translation from the German of "Schultes's Botanical Visit to England in 1824," which is particularly remarkable for what our continental neighbours would call *piquant* observations. There is also some information respecting the German Botanical Society, the localities of some rare plants in Scotland by Wm. Wilson, Esq. of Warrington, and some account of the substance commonly known under the name of rice paper.

The second part commences with a valuable paper on the Botanical Characters, and Remarks on the Cultivation of the Sugar-Cane, by James MacFadyen, M. D. Jamaica. This, like the other monographs, contains a beautiful illustration. There are, in addition, Descriptions of New and Rare Species by the Editor; Monographs on the Genus *Colliguaja* of Molina, with an Account of Three New Species; on the Genus *Colletia,* discovered by Dr. Gillies; a Notice of some Species of the Genus *Verbena,* discovered by the same gentleman in the extra tropical parts of South America; of *Macræa,* a new genus from Chile; and Remarks on the Structure and Germination of the *Lemna Gibba,* by Wm. Wilson, Esq. of Warrington. Two most important communications complete the part; the first, which we are sorry that we cannot lay at length before our readers, is the Sketch of a Journey to the Rocky Mountains, and to the Columbia River in North America, by Thomas Drummond, full of interesting information; and the second, Remarks on the Botany, &c. of the Banks of Swan River, Isle of Buache, Bay Geographe, and Cape Naturaliste, by Charles Fraser, colonial botanist. This is a garden from which we have also culled many pretty flowers for our account of the Swan River given in the present Number.

We have now come to the third and concluding part of the first volume, and are glad to find an ever-increasing interest in its pages. The leading article is a Journal of Two Months Residence on the Banks of the Rivers Brisbane and Logan, on the east coast of New Holland, by Mr. Frazer. The country is new, and the information new; but we can only refer our readers to the original. It really grieves us sorely to pass over the descriptions of so many new genera, and so many interesting species adapted to our gardens and hot-houses, and not be able to enter with scientific minuteness on their history; but the remembrance that they are accessible to the public, and that we have called their attention to them, takes away from the bitterness of the consideration. There is a monograph on a new genus of the natural order of *Tiliaceæ,* from the island of Madagascar, communicated by Professor Bojer of the Mauritius,—description of Malayan Plants, from Jack's Malayan Miscellanies,—some Remarks on the Species of the Genus *Citrus,* which are cultivated in Jamaica, by Dr. James MacFadyen,—on the Plants of the natural order *Umbelliferæ,* detected by Dr. Gillies in the extra-tropical parts of South America, by the Editor,—on a New Genus of Plants of the natural order *Cruciferæ,* from the Andes of Chili and Mendoza, &c. &c.

There are further some interesting notices of the botany of the Philippine and Marian (Ladrone) islands; also of the peninsula of Kamtschatka, and neighbouring archipelago, translated from Captain Kotzebue's voyage of discovery.

The beautiful woods which clothe the mountains and vallies of the former district with luxuriant green, descending to the very brink of the sea in groves of mangle trees, (*Rhizophora,*) consist principally of fig-trees, and numerous genera of leguminous plants. Palms are more numerous than at St. Catherine's: the slender prostrate *Rotang* is the most interesting. Amongst the Aroideæ is the *Pothos scaudens.* The graceful bamboo cane grows abundantly on the banks of brooks. The plains consist alternately of woods and savannahs: the vegetables of the latter are chiefly two species of grass, which grow about eight feet high.

Among the Marian islands, Guaga is well wooded, and its flora rich. Forests clothe its steep descents to the sea-shore, and in several sheltered spots, the Mangle trees dip their pendant boughs in the flood. Orange trees, and other memorials of a once flourishing cultivation, grow wild. The Bread fruit, Cocoa, and Pisang, are abundant: the *Mango* grows well, but is not naturalized. Two species of *Pandanus*, and many kinds of Fig, are natives of Guaga. The flora of Radack-Ralick, Repith-Urur, and Bogha, is scanty. The most useful Palm is the common *Pandanus*, or Screw pine of the South Seas, and next to it the Cocoa tree holds rank. The Bread fruit tree is not very common.

A number of useful Palms are cultivated on the Caroline Islands. All these islands are rich in Bread fruit trees, Bananas, and esculent roots. The orange, the sugar-cane, and the *Curcuma*, also thrive; the cloves are not esteemed.

In the Isle Romanzoff the Russian naturalists found only nineteen species of perfect plants, (one Fern, three Monocotyledonous, and fifteen Dicotyledonous.)

The vegetation of the Sandwich Islands, having nothing in common with the adjoining continent, is more interesting. The plants collected by Archibald Menzies, in his expeditions to the heights of O-waihi and Mauwi, are still, we believe, undescribed, though a long time forming part of the herbarium of Sir Joseph Banks.

Of the vegetation of Kamtschatka we have not room to say much: the arborescent birch is stunted, and very different from the slender elegant tree of the north of Europe. *Pinus cembra*, which on our Alps grows at greater heights than *P. abies*, remains quite shrubby. Grapes and herbaceous plants thrive luxuriantly, the soil being rich, and the sky mild. There are but few species of vegetables, and these seem about equally distributed. The genera of plants are generally the same as those of northern Europe: their proportions, however, differ, and the mountains of these dreary climes being unprotected by any covering of vegetation, soon decompose. The frost bursts the rocks, every summer's gentle warmth causing fresh ruins, and so destruction hastens towards its completion.

It will thus be at once perceived that Dr. Hooker, a host in himself, with the assistance of such men as Mr. Frazer, Dr. Gillies, Dr. MacFadyen, and other correspondents abroad, has been able to give to the world more important botanical matter, in a given time, than any society in Europe, including even those devoted to horticultural or botanical pursuits. This is the greatest compliment we can bestow on this periodical; and we can only terminate by hoping that the reports we have heard, of the public not having answered the publisher's expectations, in giving due support to a valuable, and consequently rather expensive work, are unfounded, and that our library will be adorned with many a future volume of a publication reflecting so much credit on the labours and taste of our countrymen.

GEOGRAPHICAL COLLECTIONS.

Geography of Rajast'han, or Rajpootana; from the "Annals and Antiquities of Rajast'han, or the Central and Western Rajpoot States of India." By LIEUT.-COL. JAMES TOD. Vol. I. Smith, Elder, & Co. London, 1829. —*(Concluded from p. 364.)*

"LET us now quit our alpine station on the Aravulli, and make a tour of the *Pát-ár*, or plateau of Central India, not the less important feature of this interesting region. It possesses a most decided character, and is distinct from the Vindhya to the north, and the Aravulli to the west, being of secondary formation, or trap of the most regular horizontal stratification. *

Commencing the tour at Mandelgurh, let us proceed south, skirting Cheetore, (both are insulated rocks detached from the plateau,) thence by Jawud, Dantolli, Rampoora, † Bhampoora, the Mokundurra Pass, ‡ to Gagrown, (where the Cali Sind forces an entrance through its table barrier to Eklaira, ||) and Mergwas, (where the Parbutti, taking advantage of the diminished elevation, passes from Malwa to Harouti,) and by Raghoogurh, Shahabad, Gazeegurh, Guswanee, to Jadoowati, when the plateau terminated in the Chumbul east, which from the same point of outset, Mandelgurh, soon losing much of its table form, it stretches away in bold ranges, occasionally tabular, as in the Boondi fortress, by Dablema, Indurgurh, § and Lakheri, § to Rint'humbor and Kerowli, terminating at Dholpoor Bari.

The elevation and inequalities of this plateau are best seen by crossing it from west to east, from the plain to the level of Khumbul, where, with the exception of the short flat between Kotah and Polliferry, this noble stream is seen rushing through the rocky barrier.

At Rint'humbor the plateau breaks into lofty ranges, their white summits sparkling in the sun, cragged but not peaked, and preserving the characteristic formation, though disunited from the mass. Here, then, are seven distinct ranges, (Latparra,) through all of which the Bunas has to force a passage to unite with the Chumbul beyond Rint'humbor; and the whole way from Kirowli to the river is an irregular table land, on the edge of whose summit are the fortresses of Ootgeer, Mundrel, and that more celebrated of T'hoon. But east of the eastern side there is still another *step* of descent, which may be said to originate near the fountain of the Sinde at Latote, and passing by Chanderi, Kuncadhana, Nirwar, and Gwalior, terminates at Deogurh, in the plains of Golind. The descent from this second *step* is into Boondelkhund and the valley of the Betwa.

Distinguished as is this elevated region in the surface of Central India, its summit is but little higher than the general elevation of the crest of the Vindhya, and upon a level with the valley of the Oodipoor, and base of the Aravulli. The skirt or descent, therefore, from these ranges, from the skirts of the plateau, is great and abrupt, of which the most intelligible and simple proof appears in the course of these streams. Few portions of the globe attest more powerfully the power exerted by the action of water, to subdue every obstacle, than a view of the rock-bound channels of these streams in their adamantine barrier. Four streams, one of which, the Chumbul, would rank with the Rhone, have here forced their way, laying bare the stratification from the water's level to the summit, from three to six hundred feet in perpendicular height, the rock appearing as if chiselled by

* The structure of trap rocks in Europe is seamed, and not stratified. ED.
† Near this the Chumbul first breaks into the Pát-ár.
‡ Here the Newar breaks the chain.
|| Here is the celebrated pass through the mountains.
§ Both celebrated passes where the ranges are very complicated.

the hand of man. Here the geologist may read the book of nature in distinct characters. Few tracts (from Rampoora to Kotah) will be found more interesting to him, to the antiquarian, or to the lover of nature in her most rugged attire.

The surface of this extensive plateau is greatly diversified. At Kotah the bare protruding rock, in some places, presents not a trace of vegetation; but when it bevels off to the banks of the Rar, it is one of the richest and most productive soils in India, and better cultivated than any spot even of British India. In its indented side are glens of the most romantic description, (as the fountain of the "snake king" near Hinglaz,) and deep dells, the source of small streams, where many treasures of art in temples and ancient dwellings yet remain to reward the traveller.

This central elevation, as before described, is of the secondary formation called trap. Its prevailing colour, where laid bare by the Chumbul, is milk-white; it is compact and close-grained, and though perhaps the mineral offering the greatest resistance to the chisel, the sculptures at the celebrated Burolli evince its utility to the artist. White is also the prevailing colour to the westward. About Kotah the trap is often mixed white and porphyritic, and about Shahabad of a mixed red and brown tint. When exposed to the action of the atmosphere in its eastern declivity, the decomposed and rough surface would almost cause it to be mistaken for grit stone.

This formation is not favourable to mineral wealth. The only metals are lead and iron; but their ores, especially the latter, are abundant. There are mines, said to be valuable, of sulphuret of lead, (galena,) in the Gwalior province, from which I have had specimens, but these also are closed. The natives fear to extract their mineral wealth, and though abounding in lead, tin, and copper mines, are indebted almost entirely to Europe even for the materials of their culinary utensils."

The author then directs the reader's attention to an important deduction to this review of the physiognomy of Rajwarra.

There are two distinctly marked declivities or slopes in Central India. The chief is that from west to east: from the great rampart, the Aravulli, (interposed to prevent the drifting of the sands into the central plains bisected by the Chumbul and his hundred arms,) to the Betwa. The other slope is from south to north: from the Vindhya, the southern buttress of Central India, to the Jumna.

"Extending our definition, we may pronounce the course of the Jumna to indicate the central fall of that immense vale which has its northern slope from the base of the Himalaya, and the southern from that of the Vindhya mountains.

The Chumbul has *his* fountains in a very elevated point of the Vindhya, amidst a cluster of hills, on which is bestowed the local appellation of 'Janapava.' It has three co-equal sources from the same cluster, the Chumbul, Chambela, and Gumbheer; while no less than nine other streams have their origin on the south side, and pour their waters into the Nerbudda.

The Lipra from Reepuldo, the little Sinde from Dewas, and other minor streams, passing Oogein, all unite with the Chumbul, in different stages, before he breaks through the plateau.

The Cali Sinde from Baugri, and its petty branch, the Sodwia, from Raghoogurh; the Newaz (or Jamneeri) from Morsookri and Mazurda; the Parbutti from the pass Amlakhera, with its mountain arm Doulutpoor, uniting at Furher, are all points in the crest of the Vindhya range, whence they pursue their course through the plateau, rolling over precipices, till engulphed in the Chumbul, at the ferries of Novnerah and Polli. All these unite on the right bank.

On the left bank, his flood is increased by the Bunas, fed by the perennial streams from the Aravulli, and the Beris from the lakes of Oodipoor; and after watering Mewar, the southern frontier of Jeipoor, and the highlands of Kerowli, the river turns south, to unite at the holy 'Sungum' Rameswar.

The course of the Chumbul, not reckoning the river's sinuosities, is upwards of five hundred miles, and along its banks specimens of nearly every race now existing in India may be found. Sindees, Chunderawuts, Seesodias, Haras, Gore, Jadoon, Seherwal, Goojur, Jat, Tuar, Chohan, Bhadoria, Kutchweha, Sengar, Boondela, each in associations of various magnitudes, from the substantive state to the republic communes between the Chumbul and Cohan."

Having thus sketched the central portion of Rajast'han, or that eastward of the Aravulli, Lieut.-Col. Tod gives a general view of that to the west, conducting the reader over the T'hulca Teeba, or sand-hills of the desert, to the valley of the Indus.

" Let the reader again take post on Aboo, by which he may be saved a painful journey over the T'hul.* The most interesting object in this arid region of death is the ' salt river,' the Looni, with its many arms falling from the Aravulli, to enrich the best portion of the principality of Jodpoor, and distinctly marking the line of that plain of ever shifting sand, termed in Hindu geography Maroost'hulli, corrupted to Marwar.

The Looni, from its sources the sacred lakes of Poshkur and Ajmer, and the more remote arm from Purbutsir, to its embouchure in the great western salt marsh, the Rin, has a course of more than three hundred miles.

In the term ' Erinos' of the historians of Alexander, we have the corruption of the word ' Run' or ' Rin,' still used to describe that extensive fen formed by the deposits of the Looni, and the equally saturated saline streams from the southern desert of Dhat. It is one hundred and fifty miles in length, and where broadest, from Bhooj to Buliari, about seventy : in which direction the caravans cross, having as a place of halt an insulated oasis in this Mediterranean salt-marsh. In the dry season nothing meets the eye but an extensive and glaring sheet of salt, spread over its insidious surface, full of dangerous quicksands, and in the rains it is a dirty saline solution, up to the camel's girths in many places. The little oasis, the *Khari Caba*, furnishes pasture for this useful animal, and rest for the traveller pursuing his journey to either bank.

It is on the desiccated borders of this vast salt marsh that the illusory phenomenon, the *mérage*, presents its fantastic appearance, pleasing to all but the wearied traveller, who sees a haven of rest in the embattled tours, the peaceful hamlet, or shady grove, to which he hastens in vain : receding as he advances, till the sun in its might dissipating these ' cloud-capp'd towers,' reveals the vanity of his pursuit.

Such phenomena are common to the desert, more particularly where these extensive saline depositions exist, but varying from certain causes. They are well known to the Rajpoots by the name of Lee-Kato, or winter castles, because chiefly visible in the cold season ; and Lieut.-Col. Tod beheld the appearance from the top of the ruined fortress of Hissar, with unlimited range of vision, no object to diverge its ray save the miniature forests, the entire circle of the horizon, a chain of more than fancy could form, of palaces, towers, and these airy " pillars of heaven," terminating in turn their ephemeral existence. But in the deserts of Dhàt and Oomrasoomra, where the shepherds pasture their flocks, and especially where the alkaline plant is produced, the stratification is more horizontal, and produces more of the watery deception.

From the north bank of the Looni to the south, and the Shekhavat frontier to the east, the sandy region commences. Bikaner, Jodpoor, Jessulmer, are all sandy plains, increasing in volume as you proceed westward. All this portion of territory is incumbent on a sandstone formation. Soundings of all the new wells made from Jodpoor to Ajmer yielded the same result, sand, siliceous deposits, and chalk.

Jessulmer is every where encircled by desert, and that portion round the capital might not be improperly termed an oasis, in which wheat, barley, and even rice are produced. The fortress is erected on the extremity of a range, of some hundred feet in elevation, which can be traced beyond its southern confines to the ruins of the ancient Chotun, erected upon them, and which tradition has preserv-

* T'hul is the general term for the sand-ridges of the desert.

ed as the capital of a tribe or prince termed Happa, of whom no other trace exists. It is not unlikely that this ridge may be connected with that which runs through the rich province of Jalore; consequently an off-set from the base of Aboo.

Though all these regions collectively bear the term Maroost'hulli, or "region of death," (the emphatic and figurative phrase for the desert,) the restrictive definition applies to a part only, that under the dominion of the Rahtore race.

From Bhalotra on the Loomi, throughout the whole of Dhat and Oomrasoomra, the western portion of Jessulmer, and a broad stripe between the southern limits of Daodpotra and Bikaner, there is real solitude and desolation. But from the Sutledge to the Rin, a space of four hundred miles of longitudinal distance, and varying in breadth from fifty to one hundred miles, numerous oases are found, where the shepherds from the valley of the Indus and the T'hul pasture their flocks. The springs of water in these places have various appellations, *tir*, *par*, *rar*, *dur*, all expressions of the element, round which assemble the Rajurs, Sodas, Mangulias, and Sehraies,* inhabiting the desert.

The mineral productions are confined to the jasper rock near Jessulmer, which has been much used in the beautiful arabesques of that fairy fabric at Agra, the mausoleum of Shah Jehan's queen.

The small stream which breaks from the Indus at Dura, seven miles north of the insulated Bekher, and falls into the ocean at Lukput, shows the breadth of the eastern portion of the valley of the Indus, which forms the western boundary of the desert. A traveller proceeding from the Kheechee, or Flats of Sinde, to the east sees the line of the desert distinctly marked with its elevated *teebas* or sand-ridges, under which flows the Sankra, which is generally dry, except at periodical inundations. These sand-hills are of considerable elevation, and may be considered the limit of the inundation of the 'sweet river,' the *Meeta Muran*, a Scythic or Tatar name for river, and by which alone the Indus is known from the Punjnud † to the ocean.

A Chronological Table of the principal Geographical Discoveries of Modern European Nations.—Concluded from p. 370.

1553 *White Sea.* This sea, which had not been visited since the time of Alfred, was now supposed to be discovered by Chancellor, the English navigator.

Nova Zembla, discovered by Willoughby, an English seaman.

1575 *Solomon's Isles*, discovered by Mendana, a Spaniard, sent by the Governor of Peru.

1576 *Frobisher's Strait*, discovered by the English navigator whose name it bears.

Greenland, further explored by Frobisher, who also penetrated further between this country and Labrador.

1577 *New Albion*, discovered by Drake, who was the second to attempt a voyage round the world, which he performed in three years.

1580 *Siberia*, discovered by Yermak Timophéiévitch, Chief of Cossacks.

1587 *Davis's Strait*, discovered by the English navigator whose name it bears, in his voyage for the discovery of a north-west passage.

1594 *Falkland Islands*, discovered by the English navigator, Hawkins.

1595 *Marquesas*, discovered by Mendana, a Spaniard, on his voyage from Peru to found a colony in the Solomon Isles.

* *Sehraie*, from *Sehara* a desert. Hence *Sarrazin* or *Saracen* is a corruption of *Sehara*, desert; and *zuddun*, to strike contracted.

† The confluent arms or sources of the Indus.

Solitary Island, discovered by Mendana on the above-named voyage.

1606 *Archipelago del Espirito Santo*, discovered by Guiros, a Portuguese, sent from Peru. These islands are the Cyclades of Bougainville, and the New Hebrides of Cook.

Otaheite, supposed to be discovered by Guiros, who named it Sagittaria.

1607 } 1610 } *Hudson's Bay*, discovered by the celebrated English navigator, Hudson, on his third voyage. Venturing to pass the winter in this Bay on his fourth voyage, he was, with four others, thrown by his sailors into a boat, and left to perish.

1607 *Chesapeak Bay*, discovered by John Smith.

1615 *Straits of Le Maire*, discovered, with the island of Staten on the east, by Le Maire, a merchant of Amsterdam, and Schouten, a merchant of Horn.

1616 *Cape Horn*, doubled by Le Maire and Schouten, Dutch navigators, who called it after the town of which Schouten was a native. These enterprising men performed a voyage round the world in about two years.

1616 *Van Dieman's Land*, discovered by the Dutch.

1616 *Baffin's Bay*, discovered by William Baffin, an Englishman. The nature and extent of this discovery were much doubted, till the expeditions of Ross and Parry proved that Baffin was substantially accurate in his statement.

1636 *Frozen Ocean.* In this year the Russians discovered that this ocean washed and bounded the north of Asia. The first Russian ship sailed down the Lena into this sea.

1642 *New Zealand*, with the southern part of Van Dieman's Land, discovered by Tasman, a Dutch navigator.

1654 *Bourbon*, Isle of, occupied by the French.

1673 *Louisiana*, discovered by the French. This country received its name from La Salle, a Frenchman, who explored the Mississippi, in 1682.

1686 *Easter Island*, discovered by Roggewein, a Dutch navigator.

1690 *Kamschatka*, the principal settlement of the Russians on the coast of Asia, discovered by a Cossack chief, Morosko. The country was taken possession of by the Russians in 1697.

1692 *Japan.* Carefully visited by Kemfer, a German.

1699 *New Britain.* This island, and the straits which separate it from New Guinea, discovered by Dampier. This enterpristng seaman made a voyage round the world at the period of this discovery.

1711 *Kurile Isles*, occupied by the Russians. The people of these islands, which are twenty-one in number, still pay tribute to Russia. They are principally volcanic.

1728 *Behring's Strait*, explored and designated by a Danish navigator in the service of Russia, whose name it bears. Behring thus established that the continents of Asia and America are not united, but are distant from each other about thirty-nine miles.

1728 *Kamschatka*, ascertained by Behring to be a peninsula.

1741 *Aleutian Isles*, on the coast of North America, discovered by Behring. A more accurate survey of these islands was made under the Russian Government, by Captains Billing and Sarytchef, from 1781 to 1798.

1765 *Duke of York's Island*, discovered by Byron.

Isles of Danger, discovered by Byron.

1767 *Otaheite*, discovered by Wallis.

1768 *Cook's Strait*, discovered by Captain Cook on his first voyage round the World, which occupied from 1768 to 1771.

1770 *New South Wales*, discovered by Captain Cook.

1772 *Island of Desolation*, the first land south of India, discovered by Kerguelen, and called by his name. Subsequently called the Island of Desolation by Captain Cook.

1774 *New Caledonia*, discovered by Cook in his second voyage, 1772—1775.

1778 *Icy Cape*, discovered by Captain Cook.

1778 *Sandwich Islands*, discovered by Cook in his third voyage, which commenced in 1776. He lost his life in 1779.

1797 *Bass's Straits.* Mr. Bass, Surgeon of H. M. S. Reliance, penetrated as far as Western Port, in a small open boat, from Port Jackson, and was of opinion that a Strait existed between New South Wales and Van Diemen's Land. In 1799, Lieut. Flinders circumnavigated Van Diemen's Land, and named the Strait after Mr. Bass.

1804, 5, 6, *Missouri* explored to its sources by Captains Lewis and Clarke, and the origin and source of the *Columbia* ascertained.

1819 *Barrow's Straits*, discovered by Lieut. Parry, who penetrated as far as Melville Island, in lat. 74′ 26″ N. and long. 113′ 47″ W. The Strait was entered on the 3d August. The lowest state of the thermometer was 55° below zero of Fahrenheit.

1819 *New South Shetland*, discovered by Mr. Smith, of the brig William, bound to Valparaiso.

1819 } *North America*, The northern limits of, determined by Capt. Franklin,
1822 } from the mouth of the Coppermine River to Cape Turnagain.

1821 *Asia*, The northern limits of, determined by Baron Wrangel.

1825-6 *North America*, Franklin's second expedition, in which the coast between the mouths of the Coppermine and M'Kenzie's rivers, and the coast from the mouth of the latter to 149½ W. long. were discovered.

1827 *North America.* In August of this year, Captain Beechey, in H. M. S. Blossom, discovered the coast from Icy Cape to Point Barrow, leaving about 140 miles of coast unexplored between this Point and Point Beechey. Point Barrow is in 156½° W. long.—*Companion to the Almanack for* 1830.

NOTICE ON THE SWAN RIVER AND THE SURROUNDING COUNTRY.
(With a Map.)

One of the first establishments which has been attempted on the western coast of Australia, is the colony at the Swan River; and from the importance of its situation, and the extensive plan of colonization which has been entered upon, it promises to be a future object of great interest to the mother country.

The principle of colonization by which the two sexes, inhabiting a civilized country, and enjoying the spirit-stirring ambition of being able to work for luxuries, leave their homes to go where at first they must even find difficulty in supplying their immediate wants, is strikingly illustrative of the natural course of events.

Geology has not gone so far yet as to inform us with certainty whether there are really continents which are newer the one than the other,—which came, as it were, from the bosom of the ocean to receive the overflowing tide of population, or to offer the foundation-stone of cities erected upon the ruins of fallen states. But he must have lost the power of vision, who cannot see, in the progressive history of man, a noble harmony with the course of nature, and a changeless destiny rolling in its own career, like the dark orbit of a sun beyond the reach of star-eyed science.

The population that was sickening in the thronged city, cannot but thrive amidst the verdant plains of unexplored Australia, and under the emulating warmth of an antipodal sun. Several hundreds of our countrymen are now felling trees or dragging the net, on lands and in rivers, that a year ago had never reflected the bright countenance of intellectual man. Women of the hue of fairest flowers, are gazing on the strange forms of unknown animals,—becoming acquainted with the tall stature of plants sealed by a different hand, or listening to the songs of birds of another world; and the bustle and activity of tilling and planting, of shipping and house-building, and the thronging of multitudes, ring in loud peals along shores where the burst of the rising tide, or the rough bellowing of the sea-lion, alone came to break the stillness of creation.

Tenanted by the industrious sons of the west, the curling smoke will soon rise above the dark groves of evergreens,—the sunbeam will glance from the axe's edge,—the bark will be stranded on the red shores, and the white sail will sweep like a spirit over the calm blue waters. Then the whale will descend to more southerly seas, the kangaroo will bound away far into the interior of the continent, and the raven-winged swan will take its last majestic flight. The stern and obdurate savage will alone remain to mar the quiet of the settlers. His fate is as that of the hunted beast. If he will not know the truths of religion, nor bow to the rules of social order, he must yield to the strong arm of power, and in future times tradition alone will tell of the dark wandering tribes of Australia.

Anxious to fulfil the promise made to our readers, of giving them some of the general results which we could cull from our partial acquaintance with the geography and natural history of these districts, we shall draw the stern veil of science over the vision of future glory that hovered so brightly o'er these favoured shores; and having done every thing in our power to accumulate facts for such a labour, shall be able to give more satisfactory information on the productions,—the natural resources and probable success of this interesting colony,—than are easily attainable by the public.

Geographical Position.—The most south-westerly point of Australia is called Cape Leeuwin, and the land, from a little to the south-east of this to near the Swan River, gets the name of Leeuwin's Land, having been first seen by the commander of a Dutch vessel named the Lioness in 1622. Edel's Land, situated beyond this, and extending northward to Cape Escarpée, and through which this river courses, was probably first seen and named by Edel a Dutchman in 1619, three years after the discovery of Endracht's Land by Dirk Hartog. The Swan River was, however, first visited by Vlaming in 1697, and is situated in latitude 32° 4′ 31″ south, and longitude 115° 46′ 43″ east of Greenwich. The determination of Captain Baudin gives to the mouth of this river 32° 4′ 31″ of south latitude, and 113° 26′ 28″ east longitude of Paris. By a typographical error, it is placed, in the printed correspondence of the House of Commons, in 11° east longitude. In these documents it is also placed in 34° south latitude.

A group of islands connected with one another, and with the mainland by reefs, is situated off the mouth of the river. The largest was named Rottenest by the Dutch, from the number of rats' (Perameles nasuta, Geoff.) nests which occur in it. Its greatest diameter is eight miles. The second largest island received from the French the name of Buache. There is another little isle called Isle Polo Carnac and Isle Berthollet; and the whole group was named by the French navigators Isles Louis Napoleon.

General Characters.—The line of coast, as far as Geographe Bay, is a limestone ridge, varying from twenty to six hundred feet in height, and extending inland for the distance of four or five miles. The country, from the shores to the base of the mountains, is undulating and open, a thinly-wooded grazing country to the north, and fine grass plains towards Cape Geographe. The range of mountains denominated General Darling's Range, attains a height of from 12 to 1500 feet: the culminating points of St. Anne's and Mount William are 3000 feet high. Bailly, who visited the river in the Naturaliste, says that its banks were covered on both sides with fine forests, which extended a great way into the interior. Mr. Frazer, however, says that the forests do not average more than from eight to ten trees an acre. "We found," says Captain Stirling, "the country rich and romantic, gained the summit of the first range of mountains, and had a bird's eye view of an immense plain, which extended as far as the eye could reach to the northward, southward, and eastward. After ten days absence we returned to the ship; we encountered no difficulty that was not easily surmounted; we were provided with abundance of fresh provisions by our guns, and met with no obstruction from the natives."

Geognostic Structure—The calcareous deposits which constitute the outline of the coast in the neighbourhood of Swan River, and which alternating with sands and sandstones, are met with forming almost perpendicular cliffs in the course of the river, appear to consist of two kinds. The first most ancient, though with every probability belonging to the *tertiary formations*, is that which presents the most compactness, which alternates with sandstone, and is not very shelly. It forms the bluff headland at the mouth of the river, is the principal ingredient of the whole ridge lining the coast in the vicinity of this river, and is found near Geographe Bay lying on breciated conglomerates. It is every where pierced with caverns, sometimes crowded with stalactites. At Cape Naturaliste these attain a length of from twenty to twenty-five feet; and in one case they presented the remarkable appearance of being all bent outwards, as if a gale of wind were perpetually blowing through the cavern. This rock is a principle constituent of the Isle of Buache, where it is found alternating with sands in horizontal layers, and the hills formed by this mountain rock, instead of occurring in isolated summits, form long and continuous crests. This formation is covered by a bed of sand mixed with the detritus of vegetables, which furnish the mould for the propagation of trees and shrubby plants. The second kind is a formation almost peculiar to the coasts of Australia, and has been minutely described by Capt. King. Mr. Abel also noticed this formation at the Cape of Good Hope. "It is impossible," says Mr. Frazer, (Botanical Miscellany, Part II.) "to pass along the beach fourteen yards without crossing a stream which issues from caverns of limestone, and which forms banks of shells, sea-weed, stones, and whatever substances may come in their reach, incrusting them in a beautiful manner." In the immediate vicinity of the sea, there occur downs which from this action are converted into extensive formations of mountain rocks; even far up the course of the river, the French described the limestone rock as entirely composed of incrustations of shells, roots, and even the trunks of trees.

Between the limestone rock and the Darling mountains occurs a low tract of land of different structure,—a bed of large-grained sand covers a formation of compact clay of a reddish hue. This change of structure is accompanied with other changes which we shall notice in the hydrographical part.

At Cape Naturaliste there are immense cliffs, presenting at their base large beds of granite and schistose rock: large masses of feldspar were seen traversing those beds, in various directions, and of various thickness. The granite rock was succeeded by a bed of micaceous schist, in an advanced state of decomposition, over which were observed several caverns, which were found to contain rock-salt in crystallized masses, and in large quantities. The base of the mountains (which were named Darling's Range in honour of General Darling) is covered with fragments of quartz and chalcedony: the soil a red sandy loam. Farther up the soil improves to a light-brown loam; but from its rocky nature is incapable of cultivation. The highest part of the range is of ironstone, and it is remarkable that there is no underwood. The island of Berthollet, distant six miles from Buache, is a barren, inhospitable spot, producing abundance of hares, seals, and mutton birds. Its shores present many tesselated cliffs of limestone, resembling the turrets of a Gothic cathedral.

Hydrography.—The most important features of the country are contained in the accessibility of its shores, in the distribution of its rivers, and in the abundance of its fresh waters. The entrance of Swan River was considered by the first navigators who visited this coast, as almost impossible during the prevalence of some winds, but the difficulties have been smoothed down by further acquaintance, and the rocky, abrupt entrance of this fine stream, appears, on the contrary, to offer some peculiarities of a very favourable description. In alluding to the hydrography of this district, it will be necessary to premise that the seasons are not the same as in our country. Spring occurs in September, October, and November; summer in December, January, and February; autumn in March, April, and May; and winter in June, July, and August; and as the state of the rivers and marshes are almost entirely regulated by the seasons, the time of the year must always form an important matter of consideration in the testimony we can draw from the accounts of travellers. The navigation from the Cape to the Swan River does not present any extraordinary difficulties, and it is well known that ships navigating the eastern seas, have constantly to beat down to a parallel with this river; but that the long belt of oceanic water that washes the shores of Leeuwin's, Edel's, or Endracht's Lands, is boisterous, and at certain seasons of the year with difficulty navigable, is certain from the experience of what few visits have been made to these shores. The coast in the neighbourhood of Swan River, presents also the usual difficulties met with in navigating the South Seas in coral reefs and islands, but not to a very dangerous extent.

Swan River is not a very large river, not being, we believe, above a mile in width a little beyond its embouchure. It is, however, deep; and though the French navigators met with several mishaps, being twice stranded in their course, Captain Stirling's party found the river navigable until it almost ceases to be a stream, or where there was not room for a boat to pass. Port Cockburn is the place which is regarded as fittest for harbouring ships: it is distant eight miles from the river, and there is room for the largest fleet, with seven fathoms water, within twenty yards of the shore, and this perfectly land-locked. There is stated to be no surf, and Mr. Frazer is inclined to think that, as at the entrance of the river, there is not a perpendicular height of five feet from the line of low water to that of vegetation, there is never any very heavy weather in the Sound. On the bar at the entrance there is only one fathom of water, but that is always smooth. Between the isles of Berthollet and Buache is the entrance for ships drawing more than sixteen feet water into Port Cockburn. Vessels drawing less than sixteen feet, can run directly across the sound from the entrance of Swan River to Port Cockburn. Vessels of any burden, then, can proceed up the sound to the entrance of the river, where there is good anchorage, with plenty of room to beat out, should the wind come to blow hard from the north-west.

After passing the rocky barrier which incloses the river at its mouth, it developes itself, and becomes much wider. The country is low, and this is the termination of the limestone. The soil, consisting of a retentive argillaceous substratum, is the part marked as Melville Water in the map, into which Canning River, mistaken by the French for an outlet, to which they gave the name of Moreau, falls on the one side, and there is abundance of fresh water on the other. The season the French visited the place was rather early after the wet season, and it was yet covered with little lakes and ponds, and traversed by numerous rivulets. There can be no doubt but that, during the winter season, the whole of this part of the country is *one entire flood.** Further up the river are a number of small islands, called by the French, Isles of Herisson. These are composed of a rich deposit carried down by the floods. Captain Stirling's expedition met with the same difficulties as the French at this part of the river, and had to drag the boats over the mud, and beds of oyster shells lay a foot deep in the mire, and lacerated the feet.

There are several lagunæ in the island of Buache, which are all salt. Their shores were covered with deep beds of the only two kinds of shells met with; one a bi-valve, the other a rose-coloured species of Melania. On the coast near Swan River, Mr. Frazer met with an extensive mineral spring, issuing from beneath a mass of cavernous limestone rocks, in width about seven feet, and running at the rate of three feet in a second.

There is no water on Berthollet Island.

Botany.—On the south head of the entrance to Swan River, Mr. Frazer observed a considerable variety of interesting plants, amongst which were *Anigo-*

* "The flats or levels (says Mr. Frazer) are very fertile, composed of a rich alluvial deposit, but evidently occasionally flooded, drift timber having been seen five feet above the surface."

santhus rufus, Anthocercis littorea, two species of *Metrosideros* and a *Prostanthera,*—on the downs a species of *Gnaphalium,* with white flowers, as on the downs bordering the Bay of Biscay, gives a snowy appearance to many parts of the cliffs,—on the margin of a salt lake he found a species of *Brunonia.* At the distance of one mile from the mouth of the river, the genus *Eucalyptus* makes its appearance, although in a stunted state: the French naturalists stated the most abundant shrub in the country to be the *E. resinifera.*

The vegetation of the beach consists principally of syngenesious plants, and a species of *Hibiscus* with peltate leaves. Here Mr. F. observed a beautiful pendulous *Leptospermum,* resembling the weeping willow, and associated with an arborescent *Acacia.* The few trees and shrubs seen on the hills of limestone, consisted of stunted *Eucalypti* and *Leptosperma,* and a beautiful species of *Calytris* or cypress, of the finest green colour: a *Rhagodia* grows on the beach to a height of twenty feet. The genus *Banksia* appears in all its grandeur near Canning River. The shores are covered with rushes of great height and thickness, concealing many beautiful syngenesious plants. The botany of Point Heathcote is splendid, consisting of magnificent *Banksias* and *Dryandras,* a remarkable species of *Hakea,* two species of *Grevillia,* a species of *Leptospermum,* and a beautiful dwarf species of *Calytris.* The beach at Garden Point is of the same character; and Mr. F. thinks that every beach within the heads will be found of the same description. The margins of the islands are covered with *Metrosideros* and *Casuarina,* and their interior with sea-side succulent plants. On the flats the *Banksia grandis* attains a height of fifty feet, and a *Zamia* thirty. Up the river are thickets of *Casuarina.* The brome grass of New South Wales makes its appearance. *Bastard* and real *blue gum* is seen in considerable quantities. At the base of the mountains, Mr. F. observed a species of *Hakea* with holly-shaped leaves. The summit was studded with noble *Angophoras.* At the source of the river were thickets of an arborescent species of *Acacia,* and gigantic thistles eleven feet in height.

The island of Buache, composed of low ridges of light sandy loam, has its loftiest parts covered with cypress, (*Calytris,*) and thickets of *Solanum,* and a species of *Brunonia*; towards the north were thickets of *Metrosideros.* The appearance of the country about Cape Geographe is particularly pleasing. The shore seemed well clothed with timber, and the foliage of the richest green. The principal part of the timber consisted of *Eucalyptus.* Mr. F. saw no traces of *Banksia* nor of *Casuarina.*

Zoology.—At Rottenest the French met with a little kangaroo, about two feet in height, probably Petaurus Peronii, Desm. and what they called a large rat, (Perameles nasuta.) Seals were very numerous, and there were a great number of reptiles: tortoises abounded in Geographe Bay. At the source of Swan River Mr. Frazer met with a number of deep pits, made by the natives for the purpose of catching land tortoises, with which the ridges abound. The animals met with were kangaroos, native dogs, emus, &c. &c. The quantity of black swans, ducks, pelicans, and aquatic birds seen on the river, was truly astonishing. Fish were abundant, and the sound swarmed with tiger sharks. A species of Psittacus (cockatoo) was seen in large flocks: it fed on the roots of orchideous plants. One of the most remarkable animals frequenting the tall rushes of the river's banks, was the sea-lion of Anson, elephant-marin of the French, (Macrorhinus proboscideus, F. Cuv.) which roars loudly, and fight among themselves. The French met with them in the interior of the woods. Partridges and crows were said to be met with on Isle Buache by the French. They also saw on Swan River, parrots and large and small crows. Fishing in the river was very successful. Mr. Frazer only saw one snake during the survey.

The French had no direct communication with the natives. They did not appear navigators; no traces of boats were found, though the natives were met with in pretty great numbers on the banks of the river. The few natives Captain Stirling's party met with were not disposed to behave ill; on the contrary, they seemed much alarmed at first, but soon gained confidence. Black swans were given to them, and eagerly accepted. They had no means of navigation, and rather showed a horror of the water. The language spoken by the different tribes of Australians differs in each, but there seems to be no other variations amongst them. The arms of the natives of the Swan River were the same as those of the natives of New South Wales, and their clothing and appearance are equally loathsome.

Agriculture and Commercial Advantages.—In an agricultural point of view, the new establishment at Swan River presents four different positions. 1. The limestone ridge bounding the east; 2. The flats and swamps between that and the range of hills; 3. The high lands and forests at the sources of the rivers Swan and Canning, with the bases and part of the acclivity of the hills constituting Darling Range; and 4. The pasture lands to the east of this range. The limestone tract will probably in future times be one of the most marked and fruitful tracts at Swan River; the climate and the land is at the present moment ready for the cultivation of the vine. The orange-tree, the olive, the fig, and the pomegranate, with numerous other plants, would thrive on the light sandy soil which covers this ridge. We cannot, on this occasion, enter upon an enumeration of what edible plants and fruits would probably succeed on the four different positions alluded to; but we must mention that it is not either the ordinary agriculturist, or the mere English botanist, that is fitted, on visiting the shores of the Swan River, to judge of their capabilities. He must be well acquainted with the productions of similar climates and soils in the whole range of isothermal lines in Europe, in Asia, and in America, who could give the subject its full scope. We can only premise that the headlands and Isle Buache have been thought favourable for the growth of bananas, and most of our culinary vegetables. The soil of Isle Buache appeared capable of producing any description of light garden crops. The extensive salt-marshes, Mr. F. states, are admirably adapted to the growth of cotton, probably also of rice. The seeds of British Graminæ should be sown on the fresh water marshes; the maize and forest timber should be grown at the base and on the acclivities of the hills, where the arts of agriculture should be put in force to further the growth of the Eucalyptus, and timber trees of the country. The trees of our orchards ought not to be neglected.

The commercial advantages of this settlement are very great. The navigation of the river appears to present many difficulties to ships of any burthen, but it would not to craft bearing down the produce of the country. The general advantages which this country holds out to settlers above those of New South Wales, as stated by Mr. Frazer, a person well qualified to make such a comparison, have been given in our first number. And after considering the agricultural prospects and extent of pasture-land, we have only to mention, that for exportation and exchange of produce, they have the vicinity of India, China, the Spice Islands, Java, the Mauritius, and the Cape of Good Hope, and that Swan River may become the centre of the eastern trade, forming a suitable depot for vessels navigating those seas, and may serve as a place of call for East India and China ships.

Plan of Colonization.—On Nov. 4. 1828, Thomas Peel, Esq. Sir Francis Vincent, and others, addressed a memorial to Government for the colonization of Swan River, lately visited by Captain Stirling in his majesty's ship Rainbow. These gentlemen proposed to provide shipping for the purpose of taking out 10,000 of his Majesty's subjects, and to bring to the settlement 1000 head of bulls, cows, bullocks, and calves, and have three small vessels running from Sydney to the settlement. His Majesty's Government, desirous that the experiment should not be made, in the first instance, upon a very large scale, on account of the extensive distress which would be occasioned by a failure in any of the objects expected from the undertaking, limited the grant to a maximum of one million of acres, half a million to be allotted after the arrival of the first vessel containing not less than 400 persons of both sexes, and if this grant was covered by investmeuts before the year 1840, the remaining half million to be allotted by degrees. A convenient allotment of land to be reserved for the town and harbour, for public buildings, and for the accommodation of future settlers, and a priority of choice, to the extent of an hundred thousand acres, to be allowed to Captain Stirling, whose surveys and report of the coast, led to the formation of the settlement. The proportion of male to female settlers, must be not less than five of the former to six of the latter. The passage of labouring persons to be considered as an investment of capital, entitling the parties to an allowance of land, at the rate of L. 15, that is, of two hundred acres. Forty acres are also granted for every L. 3 sterling invested upon public or private objects in the colony. Forty acres are allowed for every child above six years, and 120 for do. under ten ; when the allowance of two hundred will commence. The government to be administered by Captain Stirling, R. N. as civil superintendent of the settlement. Previous to the completion of these arrangements, Sir Francis Vincent and the other gentlemen withdrew their coalition, and Government consented to allow Mr. Thomas Peel to carry on and complete the project by himself.

Captain Stirling in selecting his land named Isle Buache, together with such live stock as may be found in it, the produce of what he left there in 1827. The remainder of the hundred thousand acres, not contained in that island, to be those which are situated nearest to Cape Naturaliste in Geographe Bay ; but as the latter portion must remain a considerable time unprotected, Captain Stirling submitted that he might not be required to stock it, nor to pay to Government the duty of sixpence per acre, until after a protecting force be stationed in that neighbourhood. Government granted to Captain Stirling his request, with a provision to reserve for the use of the crown a certain portion of land along the north-eastern side of the island of Buache, should it hereafter be considered expedient to erect any buildings in that quarter.

Since the arrival of the first vessel at the colony, intelligence has been received in England by various hands, and many gloomy reports disseminated, with an exaggeration of the disappointment felt by those who had founded their hopes in injudicious statements of the great luxuriance of soil. It appears that the first settlers remained in Garden Island for two months after their arrival in huts built from the timber of the country, of which there is great abundance, and closed in by brushwood, Shortly afterwards a town was established at the entrance of Swan River, to which they gave the name of *Freemantle*, and eleven or twelve miles up above Melville Water another was established on the left bank, to be called *Perth ;* the foundation-stone was laid by the lady of Captain Dance. Every one seemed delighted with the exertions and good disposition of the lieutenant-governor. The only mischance has been in the loss of the Marquis of Anglesea off Gage Roads : but it was long after it had landed its emigrants, when it drove away with three anchors a-head on the rocks southward of the entrance to the river. Captain Dance is exerting himself constantly in getting the passage buoyed off, and the same officer has sent an expedition, in the charge of his first lieutenant, to cross the Darling Range, and ascertain the nature of the country beyond, and he intends going in the same direction himself very shortly. Independent of the west coast, and more especially Swan River being one of the best points to start from in an attempt to penetrate into the interior of this very interesting country, now bounded by our establishments, and its shores investigated by our navigators, the safety and success of the colony demand that British intellect should devote its energies in exploring the neighbouring country. But we are too well aware how deeply sensible our Government is of this necessity, that we should venture any remarks of our own.

African Expedition—Messrs. Richard and John Lander sailed from Spithead last month for the western coast of Africa, in the merchant brig Alert, Captain Lyson, which ship also carried out —— M'Lean, Esq. the President of the

Council of Cape Coast Castle, Mr. Murray, surgeon, and other officers sent by the African Company, but who were totally unconnected with the mission of the Messrs. Lander, and were to be left at the latter settlement. The travellers were to have been taken out in a king's ship; but as they were anxious to reach the high countries before the rainy season, which will commence in March, they were unwilling to delay their journey beyond what was absolutely necessary, and therefore took advantage of the Alert, which will carry them as far as Cape Coast Castle. They take with them instructions from the Secretary of State, addressed to the captain of the first king's ship they may chance to meet, after leaving the Alert, and directing him to convey them to Badagry, where he or his officers are to introduce the travellers in the name of our sovereign to the king of that country, Adolee by name. They will from thence proceed to Katunga, the capital of Yarlba, from thence to Boussa, (where Mungo Park was lost,) with a view to trace the river Niger to its termination. If the river should be found to flow into the Bight of Benin, the young men will return by that route; if, on the contrary, it should be found to flow to the eastward, into the lake Tschadan Bornou, they will return over the Great Desert to Tripoli, by way of Fezzan.

Captain Dillon.—Chevalier Captain Peter Dillon, the discoverer of the remains of the expedition of La Perouse, the French circumnavigator, has lately been appointed French vice-consul at Valparaiso and the Southern Seas, and is to sail shortly with an expedition which is now preparing at Brest for Madagascar with missionaries, and to visit the different islands to see if there are not still some persons living of that fatal expedition.

Liberation of M. Bonpland.—Accounts have reached Europe of the liberation of this celebrated naturalist, the companion of Humboldt, whom the dictator, Dr. Francia, has so long detained a prisoner in Paraguay. We anticipate very interesting details respecting that country from his pen. The following is translated from *El Universal*, a journal published at Monte-Video, of the 13th of November:—

"M. Bonpland has at length obtained permission to leave Paraguay, and was at the time of the last packet's sailing from Buenos Ayres at Corrientes."

Corrientes, we may observe, is a town in the province of Entre Rios, upon the Parana, and the nearest town to Paraguay.

This intelligence has been confirmed by two Portuguese passengers, who left Bonpland at Itaprea, on the eve of embarking to proceed by the Parana to Corrientes, and afterwards to Buenos Ayres.

Lakes of the West of America.—From statements published in the New York Statesman, it appears that Lake Ontario is 80 miles long, 40 miles broad, and 500 feet in depth; its surface is supposed to be elevated 213 feet above the level of the sea. Lake Erie is 270 miles broad, 200 feet deep, and at Albany 565 feet above the level of the sea. Lake Huron is 250 miles long, 100 miles broad, 900 feet deep, and about 595 feet above the level of the sea. Lake Michigan is about 260 miles long, 50 miles in breadth, and its depth unknown. Green Bay Lake is 105 miles long, and 20 miles broad. Lake Superior is 480 miles long, 109 miles broad, 900 feet in depth, and its surface is 1048 feet above the level of the sea. This lake is the principal fountain of the imposing mass of water which feeds the rivers, spreads itself in lakes, and resounds over the cataracts of Niagara, St. Lawrence, &c. After forming part of a sphere, 20 degrees to the south, and embellishing and fertilizing one of the most interesting parts of the globe, it empties itself into the sea, 2000 miles from its springs.

NATURAL-HISTORICAL COLLECTIONS.

M. Rang's Zoological Researches in the Mediterranean. Extracted from a Letter to Baron de Ferussac.

Toulon, 1*st September* 1829.

YOU will doubtless feel interested in the results of my first researches in the Mediterranean, of which I shall here present a brief account.

In the harbour of Toulon I found two dorises which I have not seen figured in your plates, and which I am much disposed to look upon as new. These two animals are singularly remarkable for the beauty and lustre of their colours. I found, moreover, several beautiful species of Ascidiæ and a Lima, differing from all those already known.

The first molluscous animal which I gathered at sea is your magnificent Octopus veliferus ; at least so I supposed from the three broad membranes which connect four of its arms. I found it at a short distance from the coast of the kingdom of Valencia, in the stomach of a (*bonite,*) Scomber, which had no doubt just swallowed it, for, although it gave no signs of life, it yet did not appear to have suffered from the effect of digestion. I was thus enabled to obtain its characters in an accurate manner, and to make a good coloured drawing, of which you had none. This individual was not so large as yours, and its three membranes, which I saw entire, present, when unfolded, a very large fan. The four arms which support them are larger than the others, especially the two extreme ones. Lastly, its general colour is purplish-red, very deep, and finely dotted with brown.

Having experienced some days of calm weather, I met with various charming *Pterpoda ;* among others, *Cleodora lanceolata* and *Lessonii.* The latter, which is only as yet known by the figure which I have given of it in the plates of our Monograph of the *Pteropoda,* and which was sent to me by M. Lesson, who found it in the seas of New Holland, is very common in the western part of the Mediterranean, and if it was not sooner known, it was doubtless because the precaution which I use has not generally been taken, of seizing every thing that comes to the surface of the sea at the moment of sunset, in calm weather. I am still convinced that it is in general then only that the *Pteropoda* come to the surface to respire pure air. The *Creseides* presented themselves not less abundantly than in the ocean. They were *C. striata, virgula* and *clava.* The latter gave me an opportunity of observing, for the first time, the product of generation, which discloses itself under the form of a glairy matter enveloping all the anterior and external part of the shell. Nor had I before observed in these animals the position of the heart. When they are alive it is easily distinguished by its pulsations, and by means of a glass, at the posterior part of the body.

The genus *Dio* afforded me a new species remarkable for its small size, its oblong form, its purple colour, and its wings resembling in form the ventral fins of fishes. It often contracts so as to take the form of a ball, from which, however, the caudal extremity still escapes, which gives it the appearance of a small tadpole. It also belongs to the coasts of Spain.

I had the good fortune to meet with a Pteropodous animal which, when better known to me, will certainly form a new genus in the family of *Hyalææ.* Unfortunately I had only a single individual of it, and besides so small, that I have only been able to obtain from it the most superficial characters. This animal did not present a distinct head, but two small opposite and equal fins, connected together by a small intermediate lobe, precisely as in the *Hyalææ.* As to the shell, it is glassy and transparent in the highest degree, spiral and turbinate ; its aperture is round, with the eggs not continuous ; it has no umbilicus, and I was able to count five turns of the spire. This singular little Pteropodous mollus-cum is certainly related to the genus *Limacina ;* but it seems to me that the form of the shell well distinguishes it. I have not succeeded in obtaining a second individual.

The *Atlantides* are extremely common, especially the *Atlantis* of Peron, which is smaller in the Mediterranean than in the Ocean, and still more so than in the Indian Sea. I have with great pleasure observed the *Atlantis* of Keraudren, and its animal, which is by much the prettiest molluscous animal that I know. I have obtained from it some new particulars with respect to this genus, which it will be well to add to what I have already said of it in an anatomical memoir, published two years ago, in the collection of the Natural History Society of Paris. I have discovered, for example, that the mouth is armed with a horny apparatus, similar to that which is observed in the *Carinariæ;* that the posterior part of the animal, that which bears the operculum, is a little dilated in the vertical direction, so as to form a kind of secondary fin; a circumstance which adds to the remarkable similarity between the *Atlantides* and the other *Nucleobranchiata.* I shall also have some particulars to add to those already known respecting this interesting genus.

The *Anatifa vitrea* has also afforded me an opportunity of making some observations, which will contribute to render it better known. It is not fixed, like all the other animals of its class, but free and pelagic, floating about in the open sea just as much as the *Janthina;* for, like it, it suspends itself at the surface of the sea by means of a cluster of white and transparent air vesicles. In the *Anatifa vitrea* this singular organ is an appendage to the fleshy pedicel. By this means the animal floats free upon the water, but it falls to the bottom when it pleases.

On the rocks at Cadiz, I found two beautiful Dorises, which are also unknown to me, and which I have not been able to refer to any of the species in your plates; a fine Pleurobranchiate species, which I had already met with on the coasts of Rochelle, and of which the inner testaceous piece presents a very distinct summit, with from one to one and a half spiral turns; lastly, the *Sigaretus* of Kindelau, which has been described in the Bulletin of the Linnæan Society of Bordeaux. I have discovered that the animal of this small shell changes its colour three or four times during its life, a circumstance which may easily lead to error by inducing observers to consider as distinct species what are merely varieties dependent upon age. This is also the case with the Pleurobranchiate species, of which I made mention above.

I am certain that, had we remained longer at Cadiz, I should have made an abundant harvest, and this so much the more assuredly, that its shores receive the tribute of three different countries. In fact, there are found upon them many mollusca of the Mediterranean, several from the Canary Isles, the Cape Verd Isles, and even the West Indies, and, lastly, the greater part of those of the Gulf of Gascogny.

I keep all these animals in spirit of wine, and have previously taken drawings and descriptions from them while living. I have done the same with many other mollusca, which are well known, but which have either never been figured, or have been represented in an imperfect manner, such as several species of living *Terebratulæ,* of which I have especially studied the singular system of their internal calcareous framework. I may add, that I have four new species of this genus, and that I have described the animal of the *Crania* from live specimens.

I shall soon set sail for the western coasts of Africa, where, notwithstanding the beautiful discoveries already made by Adanson, I anticipate numerous new mollusca and fishes. The taste for natural history is spreading among the officers, who are all desirous of having an occupation to destroy the ennui and monotony of a long campaign. M. Joly, in particular, my first surgeon, who is an excellent officer, lends me great assistance. We intend to collect in all the branches of natural history, which will, perhaps, enable me to discharge the debt I owe to the naturalists of the capital, who have received my investigations with indulgence, or who have deigned to honour me with their friendship.'—*Bullet. des Sciences Nat.*

History of the Developement of the River Crab; by M. Rathke, *of Dantzig.* —The germ appears in the egg of the river Crab, even before the egg is brought to light, under the form of a small disc, which occupies about the tenth part of the vitellus. But, at the moment when the egg is expelled, the matter of this germ expands over the whole yelk, around which it forms a kind of cloud. After some time this matter is brought together again, but only in a partial manner, and so as to preserve the appearance of a multitude of small agglomerated islands. At a later period these small masses dissolve, and the matter of the germ expands a second time over the whole of the yelk. It is again collected under the form of a disc, which, as at first, occupies about the tenth part of the yelk.

By degrees the germ separates in two laminæ, one of which, applied around the yelk, corresponds to the mucous layer of the vertebrate animals, and of which the other represents the serous lamina. As soon as the two edges of the first lamina meet each other, the digestive canal and the sac of the yelk are formed. From the other lamina results the wall of the body. There is also a vascular lamina, which does not always exist separately, but which is confounded with the serous lamina, while, in the vertebrate animals, it is confounded with the mucous lamina.

The central parts of the nervous system appear at the internal surface of the serous lamina. Proceeding from the brain, we perceive ganglia disposed in two close and parallel series, so that there is a pair for each ring of the animal, consequently six pairs for the organs of mastication, five pairs for the feet, and also, probably, six pairs for the tail. Those of the organs of mastication, and of the first pair of feet successively approach each other, and are at length confounded into two ganglionary bodies placed the one behind the other. The other ganglia come close together on the two sides, but keep separate in the longitudinal direction. From this it will be seen, that the nervous system of crabs presents phenomena similar to those which M. Herold has observed in butterflies.

The vitellus draws near the back, placing itself under the shell. The organs of mastication and the feet are at first so like each other, that they might easily be mistaken the one for the other. Not only the tail, but also all that part of the body which gives attachment to the feet and branchiæ, are at first bent downwards. The head constitutes the largest part of the body, and in the whole of the first period, the embryo is in a manner nothing else. This disposition is even observed in the *Cyclopes*, when they issue from the egg. The crab, in leaving the egg, carries with it a very large portion of the vitellus, and is nourished by it for some time. The genital organs only begin to appear after the embryo has left the egg, and the first thing observed is the single ovary or the testicle. Ducts (the deferens and oviduct) proceed from these organs, and traverse, only a few weeks after birth, the roots of the feet, to make their appearance externally.—*Ibid.*

New Species of Pterodactyle. (From a communication by Professor Buckland to the Geological Society of London, in course of publication.) This specimen of pterodactyle was discovered in December last, by Miss Mary Anning, and belongs to a new species of that extinct genus, hitherto recognized only in the lithographic Jura-limestone of Sollenhofen, which the author considers as nearly coeval with the English chalk. The head is wanting, but the rest of the skeleton, though dislocated, is nearly entire; and the length of the claws so much exceeds that of the claws of the Pterodactylus longirostris and brevirostris, (of which the only two known specimens are minutely described by Cuvier,) as to shew that it belongs to another species, for which the name of Pterodactylus macronyx is proposed; it is about the size of a common crow, and a drawing of this fossil by Mr. Clift accompanies the paper. The author had for some time past conjectured, that certain small bones found in the lias at Lyme Regis, and referred to birds, belong rather to the genus Pterodactyle. This conjecture is now verified. It was also suggested to him, in 1823, by Mr. J. S. Miller of Bristol, that the bones in the Stonesfield-slate, which have been usually considered as derived from birds, ought to be attributed to this extraordinary family of flying reptiles. Dr. Buckland is now inclined to adopt this opinion, and is disposed to think still further, that the coleopterous insects, whose elytra occur in the Stonesfield-slate, may have formed the food of the insectivorous pterodactyles. He conceives also, that many of the bones from Tilgate Forest, hitherto referred to birds, may belong to this extinct family of anomalous reptiles; and, from their presence in these various localities, he infers that the genus pterodactyle existed throughout the entire period of the deposition of the great Jura-limestone formation, from the lias to the chalk inclusive, expressing doubts as to the occurrence of any remains of birds, before the commencement of the tertiary strata.—*Ed. Phil. Jour.*

Course of Lectures on the History of the Natural Sciences; by Baron Cuvier.

Cuvier is again lecturing at the Collège de France. The subject he has this year chosen is the history of the natural sciences,—than which there is probably none more admirably calculated for the generalizations which seem to flow spontaneously from his philosophical mind. It is with pleasure that we have it in our power to present to our readers a series of abstracts of these lectures, two of which will be condensed in each successive Number till they are completed.

We have for some time contemplated the possibility of exhibiting, by analytical reports, the nature of the lectures of natural science which are delivered in our own and in foreign schools; and we were delighted when we found ourselves able to use the name of Cuvier as a sanction to our design.

When the present series is concluded, we shall probably continue this section of our labours by reports of the lectures on natural history in the University of Edinburgh.—Ed.

Lectures I. and II.—After having explained the motives which induced him this year to elucidate the history of natural science, M. Cuvier spoke of the utility of this branch of study. And tracing rapidly the progress of science from the earliest periods to our own days, he was led to distinguish three principal epochs: the *religious*, the *philosophical*, and the epoch of the *division of labour*, which may be termed the *scientific* epoch, properly so called.

The 1st epoch comprises the whole period during which science was shut up within the temples, and cultivated solely by priests, who made it a mystery to the vulgar, or presented it to them in an emblematic form.

The 2d epoch dates from the time when the sciences, whose germ had been found in Egypt, began, after a long interval, to be developed in Greece. From the moment of their regeneration they took a new direction, were entirely separated from religion, and were no longer cultivated by the priests, but by sages, who communicated the fruit of their researches without reserve or disguise. Then each of them embraced the whole circle of human knowledge, and the philosopher was at the same time a metaphysician, a moralist, a geometrician, a naturalist, and a physician.

The 3d epoch was marked by the separation which took place between the different branches of science. Each division was cultivated by men who devoted themselves exclusively to it, with the whole energies of their minds; and, by this judicious distribution of labour, an unprecedented success was obtained.

It was not the fault of Aristotle that this epoch was not hastened; indeed, this great man had assigned to each part of science its natural limits. But, unfortunately, he left no successors worthy of him, and the peripatetic sect, which he founded, fell in several centuries into disrepute. It was then only, after a long lapse of time in the middle ages, and towards the commencement of the sixteenth century, that the change took place. Thus the sciences are in reality only founded on three centuries of well regulated labours.

Having thus marked the character of the three scientific epochs, the Professor returned to the first; and, with the view of determining its origin, he penetrated the antiquity of human society: he showed that, notwithstanding the inconsiderable data which we possess on this subject, it is possible to obtain some satisfactory results, by relying at once on history and geology, whose evidences are mutually confirmative. Thus, whilst the traditions of all nations have preserved the remembrance of one great catastrophe, which changed the surface of the earth, and almost annihilated the human race, geology teaches us, that, of the different revolutions which have agitated our globe, the last corresponds, evidently, with the epoch which we assign to the deluge.

We will tell you, said he, how, by means of considerations purely geological, we can obtain, with a degree of precision, the date of this great event.

There are certain formations which must have been commenced immediately after the last catastrophe, and which, from that moment, have been continued to our days with marked regularity. Such are the deposits which we observe at the mouths of rivers, the detritus which lies at the foot of mountains, and is formed of the debris which falls from the summit. These deposits increase every year, by a quantity which observation can make known to us. Consequently, nothing is more easy than to calculate the time which would have been required to produce the accumulation which we see at this day. This calculation has been made for the detritus of mountains; and we have found it to be, in every instance, from 5 to 6000 years. It has been made for the deposits of rivers, and has given the same number of years. In fine, whatever natural phenomenon has been interrogated, we have always received a confirmation of the exaetitude of the traditions. These traditions themselves, treasured in the recollection of men, present the most astonishing conformity. The Hebrew text of Genesis places the deluge in the year 2349, before Christ. The Indians make the fourth age of the world—the age in which we live—to commence in 3012. The Chinese date it about 2384. Confucius indeed represents the first king, Yao, as being occupied in draining off the waters of the ocean, which were elevated to the tops of the mountains, and in repairing the injuries which they had caused.

It was certainly long posterior to this epoch that men began to cultivate the sciences. Astronomy presents the earliest traces, and seems to have sprung up simultaneously in many countries. The first observation of an eclipse made by the Chinese, and of established authenticity, was in the year 776. At Babylon, the most ancient observation made by the Chaldeans, was in the year 747. There is a statement, it is true, that Callysthenes brought from Babylon to Aristotle a series of observations which comprized a period of 1900 years; but this assertion, which was found for the first time in Synesius, a writer of the 16th century, deserves no confidence. Aristotle, who speaks of astronomy in many parts of his works, would not have omitted to notice a fact so important.

It has been supposed that we had discovered in the zodiacs traced on the walls of certain temples in Egypt, a proof that astronomy was cultivated in that country from the remotest times. But whatever interpretation may be given to these zodiacs, we now know, thanks to the discoveries of M. Champollion, the true antiquity of the temples. That of Denderah, in particular, was built under Tiberius, and bears the name of Nero: another is of the reign of Domitian. It may, then, be regarded as sufficiently proved, that the sciences only acquired a certain degree of perfection in the 8th century before the Christian era. However, many ages before that period, great nations were formed in many parts of the earth. About 1500 years before Christ, we find four,—the Indians, the Chinese, the Babylonians, and the Egyptians.

The Chinese having preserved a constant isolation, the progress which they have made has been useful only to themselves, and has contributed nothing to the general civilization. Thus, in giving a history of the sciences, we cannot take this people into account. As to the three others, we observe such a resemblance in their general doctrines, and in the emblems under which these doctrines were wiled, that there has evidently been, at some period, a communication between them.

The subject of metaphysics being the same for all nations, we can conceive that many of them might arrive separately at a similar system of religious philosophy,—we can conceive, moreover, that they might fall upon the choice of similar emblems, since these emblems, in general, are derived from the natural bodies which men have constantly around them. But who can explain the identity of political constitutions, if there have been no communication? We know what is the organization of Indian society; it is to this day what it was before the Christian era. The people are divided into four principal castes: first the Brahmins, the depositories of science and ministers of religion; then the military, those who formerly were charged alone with the defence of the country,—these men have the privilege of hearing the sacred volumes read;—next come the merchants; and lastly the artisans. In these last two castes, the different professions form so many hereditary subdivisions. This singular constitution, which could only originate with a powerful genius, and which would require the most extraordinary means for its establishment, even amongst a single people, is found identically the same in Egypt. No one, surely, would be disposed to think that chance alone could have produced such a coincidence.

A resemblance more astonishing, because it presents itself under circumstances still more arbitrary, is observed between the monuments of the three nations. The columnar architecture might have originated at the same time, it is true, in the artificial caverns of Higher Egypt, and in the subterranean pagodas of India, since it was natural to think of sustaining the ceiling of these excavations by pillars wrought out of the rock; but the resemblance of form could not be determined by the use of similar materials in the edifices, which are constructed on the surface of the earth. In Assyria, instead of granite or syenite, brick alone was used. However, from the relics of religious monuments which remain in this country, we see that their great architectural forms were the same as in India and in Egypt.

Again, the three nations had a degree of resemblance in their geographical situation: all the three were established in the vicinity of large rivers, in countries where internal navigation was favoured by numerous natural canals. The history of the Indians makes us acquainted with them first in the great plains of the Ganges, and having some colonies on the banks of the Indus; the Babylonians were established on the delta of the Euphrates; the Egyptians along the Nile: the three nations possessed the means of an immense commerce, which religion fostered with its protection. There was not, indeed, a sacred edifice which had not a part serving as a depôt for merchandize,—a sort of caravansera.

Although the mode of communication adopted during the religious period, was but little favourable to the progress of the human mind, it is probable that the sciences, in the three couutries which we regard as their cradle, would have attained a very high degree of perfection, if they had not been, at different periods, arrested by the irruptions of barbarians.

The countries inhabited by the Babylonians, the Chinese, and the Indians, form a rich circle around a vast tract, composed in a great measure of elevated, sandy plains, fit only for the support of pastoral tribes. These people could never arrive at the degree of civilization of agricultural nations, and still less of commercial countries; but they are sober, courageous, active, little attached to the soil, eminently calculated for becoming conquerors, and ready, whenever an enterprizing chief presents himself, to rush in innumerable armies upon their richer neighbours. And history exhibits, at all epochs, civilized nations sometimes repelling these erratic tribes, and sometimes submitting to them. China has been invaded at different periods and subjugated by the Tartars, India by the Mongols, Babylonia by the Assyrians, and more lately by the Persians.

Egypt has also, at various times, been invaded by nomadic hordes. The first conquest is that related of the shepherd kings, about the year 1750 before Christ:

they possessed it for two centuries. During this time the order of priests was degraded, and the progress of science stayed. The second irruption was that of the Medes and Persians under Cambyses. Since our era other nomadic tribes have attacked them; the Saracens, and afterwards the Turks. We do not take into consideration the conquest in the time of Alexander: it was, indeed, opposed to civilization, since the Greeks were then more advanced than the Egyptians.

Thus, the sciences continually retarded in the east by the irruptions of barbarians, did not attain a condition favourable to their developement, until they had penetrated into the west, passing from the Egyptians to the Greeks, and from them to the rest of Europe. As to the Indians, they did not contribute directly to our civilization, and it is in fact but a very short time since scientific communication has been established between their country and ours.

It is in India, however, according to all appearances, that we must search for the origin of the sciences. It was in this country, indeed, that man first established himself after his escape from the last cataclysm. The highest mountains of the world, the chains of Himalaya and Thibet, served for their asylum; and the base of the same mountains presented to them the first field for cultivation. Babylonia could then offer nothing but marshes, and Egypt was yet under the waters. All the low country, indeed, as the priests told Herodotus, is a present from the Nile. This river every year deposits a new bed of mud. By counting the number of superincumbent beds, which are easily distinguished from each other, we can learn how much the soil rises during a given time; and thence, by a simple calculation, we arrive at the fact, that 2000 years before Christ, Lower Egypt did not exist.

The priority of the Indians is proved also by a tradition, to which no one seems to have paid attention. We find, indeed, from the extracts which are preserved out of the writings of Manetho, that in the reign of Amenophis, king of the 16th dynasty, a colony from the Indus established itself in Ethiopia. But Diodorus Siculus, and all those who have written upon the religion of Egypt, trace it from Ethiopia or Higher Nubia. Thebes itself was but an island,—but a colony of Meroe, the sacerdotal city of the Ethiopians, Thus, then, civilization would advance from India to Nubia, and from Nubia to Egypt; from the latter country it may be followed to Babylon, since, according to Diodorus, the Chaldeans, who formed the sacred caste in Babylonia, were at first nothing but a colony of Egyptian priests.

We might expect to receive great light on the history of the sciences amongst the Indians, who were the first to cultivate them, and who, notwithstandiug the different conquests, preserved themselves so free from alteration, that we see them in this day precisely as they were in the time of Alexander. No documents are, however, found amongst them. Not that they were destitute of writings even at a very early date; but they have not a single historical work. Perhaps the Brahmins, to concentrate every interest in their own caste, would not allude to events which might bring the others into notice. It is certain that they hold it to be a point of doctrine, that history ought not to be written. The fourth age, say they, the age in which we live, is too miserable; all past time is too degraded for us to seek to preserve it in remembrance. The traces of the effects of civilization, have all then been preserved among them, and the only hope, in this absence of annals, is, that we may draw some indirect information from other books, or from the monuments.

The monuments cannot, in this respect, afford us much assistance. Although they do not bear any date, we may conclude that they are posterior to the times of Alexander or the Ptolemies. If they had existed at this epoch, some Grecian writer would not have failed to speak of them,—their gigantic proportions must at all times have rendered them very remarkable. We may, moreover, in a certain degree, estimate their age by the emblems which are represented on them. These emblems all belong to the religion of the present day; but the mythological notions to which they refer, are only to be found in treatises posterior to the

Vedas, since the metaphysics of these latter books are entirely pantheistic. The temples with which we are acquainted, are therefore less ancient than the Vedas.

As to the Vedas themselves,—the sacred volumes written in Sanscrit,—we have learnt their age from a calendar which was found annexed to one of them, and which gives the position of the vernal equinox. We have been able, by means of the known laws of the precession of equinoxes, to see in which year this calendar must have been closed. It goes back to 1500 years before Christ.

The Vedas contain the exposition of the religious philosophy of the Indians: the Oupavedas, which are of the same date, are composed of different scientific treatises on music, medicine, war, architecture, the mechanical arts, &c. These two works are, as well as some very considerable poems, written in the Sanscrit language, which is not spoken at the present day,—the most regular of all known tongues,—and especially remarkable for containing the roots of different European languages, of the Greek, the Latin, the German, the Sclavonic,—so that it would seem that, to discover the primitive instrument of science, language, we must look to the Indian nation. The astronomical part of the Vedas contains few rules: those by which the Indians now calculate eclipses belong to treatises much posterior, and all bearing a date. These treatises are in verse, and are learnt by heart by the Brahmins of the astronomical caste.

We know that, in the last century, Bailli contended that there were formerly in India a highly advanced astronomy, of which that of the present day is but a feeble relic. His system rested mainly on this point, that the Indians possess methods of calculation much more perfect than their present limited knowledge of mathematics would seem to allow. Admitting the fact, what can we in true logic deduce from it? That the Indians, in times past, have been a little more learned than at present. But this past time is, perhaps, not far removed. We may even admit, with M. Delambre, that the Indians did not invent the formulas of calculation, but received them from the Arabians. These formulas are far from being as perfect as Bailli supposed; but their very defects have served to prove, in a pointed manner, the falsity of the system of which we speak. The Indians vaunt of the possession of a long series of observation, ascending to 4000 years before Christ, an epoch at which, according to them, there was a conjunction of all the planets. If they had, in truth, observed this conjunction, we could, by means of calculation, confirm its reality. And this attempt has been made. But it has been found that this conjunction did not exist; and it has, moreover, been observed, that, if in the retrograding calculation, instead of using the exact formulas which we now possess, we employ the imperfect formulas of the Indians, we arrive at an erroneous result, but which, at the stated epoch, gives the appearance of a conjunction.

It results from these facts, and from many others known by the researches of a learned Englishman, that the ancient Indians had neither an advanced astronomy, nor regular geometry. As to the natural sciences they must have had some smattering, since commerce, which was then in a flourishing condition, caused a multitude of products to pass through their hands; but these sciences never made much progress amongst them. The prohibition which existed against their touching carcases, and the horror which they had of hides, opposed an insurmountable obstacle. In fine, every thing which the Indians could communicate to the Egyptians, was their metaphysics, their mythology, and their constitution.

(To be continued.)

Spontaneous Generation.—M. Geoffroy St. Hilaire, in reporting to the Academy of Sciences, in December last, on M. Bourdon's *Lettres à Camille sur la Physiologie*, announced his opinion on the important question of spontaneous generation. M. Bourdon regards this idea as highly erroneous, and disfiguring the works of Aristotle. St. Hilaire considers that he has pronounced too quickly upon a question which is far from being cleared. The academician entered into some details, from which it resulted that, as he thought, generations termed spontaneous differ not essentially from those which occur in ordinary cases from the co-operation of two individuals. Successive generations performed by certain beings, after a single fecundation, approach still nearer to spontaneous generations; these latter instances present the phenomena in all its simplicity. The preliminary conditions, said M. Geoffroy, are perhaps instantaneous, subtile, I will not say unobservable, but at present unobserved.

Respiration of Vegetables.—M. Adolphe Brongniart, on the 18th of last month, read to the Academy of Sciences, a memoir on the structure of leaves, and on their relations to the respiration of vegetables in air and in water.

The beautiful conclusion resulted from his experiments, that the leaves, the respiratory organs of plants, according as they have to respire gaseous air, or air dissolved in water, undergo modifications analogous to those which the respiratory organs of animals experience in the same circumstances, and according to which these organs are designated by the names of *lungs* and of *branchiæ.*

Phrenology.—Opinions of " the Great in Science and Philosophy."—So much uncandid outcry has been raised against phrenology, under the plea that no men of science have come forward in its support, that, (though we hold this argument to be ridiculous, until it be shown that men of science have duly examined its deserts,) we have been anxious to assemble the remarks which have at different times fallen from men professedly scientific.

We think it necessary to say that, possibly for want of practical study, we are not ourselves convinced of the truth of phrenology; but we consider that respect, at least, should be paid to the opinions of men who, in other matters, are characterized for good sense. In proof of our entire neutrality, we cannot better commence our collections than by giving, in authorized language, the sentiments of Dr. Hope, professor of chemistry in this University,—the remarks of a sound thinker,—but whether founded upon the requisite examination or not, we are unprepared to state.

On the 1st of last month, the second part of a paper on the fundamental principles of phrenology, was read before the Royal Society of Edinburgh, by Sir G. Mackenzie. Dr. Hope in the Chair.

" Dr. Hope, on the conclusion of the paper, stated that he thought himself at liberty to return thanks to Sir Geo. Mackenzie, for the pains he had taken to lay before the Society, a view of the fundamental principles of a doctrince which Sir George thought well founded and highly important to the welfare of mankind, and in particular to the rising generation. That as Sir George had availed himself of that opportunity of recommending to his hearers, to make themselves acquainted with the doctrine by reading the works of Gall and others, he, in his turn, would use the freedom of recommending to Sir George, and other phrenologists, to direct their attention to that view of phrenology which alone he considered as philosophical. Every person, the Professor observed, who is in the smallest degree acquainted with the anatomy of the brain, must know that there lie deep seated a very large number of distinct organs, totally different in appearance, substance, and structure; and as different organs are provided for each of the external senses, it is extremely probable that each of these organs has a particular share in the general mental operations of the brain assigned to it;—that it is a study truly philosophical, and strictly physiological, to investigate the special use of each of these organs, and the particular mental function to which each is subservient;—that much benefit had accrued to medical science and to mankind, from investigating the structure and uses of the other organs of the body—as, for example, the heart—and that, without doubt, both physical and metaphysical science would profit greatly from successful inquiries into the uses of these multifarious and finely constructed organs in the interior of the brain;—that the phrenologists of the present day were not in the right path, and had not advanced a single step in this physiological investigation; for, so far as he knew, they had not ascertained the function performed by any one of them. Dr. H. concluded by strongly recommending to Sir George Mackenzie, and other phrenologists, to pursue the truly philosophical, though very difficult course of inquiry which he had pointed out."

M. Strauss' researches on the Anatomy of Spiders.—M. Strauss is already favourably known by his labours on the anatomy of insects, which the Academy of Sciences, in 1824, judged worthy of one of its prizes. With the intention of completing this beautiful work, this gentleman has continued to devote himself to the study of the organization of those articulated animals which are most nearly related to the insects, and which were long confounded with them.

These are the spiders, *(arachnides,)* and the other genera which are associated with them. Whatever may be the resemblance which the two classes present in their general form, there are, in many parts of their organization, differences so great as to separate them in the most decided manner. In the insects which are destitute of circulatory vessels, the atmospheric air penetrates into their interior by tracheæ, which diffuse it through all parts of the body, to bring it in contact with the nutritive humours: the air seeks for the blood. In the spiders, as respiration is performed by a special apparatus, the blood advances to the air. From this single difference in the respiratory functions, numerous variations in the organization necessarily result.

The respiratory system, therefore, presents the principal distinctive characters between the insects and the spiders, though M. Dumeril does not seem to approve of the manner in which M. Strauss has formed this class. This naturalist composes it of three orders, in which are found the three modes of respiration, pulmonary, tracheal, and branchial.

On continuation of his former memoir, M. Strauss has lately placed before the Academy an anatomical description of the tegumentary and muscular system of the *Mygale avicularia*, or bird-catching crab-spider, which the reporters have thought worthy of competing for the Monthyon prize of physiology.

Geography of Plants.—Distribution of the Meliaceæ.—M. Adrien de Jusseiu has presented to the Academy of Sciences of Paris, a memoir on the family of *Meliaceæ*, upon which MM. Cassini and Desfontaines have pronounced a very favourable report.

The essay is divided into three parts, the first of which, containing general observations, is alone capable of analysis; the other two contain scientific descriptions of all the genera, and of many new species.

M. de Jusseiu sen. had laid down, and happily applied the principle, that plants must be classed according to their affinities, by attributing different values to different orders of characters. M. Adrien de Jusseiu indicated another principle, which is now generally admitted, and which considerably modifies the preceding; viz. that the value of characters, even in an elevated order, is not invariable in all families of plants. Hence it results, that instead of synthesis,—instead of the rules hitherto established, *a priori*, for the determination of families, we must substitute analysis, which requires a minute examination of each particular family. This has been undertaken by the author. The method is not new: almost all the monographs of the day are founded on it; but the execution, which must be considered the most difficult part, has never been treated with success equal to that of M. de Jussieu.

M. de Jussieu in 1789, instituted the family of *Meliaceæ*, previously confounded by Adanson with the *Pistaciæ*. At the same period Cavanilles, treating of monadelphous plants, described and figured a great number of *Meliaceæ;* and since that time, some other botanists have successively extended, or restricted, or regulated this group. Mr. Robert Brown, in 1814, proposed to separate from it a distinct family, under the name of *Cedreleæ;* but M. de Candolle, in 1824, considered the *Cedreleæ* to be only a tribe of the *Meliaceæ*, under which he admitted two others, the *Melieæ* and *Trichileæ*. MM. Blume, Fuhlrott, and Reichebac, have since made other innovations. This was the state of things when M. Adrien de Jussieu undertook his monographic work, the last result of which has been the division of the *Meliaceæ* into two families,—the *Meliaceæ* properly so called, and the *Cedrelaceæ*,—and the subdivision of each into two natural tribes, viz. the former into *Melieæ* and *Trichileæ*, and the latter into *Swieteniæ* and *Cedreleæ*.

The following conclusions are also derived from the researches of M. de Jussieu :—

1. The *Meliaceæ* become more and more frequent, in proportion as we approach the tropics; and they occupy, besides the equatorial zone, that which M. Mirbel has named the transition temperate zone.

2. There is a striking relation between the affinities of the genera and their habitations.

This accordance between the geographical distribution of genera and their botanical distribution, merits the attention of philosophers, because we observe it more or less in many other families, according as they are more deeply studied; and it may serve for the basis of important considerations.

In examining how the *meliaceæ* are distributed over the surface of the globe with relation to each other, the author has marked the following agreement between the geographical and the botanical distribution. If the genera be disposed in a certain series, which, according to their characters, the author considers to be the most natural, and the country of each be noted, we shall find that the order in which these countries follow each other, designs upon the map a very regular itinerary. Thus, he divides the whole group into two families, the *meliaceæ* and the *cedrelaceæ*, and each of these into two tribes. And we find that the series of genera of the first tribe of *meliaceæ*, passing from southern Europe, leads us successively through Africa, its southern isles, Asia, the Archipelagos which connect Asia with New Holland, and stops in this last continent. The series of genera of the second tribe, returning from the South Sea Islands, retraverse New Holland, the Archipelagos, Africa, and arrive in equatorial America, where its maximum is displayed.

A similar statement applies to the other family, whose less numerous species also design in their series two retrogade lines. Thus, a traveller who shall go from Europe to the Antipodes and return, following the route which we have indicated, and who, during his journey, shall collect all the plants of this family, will find that he has gathered them nearly in the order of their affinity.

It is not useless, moreover, to remark, that this frequent relation which we remark between the habitations and the characters of the plants, frequently does not show itself till after a most scrupulous investigation, founded on an intimate inquiry into the modifications of all the organs of plants, into characters of families, when the degree of value has been assigned to each of these characters. Thus the labours of classification are intimately related, in our day, to organography and vegetable statistics.

These preliminary considerations being established, the author gives a detailed description of the characters proper to the family of *meleaceæ*; and then occupies himself with the *cedrelaceæ*.

The latter family is interesting from containing great trees, whose odorous wood, compact structure, and beatiful colour, little liable to alteration, make them eminently fitted for cabinet work. It will be sufficient to cite as an example the *swietenia mahogani* of America, which furnishes the beautiful mahogany wood.

NATURAL-PHILOSOPHICAL COLLECTIONS.

On the Elastic Power of Steam.—Report of the Commission appointed by the Academy of Sciences of Paris.

In the name of a commission, composed of MM. Arago, de Prony, Ampère, Girard, and Dulong, the last mentioned gentleman presented a report, which was entitled :—*An account of inquiries made by order of the Academy of Sciences, for the purpose of determining the elastic powers of the vapour of water at high temperatures.*

The decree which fixes the measures of security to which the construction of steam-engines is to be subjected, prescribes, among others, as a necessary precaution, the employment of *metallic rondelles fusible at temperatures, which surpass by from* 10° *to* 20° *the temperatures corresponding to the elasticity of vapour in the ordinary state of the machine when at work.*

Before such a condition can be complied with, it is necessary to know the temperature which corresponds to a given elasticity of steam. Now, science does not possess this knowledge, and the commission above named was directed to fill up the void which existed on this subject. M. Dulong was particularly charged with the construction of the apparatus, and the direction of the experiments. M. Arago also co-operated with him, and made a great number of experiments in common.

The commission, desirous of making its investigation as perfect as the present state of science demands, and presuming that an opportunity might not soon occur of recommencing and carrying to the same length observations of the same kind as those with which they were engaged, rejected as inaccurate the procedure which consists in estimating the elastic power of steam by means of a valve loaded with weights, and resolved, notwithstanding the difficulty of such an enterprise, to have recourse to the direct measurement of the column of mercury which forms an equivalent to the elasticity of the steam.

When this elasticity does not exceed a certain number of atmospheres, the direct measurement of the fluid column which it can support, presents no difficulty ; but in such cases, as when the pressures of from twenty to thirty atmospheres are to be valued, a column of mercury of from 70 to 80 feet high has to be contained in a tube ; and it is necessary that the tube be of glass, to be easily observable in every part. The difficulties connected with the execution of such a project may readily be conceived. They were, however, surmounted, and the apparatus was finally reared, with the permission of the administration of civil buildings, in the old square tower, known by the name of *Tour de Clovis,* the only remains of the ancient church of St. Genevieve.

The apparatus consisted essentially of two parts : a kettle or caldron intended for supplying the steam, and a glass tube employed for supporting the column of mercury. But it was to be feared that the too rapid augmentation of the power of the steam, and especially the instantaneous diminution which would necessarily follow the opening of the safety-valve, would occasion shocks similar to those of the hydraulic ram ; which might endanger the more fragile parts, and produce the effusion and loss of a great mass of mercury. It was, therefore, necessary to guard against accident.

To accomplish this object, it was resolved not to put the column of mercury immediately in connection with the steam ; but to make use of an intervening instrument, a kind of manometer, which should give precisely the same indications as the column of mercury, without being productive of the same inconveniences.

The operations relative to the measurement of the tension of the stream were, therefore, preceded by an operation, which consisted in ascertaining the precise degree of elasticity acquired by air, whose volume was reduced in a determinate proportion. A given mass of air was therefore submitted to pressures, successively increasing from 1 to 24 atmospheres. The volume which corresponded to each of these pressures was carefully noted; and then there could be substituted for the troublesome column of mercury this mass of air, the different volumes of which would represent determinate weights with the greatest accuracy.

This preliminary operation, which, in consequence of local circumstances, latterly became of absolute necessity, has, moreover, enabled the commission to verify, in an accurate manner, one of the most useful laws of physics, that known by the name of *Marriotte's law.* This law, although it had received a certain degree of verification, was far from being established in a satisfactory manner in reference to high pressures. The last observations of MM. Dulong and Arago leave no doubt now on the subject. A table drawn up by the commissioners presents the results of thirty-nine experiments made on the same mass of air, submitted to pressures comprised between one and twenty-seven atmospheres, and within which Mariotte's law never contradicts itself in any appreciable manner.

The commission of the Academy had the very natural desire of profiting by the apparatus which it had raised, by submitting to observation two or three other species of elastic fluids, and proving whether they also obey Marriotte's law; but they considered it necessary, before all, to complete the inquiries required by the government; and when these were concluded, they found it impossible to obtain from the administration of civil buildings the use of the place in which their pressure-apparatus was put up. "This circumstance," said M. Dulong, "is so much the more vexing, that we could have accomplished the determination of this important point of the mechanics of gases without any increase of expense, and in a very short time; while it would now require a great expense, and several months of severe labour, to be able to resume the subject at the point where we left it."

Determination of the Elastic Powers of the Vapour of Water.

The experimenters, as we have seen, had procured a manometer, by means of which they could know the pressure exercised by the vapour with an accuracy equal to that which experiments made directly upon mercury would have yielded. It was sufficient to put a caldron in communication with the reservoir of this manometer, to accomplish the solution of the problem. By this method there was obtained the great advantage of avoiding the inconveniences already pointed out of great oscillations of the metallic column; and the apparatus was so disposed, that a vapour caldron could be substituted for the pressure pump, without producing any derangement. But, fearing the effects of an explosion in a tower whose arches threatened ruin, and especially on account of the vicinity of the college of Henri IV., the commissioners determined upon transporting their apparatus, with the necessary precautions, to the courts of the observatory. The precise measurement of the high temperature of steam requires precautions, the neglect of which has led some observers into great errors.

The first precaution consists in keeping count of the cooling produced by the atmospheric air upon the part which remains placed externally to the caldron. It can only be done, with accuracy, by keeping the whole of this part at a constant temperature; and this was carefully done.

The second consists in not immediately exposing to the pressure of the steam the thermometer, which serves to indicate this temperature, especially when the pressure is very great. For, even should a thermometer be found which could support it without breaking, it would certainly undergo a pressure which would tend to raise the column of mercury by an effect independent of heat, and would thus produce a cause of error for which it would be very troublesome to make allowance. To obviate this inconvenience, which had not previously been perceived by any observer, the thermometers were placed in the interior of metallic tubes, closed at one end and filled with mercury. They were selected extremely thin, in order to oppose the least possible delay to the transmission of heat, and were filled with mercury. One of the thermometers was immersed to the bottom of the caldron, and gave the temperature of the water in its fluid state; the other, which was shorter, reached only to within a few inches of the surface of the water, and gave the temperature of the steam.

Our knowledge of the elastic powers of steam at high temperatures was, as we have said, of hardly any amount when the commission began its labours. Beyond eight atmospheres, we had in France but a single number communicated to M. Clement by M. Parkins; but this number 215° has been found to be altogether erroneous. The elastic power of steam would be thirty-five atmospheres, while it is in fact only twenty. Steam to form an equipoise to thirty-five atmospheres, would require to be raised to about 245°.

Germany was more advanced than England. M. Arzberges, professor at the Polytechnic Institution of Vienna, had made experiments on the temperature of steam, which he had extended as far as twenty atmospheres. For determining the elasticity of steam, he had employed lever valves, a process very defective in itself, but of which he has corrected the inaccuracies by very ingenious precautions. The most remarkable of these consisted in employing a spherical steel valve, resting upon the edge of a circular orifice formed in another piece of the same substance.

The numbers which he obtained, however, are not correct, and their inaccuracy doubtless depends upon the circumstance of his having neglected, in the valuation of the temperature, two indispensable precautions, which we have already mentioned,—that of withdrawing the thermometer which he immersed in the caldron from the pressure of the steam, and that of making allowance for the cooling produced by the part of the thermometer remaining exposed to the action of the atmospheric air.

The errors resulting from these two omissions would, it is true, affect the results in opposite directions; but their effects could not be perfectly compensated in high pressures. The second would greatly prevail over the first, and would make the temperatures be estimated above what they really were. Thus M. Arzberges found that the pressure of twenty atmospheres corresponds to 222°, whereas it is really furnished by a temperature of 215°.

The law which would correctly express the elastic power of steam in function of the temperature is not known, and no more manifests itself in the new observations of our academicians, than in those which we already possess on the lower part of the thermometric scale. In the mean time, a formula of interpolation has been sought, deduced from experiment alone, and calculated to make known the elastic powers for any given point of the thermometric scale.

Numerous formulæ of this kind have been proposed to the commission by various authors; but none of them has borne the proof of the application to high temperatures. A single remarkable exception is to be made. M. Roche, professor at Strasburg, resting not upon experiment, but upon theoretical considerations peculiar to himself, has arrived at results which agree in a very remarkable manner with those furnished by the Observatory. M. Roche's theoretical opinions are, if we mistake not, submitted to the judgment of the Academy of Sciences, which will report concerning them.

The formula of interpolation which the commissioners have chosen is the following:—

$$e = (1 + 0,7153\, t)\, 5.$$

e is the elasticity, t the temperature. The pressure of the atmosphere is taken as one.

This formula pretty accurately represents all the results furnished by experiment up to 24 atmospheres. The greatest deviation to which its application leads, is observed at the pressure of eight atmospheres. It is then 9-10ths of a centigrade degree. As to the temperatures which correspond to the pressures higher than 24 atmospheres, the above formula gives them so much the more easily, that it has been calculated upon the highest of the pressures observed. The confidence which it has inspired in the commissioners is such, that they are convinced that at 50 atmospheres the error would not be 0.1. The temperatures for the pressures above 24 atmospheres, have been calculated up to 100, but only from five to five. We here give the series of numbers extracted from the table presented to the Academy.

Elasticity of steam, taking the pressure of the atmosphere for one.	Corresponding temperatures given by the *centigrade* thermometers.
1	100°
1½	112.2
2	121.4
2½	128.8
3	135.1
3½	140.6
4	145.4
4½	149.6
5	153.8
5½	156.8
6	160.2
6½	163.48
7	166.5
7½	169.37
8	172.1
9	177.1
10	181.6
11	186.03
12	190.
13	193.7
14	197.19
15	200.48
16	203.60
17	206.57
18	209.4
19	212.1
20	214.7
21	217.2
22	219.6
23	221.9
24	224.2
25	226.3
30	236.2
35	244.85
40	252.55
45	259.52
50	265.89

Extract from the Analysis of the Labours of the Academy of Sciences during the year 1828; *by* Baron Fourier. *(Continued.)*—M. Chevreul presented a memoir, which will be published in the ninth volume of the collection, and of which the title was as follows: *On the optical influence which two coloured objects may have on each other, when they are seen at once, and of the necessity of taking this influence into consideration in the art of dyeing, in order to judge of colours, without reference to their solidity.*

It has long been remarked, that in certain cases the eye sees a coloured body of a different colour from that which is attributed to it when it is seen separately, that is to say, without being surrounded by other coloured objects. Natural philosophers give the name of accidental colours to these appearances. This phenomenon engaged the attention of Buffon, Scheffer, Darwin, Rumford, M. Prieur, Laplace, and others; but in the circumstances in which these authors examined the fact, they could not elicit its whole effects, at least in the case in which the eye sees at once two colours in juxtaposition. M. Chevreul, who, as director of the dyes of the royal manufactures, is obliged to look frequently at different colours, and to view them simultaneously for the purpose of comparing them together, has been induced to examine the subject of accidental colours. He first discovered the general fact, that two differently-coloured objects placed close to each other, always undergo, through the effect of their juxtaposition, a modification in their colour. If the one is of a paler colour than the other, the former becomes lighter, while the other deepens. M. Chevreul has determined by experiment the reciprocal modifications which the seven primitive colours, as they are called, together with black and white, undergo in these circumstances. He has endeavoured to find out the law of these modifications, and has obtained the following remarkable result: *When two colours A and B are seen at the same time, to the colour of A is added the supplementary colour of B, and to the colour of B is added the complementary colour of A.*

The colours are therefore seen the most different possible; and moreover as white appears more bright, or a pale colour appears less deep, when they are seen simultaneously with a deep colour which itself acquires more intensity, there results from this that the contrast takes place with respect to the colour, and with respect to what by the tapestry-manufacturers is named the *depth of the tint.*

M. Chevreul remarks that, in the explanation which several natural philosophers have given of the accidental colours, two very different cases have not been sufficiently distinguished. The first is that in which the eye, after looking long, for example, on a small square of red paper placed on a white ground, ceases to look upon it, and is suddenly directed to some other part of the white ground, there is then perceived a small green square, that is, a square of the complementary colour of red. We can very easily conceive with P. Scheffer how, in this case, the part of the retina on which is painted the image of the red square, being fatigued by this sensation, it happens that the eye ceasing to look at it, and always seeing white, the part of the retina, which is fatigued by the red, must receive a stronger impression from the complementary rays of the red than from these rays themselves, so that the eye must see a green spot. But in the case in which M. Chevreul has examined the accidental colours, there are two differently coloured and contiguous equal zones which are seen simultaneously; and the complementary colour of one of the colours acts, not upon the part of the retina which sees that colour, but upon the part which sees the other colour. The learned author intends to recur to the explanation of these phenomena, having only accidentally touched upon them in the Memoir which he has read to the Academy.

A part of M. Chevreul's Memoir is devoted to the applications of his inquiries to the manufacture of tapestry, and, in general, to the optical effects of several colours. He explains the differences which the disposition of the same colours, and the manner in which they are blended, produce upon the organ of vision. Lastly, he gives very simple means of judging of the brightness of the colours of a painting, or piece of tapestry, in cases in which the phenomenon in question might lead into error, were one desirous of judging of these colours in an absolute manner, by looking upon them simultaneously with those in their vicinity.

New Observations on the Disengagement of Carbonic Acid Gas in Auvergne; by M. J. Fournet.—M. Fournet has made observations in the mines of Pontgibaud, of which he is director, and in the vicinity, upon the disengagement of carbonic gas which fills the crevices, the druses, and, so to speak, the pores of the vein. In disengaging itself it emits a whistling sound, and frequently a rumbling noise. The mass of the ground and mountain is so saturated with it that the upper galleries allow it to escape in abundance, although their communication with below is intercepted by the lower gallery. The disengagement in the upper parts of the vein is of short duration, whereas a continual and very violent ebullition manifests itself in the waters which run upon the floor of the lower gallery.

Sometimes the disengagement of the gas is intermittent with very near periods. Thus, in the first upper gallery, about a fathom beyond the branching of the vein, a fissure was met with, which roared loudly during a quarter of an hour, ceased to be heard during the same time, and recommenced in the same manner. After some days the phenomenon disappeared.

When intermittence takes place, it is sufficient to sound the fissure with a stick, to make the rumbling recommence. At the floor of the gallery there occurs a similar spring, whose intermissions are at shorter periods. It is remarkable that the gas is more abundant in the galleries during westerly winds and in stormy weather; and then the quantity sometimes becomes so great, that it is impossible to remain in the lower works, whereas, in ordinary cases, the gas does not rise more than a few inches above the ground. The temperature increases considerably in the parts filled with gas, which assimilates this phenomenon to that of hot springs.

M. Fournet remarks, that the phenomenon which is observed at Pontgibaud had been considered as unique in the *Annales des Mines*, and yet that several cases of a like nature have already been met with. For example, Alonzo Barba, a Spanish metallurgist, mentioned in 1630 a disengagement of gas which had "a smell similar to that which one breathes in a cellar filled with new wine, in a state of fermentation."

Carbonic acid gas occurs, in many places, in the neighbourhood of Pontgibaud. When it is dissolved in water, it acts as a solvent upon certain mineral substances, and especially the carbonates of lime, iron, and manganese.

M. Fournet imagined, at first, that it came from the volcanic agents which have overturned Auvergne, a conclusion countenanced by the circumstances of other deposits of similar formation presenting the same springs. But it must be observed that, in some countries, as Corsica, Auvergne, and the Vosges, gaseous springs are also met with in limestone formations.—*Annales Scientifiques, litter. et industr. de l'Auvergne, June* 1829.

Chemistry.—M. Despretz communicated to the Academy of Sciences, on the 18th January last, the following results, derived from his chemical researches.

1. Nickel, cobalt, zinc, and tin, at a red heat, possess, like iron, the property of decomposing water; and their oxides, at the same temperature, are reduced by hydrogen gas.

2. Carbonic acid is acted upon in the same way as water: it is transformed by zinc and tin into oxide of carbon, and this latter gas completely reduces the oxides of the three metals. Herein we see a fact, which has been considered to be anomalous, extended to many metals, and to many binary bodies.

3. Crystallizable acetic acid may be prepared by heating a mixture of acetate of lead, and of a proportional of concentrated sulphuric acid. The process by which the acid is obtained is kept secret by the discoverer, who supplies all the laboratories in Paris.

4. By placing in a good furnace, at a high temperature, a mixture of sulphur and of oxide of zinc, a sulphuret of zinc is produced, which experienced mineralogists have confounded with blende, (native sulphuret of zinc.)

Sulphate and Carbonate of Magnesia from Magnesian Limestone.—M. Pelletier has announced to the Academy of Sciences the discovery of a process, by which he has obtained the sulphate and carbonate of magnesia in great quantities from the magnesian limestone, of which there exist in France many beds, hitherto unknown.

The quantity of salts manufactured by M. Pelletier exceeds fifteen hundred weights; and they are of such a superior quality that they might be taken for our Epsom salts.

M. Serullas' Researches on Iodic Acid.—M. Serullas has discovered a process, by which iodic acid may be obtained in abundance, and well crystallized. He treats a solution of iodate of soda with an excess of sulphuric acid. The mixture, left to spontaneous evaporation, yields, in a short time, crystals of pure iodic acid. The sulphate of potassa which has been formed, and the excess of sulphuric acid, remain in solution.

M. Serullas has been led, by his researches, to perceive that the double acids named by Davy, iodo-sulphuric, iodo-nitric, and iodo-phosphoric acid, do not exist.—*Le Globe.*

Discovery of the Metallic Bases of Glucina and of Magnesia.—At a meeting of the Academy of Sciences, on the 25th January last, M. Bussy requested that a sealed packet, which he had sent in on the 4th August 1828, might be opened. He stated that it contained the chloruret of glucinium and metallic glucinium, obtained by the decomposition of the chloruret, by a process analogous to that by which M. Wolher produced the base of magnesia.

M. Bussy, at the same time, announced that he has obtained magnesium, the metallic base of magnesia. He exhibited a specimen of this metal, which possesses the following properties: it is brilliant, and of a silvery whiteness; perfectly ductile and malleable; fusible at a temperature of moderate elevation; susceptible, like zinc, of volatilization at a heat a little above the point of fusion; and condenses, like the same metal, in the form of small globules. It does not decompose water at the ordinary temperature; it becomes oxidized at a high temperature, and is slowly transformed into magnesia when it is in rather large pieces; but when it is in a fine dust, it burns with much brilliancy, sending forth sparks like iron in oxygen gas.

M. Bussy thinks that magnesium might be made useful in the arts; and he is now engaged in seeking for means of preparing it in a simple manner, and at slight expense.—*Ibid.*

Preparation of Urea, by M. Henry.—Let a slight excess of the subacetate or the hydrate of lead be added to recent urine; a precipitate will fall, which will contain salts formed by the union of the acids in the urine with oxide of lead, and also a combination of the mucus and animal matter present with the hydrate or subsalt used.

The clear fluid is to be acted upon by diluted sulphuric acid, added until in slight excess, to separate the lead present, and to act, during the future evaporation, upon the acetates of soda and lime which may be formed. The liquid is again to be freed from the precipitate, and quickly evaporated, animal charcoal being added to it during the ebullition. When clear, the fluid is to be strained through a fine cloth, and concentrated to one-third of its bulk; on cooling, it will probably become a yellowish acicular crystalline mass, consisting of much urea and some salts. The crystals, when drained and pressed, are to be added to those produced by evaporating the mother water, also similarly treated; being thus freed from the brown viscid matter which previously accompanied them, they are to be treated with a small quantity of carbonate of soda, to decompose any acetate of lime which may remain, and then are to be digested in alcohol. The solution, filtered and distilled, leaves urea, which may be recrystallized by solution in water and evaporation.—*Journ. de Pharmacie.*

CATALOGUE RAISONNÉ.

History of Insects. Vol. I.—*Family Library.* No. VII. Murray. London. 1829.

This little volume, beautiful as all its contemporaries, is another and a very forcible proof of the great utility which a new system of publication may be to the propagation of useful and of scientific knowledge. The voluminous works of Reaumur, Redi, Huber, &c. are here analyzed, and their results given in an agreeable form, and much pains has been taken to illustrate the interesting subject of the natural history of insects with excellent wood-cuts. By these means, the results of arduous investigations and researches, before seldom read, are now attainable by every one; and on becoming acquainted with the natural history of the bee, the wasp, the ant, the gnat, ichneumon, caterpillar, &c. which are contained in this first volume, many will be surprized at the interest that will be then first developed, as existing in a perusal of the habits of these little creatures, they will be struck with the ingenuity of their contrivances, and the great scope of their instinct,—in some cases, one would think, almost adapted to the circumstances in which they may be placed; and we are still further sure that no one will read through these pages, without feeling humbled in his pride, in thinking of the many opportunities he has before neglected, of acquainting himself with such an interesting subject, while he inwardly acknowledges that there is a simplicity, a beauty, and a variety, characteristic of the facts contained in the natural history even of the lowest animals, that is capable of exciting more interest, and a higher sense of delight and gratification, than the images of fancy, though painted in the most glowing and varied colours, and which more often surfeit the imagination than they satisfy the mind.

Observations on the Teeth of the *Erinaceus Europæus,* Urchin, or Common Hedge-Hog. By Gilbert Thomas Burnet, Esq.—*Quarterly Journ. of Science. (New Series.)* No. XII.

Mr. Burnet, after noticing the contradictory statements made with respect to the dentition of the hedge-hog, states his belief that the teeth described by Linnæus as canines, two on each side recumbent, are in truth degenerate incisors, and that the anterior of his molar teeth, are the real transitional canines; and that hence the hedge-hog forms an admirable illustration of the transitional structure which connects two tribes of quadrupeds whose habits and dispositions are essentially distinct,—the *Rodentia* and the *Feræ*.

Chemical Examination of a Native Arseniuret of Manganese. By Robert John Kane, Esq.—*Ibid.*

In experimenting in a tube retort on some oxides of manganese, the author was led to the discovery of this ore, which was purchased as coming from Saxony. The subsequent experiments are conducted with an accuracy that would seem to warrant confidence in the results. The qualities of this metal are as follows: specific gravity 5.55; hard, brittle, perdendicular fracture, uneven, fine-grained, brilliant; colour grayish-white, growing dull, and becoming covered with a fine blackish powder on exposure to air; horizontal fracture dull and mamillary. Burns with a bluish flame before the blow-pipe, and emits a smell of arsenic. Is totally dissolved by nitro-muriatic acid. The result of three different analyses were,

Manganese, - - -	45.5
Arsenic, - - - -	51.8
Loss, and a trace of iron, -	2.7
	100.0

The relative equivalents might be thus arranged :—

	At. weight.	Theory.	Experiment.
Manganese, - -	28	42.4	45.5
Arsenic, - - -	38	57.6	51.8
			Loss, 2.7
Mang. + Ars. -	66	100.0	100.0

On a New Salt obtained by the partial decomposition of Perchloride of Mercury. By R. Phillips, F.R.S.L. & E.—*Phil. Mag. (New Series.)* No. XXXVIII.

Gay Lussac had already, in his stenographed lectures, mentioned the formation of sub-chloride of mercury, by mixing the per-chloride with the peroxide, and some other processes. By putting hard carbonate of lime, such as Iceland spar, into a solution of corrosive sublimate, months are required to obtain even a few crystals of the salt. The dipermuriate may, however, be obtained, free of all admixture, by dissolving 1 atom, $=272$ grains, of per-chloride of mercury in water, heating the solution, and adding to it 648 grains, $=3$ atoms, of per-oxide of mercury, obtained either by decomposing the per-nitrate with heat, or corrosive sublimate with potash. The author gives a further analysis of the salt, by which it would appear that it consists of

One atom of muriatic acid, - -	37 or	7.8
Two atoms of per-oxide of mercury, -	432 or	92.2
	469	100.0

An Introductory Treatise on the Nature and Properties of Light, and on Optical Instruments. By W. M. Higgins. Nimmo, London. Blackwood, Edinburgh. 1829.

This little work is composed of many pretty historical recollections, and much physico-mathematical speculation. The pervading spirit of the book is the shadow of a conjunction between the stern truths of mathematics, for which Mr. Higgins professes a high reference, and the tantalizing deceptiousness of what is called physical *science*, to wit, such subjects as "the ultimate divisibility of matter," "the *nature* of light," "the *causes* of reflection and refraction," &c.

Mr. Higgins has perhaps here wandered into a darkness in the mysteries of physics, which the light of mathematics will serve but faintly to illuminate, and has probably been a little deceived in supposing that he can demonstrate the infinite divisibility of matter by geometrical figures.

The author does not lay claim to much originality, his object being "to assist those who, like himself, are climbing the hill of science;" but states that his "opinions concerning the nature of light are in some degree novel." These opinions appear to be comprised in the proposition, that "when the spheres of attraction which surround any particles of matter are destroyed, those particles produce light,"—a view in which, from certain facts observed in the production of caloric, we are much inclined to coincide.

We cannot give more than one specimen of the author's reasoning.—Having remarked that the supposition of the *penetrability* of matter depends upon the doctrine of the *infinite minuteness* of the particles, he contends that it is easily proved that "matter is divisible *ad infinitum*," and rests his proof upon the supposition, that the tangent of a circular arc A, could not be brought in contact, in every point, with an arc of another circle B, described from a centre at an indefinite distance in the line of the radius of the circle A; or, in other words, he presumes the tangent line to be *absolutely straight*, and therefore incompatible with any arc of a circle. *Ex uno*, &c.

Elementary remarks on optical instruments conclnde the work, which, on the whole, we have found to be a very pleasant book to read.

Sur le pouvoir Magnétisant, &c. On the Magnetizing Power of the Solar Rays; by MM. P. Riess and L. Moser,—*Ann. de Chim. Nov.* 1829.

"The surest method of judging of the magnetism of a needle," say the authors of this memoir, "is by making it oscillate;" and this plan they have followed in their experiments.

The observations on the magnetizing influence of the solar rays, conducted by Morichini, Mrs. Somerville, Baumgartner, Christie, and more lately, the essay of M. Zantedeschi, (*vide* Vol. I. p. 152. of this Journal,) have, in comparison with other experiments, involved this question in extreme doubt. In the present unsettled state of opinion, all new facts are desirable, and MM. Riess and Moser have supplied their mite of information.

The needles they used were of wrought steel; their size was very small, but they presented a considerable surface to the influence of the light. By examining them some time before use, the experimenters made themselves minutely acquainted with their magnetic intensity.

The result of the labours of MM. Riess and Moser, is the total rejection of a discovery which for a period of twenty-seven years has been a matter of discussion.

Note sur une nouvelle combinaison, &c. Notice of a new natural combination of the Carbonates of Lime and Soda, differing from Gay-Lussite. By M. Germain Barruel.—*Ibid.*

This mineral, whose structure is laminar, presents without difficulty three directions of cleavage, giving a rhomboedron similar to that of primitive carbonate of lime, as far as the author could judge without a goniometer. There are appearances of a cleavage in the direction of the small diagonal.

The transparence is perfect in fragments which are clear; the lustre is glassy, similar to that of arragonite. It marks carbonate of lime deeply, arragonite with difficulty: the needles of arragonite also mark this substance, but very slightly. The powder is white. Sp. gr. 2.921.

The double refraction is the same as that of Iceland spar.

It dissolves entirely with effervescence in nitric acid. With the blowpipe, heated alone, it decrepitates a little at first, then becomes brown, and is at length reduced to lime, but with more difficulty than pure carbonate of lime.

Its powder melted with borax dissolves with effervescence. A milky globule is obtained, demi-diaphanous, slightly pearly, becoming opaque and dull after long contact with the air.

The result of analysis is,

Gangue, - -	0.050
Per-oxide of iron,	0.010
Carbonate of lime,	0.700
Carbonate sf soda,	0.140
Water, - -	0.097
	0.997

i. e. Carbonate of lime,	11 atoms.
Carbonate of soda,	2 atoms.
Water, -	about 9 atoms.

Lettre de M. Pelletier, &c. Letter from M. Pelletier to M. Gay-Lussac on a New Alcaloid.—*Ibid.*

The true Peruvian bark is generally adulterated with a bark exactly resembling it in appearance, and possessing a similar taste, but without its medicinal qualities. It may, however, be well distinguished by the application of a little concentrated nitric acid, which converts the colour of the true *cinchona* into a red brown, whilst it gives to the adulterating substance a deep green colour.

This latter bark has been lately submitted to examination by M. Pelletier, with the assistance of M. Coreal, and the result of their investigations, read before the Royal Academy of Medicine, is condensed in the notice whose title we have quoted.

The discovery of a new alcaloid is the fruit of M. Pelletier's labours. Like cinchonia, it is white, transparent, crystalline; but it differs from cinchonia, in not being volatilized, when after having been melted, its temperature is augmented.

It is soluble in alcohol and ether, but absolutely insoluble in water. At first it seems to have no taste, but after some time it leaves in the mouth a sensation of heat, complicated with bitterness and astringency. The acids develope its savour.

But by combining this bark with acids, we principally distinguish it from cinchonia. With sulphuric acid we know that cinchonia forms a salt which crystallizes in rhomboidal prisms. The new alcaloid combines also with sulphuric acid; but the result is not crystallizable by aqueous solution. When dissolved in a certain proportion of boiling water, the solution, in cooling, becomes a white jelly, similar to *blanc-manger*. The gelatinous mass, when dried, appears horny; re-dissolved by boiling water, it again becomes gelatinous.

It is the intention of M. Pelletier to present an extended memoir on this new alcaloid, in which he will, at the same time, determine the botanical species of the bark, and give its elementary analysis.

Species général des Coléoptères, de la Collection de M. le Comte Dejean. Tom. IV. Dec. 1829. 8vo. Pp. 510.

This new volume of Dejean's *Species général* contains the descriptions of the tribe *Harpaliæ*, which corresponds nearly to the genus *Harpalus* of Bonelli, at least in the European species, though there is some doubt as to certain exotic genera. The difficulty of determining the limits of the tribe, arises from an imperfect knowledge of the sexual differences.

In the synoptical table to the 1st volume of this work, the author gave as the character of the *Harpaliæ*, "four anterior tarsi dilated in the males," which applies to most of the genera composing this tribe; but in some the dilatation of the intermediate tarsi is so slight as scarcely to be perceptible: and he now conceives it to be more accurate to give as the character of this tribe, "the first four joints of the anterior tarsi dilated in the males."

The tribe *Harpaliæ* contains 27 genera, and the genus *Harpalus* alone includes 168 species.

Illustrations of British Ornithology. Series Second. *Water Birds.* By P. J. Selby, Esq. No. VIII. Longman & Co. London; W. H. Lizars, Edinburgh.

The gratitude of his country is due to Mr. Selby for the national work which periodically appears from his delightful pencil. It has been said that Britain does not foster the elegant and costly productions of her scientific sons; but if Selby, Jardine, Wilson, are repaid,—if Audubon can find his account in leaving his own country, and selecting England, when Europe lay before him, for the publication of his work,—without alluding to the magnificent works which incessantly spring up on kindred subjects,—we affirm that our countrymen suffer not by comparison with the love of science in any foreign land. Wherever merit is, there they give support.

This second series, of which the 8th No. is just published, will be completed in two more fasciculi.

The present No. contains the Black Tern, Red-breasted Merganser, Common and Ferruginous Pochard, Gooseander, Common Cormorant, Iceland Gull, Scooping Avocet, Bean Goose, White Stork, Garganey Teal, Kittiwake, and Little Grebe.

Nearly all the plates are etched by Mr. Selby, and finished by Mr. W. H. Lizars. Temporary descriptions accompany each No. till the general volume of letter-press is finished.

PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

EDINBURGH.

Royal Society.—Feb. 4. 1830. Sir George Mackenzie concluded his paper on the Fundamental Principles of Phrenology. Professor Hope, in returning thanks, made some remarks on the philosophy of the doctrine, and adverse to the method of investigatiou pursued.—(Vide p. 462, of the present No.)

Notice of a Meteorological Journal, kept for twenty-five years at Carlisle, by Mr. W. Pitt, was then read ; and, afterwards, an account of a specimen of mineral called Wad, by Dr. Turner.

Feb. 15. Dr. Knox read some highly important observations, to determine the male and female, and equivocal organs in both sexes, being the first part of his observations, illustrating the laws which regulate hermaphroditical appearances in the mammalia, and the extent to which their presence affects the functions of the perfect animals.

A letter was read from the Chevalier Aldini, announcing his approaching arrival in Edinburgh, and requesting the support of the Society.

Mr. Allan expressed himself astonished that this gentleman should not have put in force the manufacture of the asbestus cloth in his own country, where we understood him to say that mineral was very abundant.

Wernerian Society.—Jan. 23. A notice was read on the occurrence of Coal under the new Red Sandstone near to Leicester, by Mr. Forster ; communicated by Henry Witham, Esq. Professor Jameson made some observations, tending to prove that this position of coal strata is not very unfrequent.

A paper was read on the Circulation of the Blood in the Fœtus in Man, and in the lower Animals, by Dr. John Aitken.

Mr. Reid exhibited the experiment of Chalk, exposed to the united action of Oxygen and Hydrogen Gases in a state of ignition, between two concave polished surfaces, and before a common light-house reflector.

Feb. 6. Mark Watt, Esq. read a communication on the power which certain species of Spiders possess of fixing their threads horizontally between two perpendicular bodies, placed at a distance from each other.

A letter was read from the Rev. Alexander Duncan to the Secretary, containing a notice of a sort of fascination practised on small birds by the Whitrit or Weasel.

The Rev. Dr. Scott of Corstorphine read a dissertation " the Dishong of Moses, or the Gazelle of the Plain," the Pygary of the English Bible.

Mr. Deuchar exhibited an experiment in Magnetism. A ball of soft iron being placed upon a magnet, and another ball cf the same substance applied to it, the latter will be found to possess a stronger attraction for the former than the magnet.

Royal Physical Society.—Jan. 27. Mr. K. T. Kemp, lecturer on chemistry, communicated some experiments on the Decomposition of Water, tending to prove that Water is the Deutoxide of Hydrogen.

Mr. W. Ainsworth read a paper on the Effects of Radiation on the Colour of the Hyperborean races of Man.

Feb. 3. Mr. J. P. Young communicated some Observations on the Changes in the Course of the Mississipi and Yazou Rivers.

Mr. K. T. Kemp detailed a series of experiments on the formation of the Ammoniacal Amalgam, being a new process by which the Ammoniacal Amalgam is formed without the usual Decomposition of a Salt of Ammonia.

Feb. 10. Mr. Thomas J. Aitken, lecturer on physiology, communicated a notice on the Motions of the Eye.

Mr. K. T. Kemp's Experiments on the Ammoniacal Amalgam were postponed.

Mr. W. Ainsworth communicated some Remarks on the Results of Mr. Pentland's Researches in Southern Peru.

Plinian Society.—*Jan.* 26. A paper was read on the British Species and Varieties of the genus Erica, by Mr. Bushnan.

Feb. 2. Mr. Adie read a communication on Salt Mines.

Mr. Edwards read a paper, containing Observations on the Queen Bee.

Feb. 9. Specimens were presented of Limestone with Manganese, by Mr. Westmacott; of *Bovista gigantea*, by Mr. R. Spittal, (vid. Edin. Phil. Journ. July—October 1829, p. 377. ;) and cells and specimens of the Queen Bee by Mr. Adie.

A paper was then read by Mr. Bain on Subterranean Temperature.

LONDON.

Royal Society.—*Jan.* 28. Experiments on the Influence of the Aurora Borealis on the Magnetic Needle, extracted from Letters from the Rev. James Farquharson to Captain Sabine, were read.

On the Production of Regular Double Refraction on the Molecules of Bodies by Simple Pressure, with Observations on the Origin of the Doubly Refracting Structure, by David Brewster, LL.D. F.R.SS. Lond. and Ed.

Remarks on several Icebergs, which have been met with in unusually low latitudes in the Southern hemisphere, by Captain James Horsburgh, hydrographer to the East India Company.

The Coronian Lecture, read at a recent meeting, was entitled, "Report on the Peculiarities met with in the Stomach of the Zariffa, (his Majesty's Giraffe, which died at Windsor, and was lately dissected there.) In common with other ruminant quadrupeds, the Zariffa has a stomach consisting of four cavities. The efflorescence which lines the paunch is similar to that of the bullock, but is more prominent. The second cavity is destitute of the cellular structure met with in other ruminants; but the third and fourth cavities exhibit no peculiarities. The cud, formed from the leaves and twigs of the Acaciæ, which are the natural food of the Zariffa, is so succulent, as not to require being again moistened in passing through the second stomach, as is the case with grass. The cavity is therefore not furnished with cells, which are provided for this purpose in herbiverous quadrupeds.

Geological Society.—*Dec.* 18. A paper was read, entitled, Observations on part of the Low Countries and North of France, principally near Maestricht and Aix-la-Chapelle, by William Henry Fitton, M.D. F.G.S. &c.

Jan. 1. Henry T. de la Beche, Esq. F.G.S. F.R.S. &c. read a paper on the Geology of the Shores of the Gulf of La Spezia.

Linnean Society.—*Jan.* 19. An account was read of the Mode of Growth of Corals of the Genus *Fungia*, by Mr. Samuel Stutchburg, A.L.S.

A communication was read on a New Species of Swan taken in England, and hitherto confounded with the Hooper, by William Yarell, Esq. F.L.S. Mr. Yarell gives the name of Cygnus Bewickii to this new species; its characters he gives as follows:—

"*C. rostro semicylindrico atro, cerâ flavâ, corporealbo, caudâ restricibus* 18, *pedibus nigris.*"

PROVINCIAL.

Royal Geological Society of Cornwall.—At the Anniversary Meeting, held on the 16th October 1829, Davies Gilbert, Esq. M.P. P.R.S. &c. President, in the

Chair. The report of Council was read. It congratulated the Society on increasing interest and improvement. A new Cabinet had been added to the Museum, and the Metallic and Earthy Minerals completely arranged. Sections of the Map of Cornwall, presented last year by George S. Borlase, have been transmitted to W. M. Tweedy, Esq.; Mr. Henwood; Mr. Petherick, Lanescot Mine; G. B. Kingdon, Esq. of Stratton; and Mr. Mitchell of Breage; who have undertaken to lay down the geology, &c. of the different districts to which they refer.

Some further communications on the Stream Works of Cornwall have been received this year. Interesting donations of Minerals have been also received.

It was resolved that the report of Council be printed and circulated.

Officers and Council of the present year:—*President:* Davies Gilbert, Esq. M.P. P.R.S. &c. &c.—*Vice-Presidents:* John Hawkins, Esq. F.R.S.; Lieut. General Tench; John Samuel Enys, Esq.; Robert Were Fox, Esq.—*Secretary:* E. C. Giddy, Esq.—*Librarian:* Thomas Hingston, M.D.—*Treasurer:* Joseph Carne, Esq.—*Council:* Thomas Peel, Esq.; Thos. Bolitho, Esq.; Samuel Borlase, Esq.; George Harvey, Esq.; G. C. Fox, Esq.; Wm. Millett Boase, M.D.; Richard Fox, M.D.; Stephen Davey, Esq.; Rev. C. V. Le Grice; John Armstrong, Esq.

David Brewster, L.L.D. F.R.S. &c.; and the Rev. W. V. Vernon, M.A. F.R.S. President of the Yorkshire Philosophical Society, were elected Honorary Members of the Society.

Yorkshire Philosophical Society.—The Museum of this Society, which has long been an object of anxious interest to the inhabitants of the city and county of York, was opened to the members and the public on Tuesday, February 2, on the occasion of the Annual Meeting of the Society.

The Rev. W. V. Vernon, President, in the Chair. The report of Council was read, congratulating the Society on taking possession of its new premises; noticing the obligations of the Society to the architects; the plan of a Botanical Garden, &c. It further stated, that the annual accounts of the Society are in a prosperous state; but that much expense had been incurred by the Building Committee.

Motions, indicative of the approbation of the Members and Office-bearers, of the report of Council were made and carried.

It was further moved by Sir George Cayley, Bart. that the Meeting recommend an appeal to be made to the county of York, for a renewed Subscription towards liquidating the Debt incurred by the completion of the Building, the formation of the Botanic Garden, and other improvements connected with the Institution.

Thanks were given to the President, Secretaries, and other Office-Bearers; to Wm. Wilkins, Esq. R.A., and J. P. Pritchett, Esq. Architects; and to the Authors of Communications, Donors of Books, Specimens, &c. &c.

Davies Gilbert, Esq.; the Baron de Ferussac; Dr. Brewster; the Rev. Wm. Turner; and John Dunn, Esq.; were elected honorary members of the Institution.

The following Officers were elected for the current year:—

President: The Rev. W. V. Vernon, F.R.S. L. and E. &c. re-elected.—*Vice-Presidents,* (re-elected:) Rev. D. R. Currer; William Danby, Esq.; H. Preston, Esq.; Hon. and Rev. H. Howard; Hon. W. S. Lascelles; Wm. Salmond, Esq. F.G.S.—*New Vice-Presidents:* Hon. E. Petre; Joshua Crompton, Esq.; Rev. C. Sykes; P. B. Thomson, Esq. M.P.; Mr. Alderman Wilson; Wm. Worsley, Esq.—*New Members of the Council:* James Atkinson, Esq.; Barnard Hague, Esq.; Rev. W. Lund; J. P. Pritchett, Esq.—*Treasurer:* Jona. Gray, Esq. re-elected.—*Secretaries:* George Goldie, M.D. and Wm. Gray, jun. Esq., re-elected; John Phillips, F.G.S. (in the room of Wm. Wright, Esq. resigned.)

FOREIGN.

Academy of Sciences.—Dec. 21. 1829. Mr. Pelletier announced to the Academy, that he had succeeded in Manufacturing Sulphate and Carbonate of Magnesia, in great quantities, from Magnesian Limestone, of which there exist many beds in France which have hitherto been neglected.

Mr. Chevalier addressed a Memoir of Mr d'Arcet, on the Property which Chlorurets possess of preserving from the Plague.

Mr. Boisbertrand sent a process, intended to render the forgery of Notes impossible.

The Council of Health sent to the Academy a Memoir of Drs. Thionville and Vanderbuch, on the Fossil Vertebræ and Ribs of a great Oviparous Quadruped, which the authors found in the environs of Paris, accompanied with Fresh Water Shells and a Human Finger, which appears to be the ring finger of the left hand. Messrs. Brochant and Cordier were appointed to report on it.

Mr. Poisson reported on the work of Mr. Jacobi, entitled, Nova fundamenta functionum ellipticarum.

Mr. Chevreul made a very favourable report on the Memoir lately presented to the Academy by Mr. Serullas, relating to the action of different Acids on the Neutral Iodate of Potassa.

Mr. Serullas read a note, containing a Continuation of his Researches on Iodic Acid.

M. Dumeril reported on a Memoir of Mr. Strauss, containing the Anatomical Description of the Tegumentary and Muscular System of the *Mygale aviculare.*

Acts of the Geographical Society.—Meeting of Oct. 2. 1829. Mr. William Darby of Philadelphia sent several Geographical Works, of which he is the author, to the Society.

Mr. Jomard communicated a letter from Mr. Muller, interpreter at Senegal, announcing that he had occupied himself with an Hassanian Moorish vocabulary, and giving details of a negotiation carried on between the French Colony and the New King of the Trarzas. He also gives an account of the attack made by the Almamy of Fouta-Toro against the King of the Braknas Moors, who defeated him, with severe losses. He adds, that Mr. Duranton left Kasso for Bambouk, where he will occupy himself in mining gold.

Mr. Charles Moreau presented the Map of the Colony of Swan River, executed by Captain Stirling; and the Correspondence of the Colonial Department.

Mr. Cadet de Metz read the Continuation of the Account of Captain Parry's Expedition to the North Pole.

Mr. Marcus read Extracts from an unpublished work on the History of the Colonies established in Abyssinia and Senaar, from the seventh century before Christ to the fourth century of the Christian era.

Oct. 16. Mr. Yosy, Secretary of the Medico-Botanical Society of London, announced that he is about to depart for America, where he will explore the Banks of the Mississipi and of the Missouri, the Rocky Mountains, California, Mexico, Columbia, and Brazil; and that he will be happy to receive the instructions of the Society.

Mr. Warden reported on the Documents relative to the Colony of Swan River.

The same Member, in the name of Mr. Skiddy, made a communication on the Survey of the Virgin and Devil's Rocks, by Captains Bishop and Rose.

Mr. de la Pylaie communicated the results of the Researches of Mr. Miorcec de Kardannec in ancient Armorica. The Researches of this gentleman have fixed the positions of the towns of Ocismor, of Manathias de Tolente, and the extent of the country of the Agnotes, comprising six little tribes or cities.

The reporter added to these the discovery he himself had made, of several Roman walls at the Castle of Brest, which had escaped Mr. de Kardannec.

Mr. Marcus read the second part of his report on the Colonies established in Abyssinia and Senaar.

LITERARY NOTICES.

Works in the Press.

A Journey into the Steps of Astrakan and of the Caucasus, by the Count Jean Potocki, is about to appear at Paris; it is published under the superintendance of Mr. Klaproth....Bannister, the late Attorney-General of New South Wales, is preparing an Inquiry into the best means of preventing the Destruction of the Aborigines, usually incident upon settling new Colonies....Sir Edmund Temple's Travels in Peru are nearly ready for publication. They include a year's residence at Potosi, and are said to contain some information on the Mining speculations in that Country....The Picture of India, a popular work on the Geography, Topography, Natural and Civil History of that country, is also announced.

List of New Books.

Encyclopedie Methodique, 101st Livraison....Fontainier Voyages en Orient Enterpris par Ordre du Gouvernement Francois, de l'année 1822 à l'année 1829, 2 vols. 20 francs....The Modern Traveller, 30 vols. 18mo. L.8, 5s. boards. ...Transactions of the Agricultural and Horticultural Society of India, Vol. I. 8vo. 10s. boards....Davy's Consolations in Travel, 6s....Taylor's France and Normandy, 12mo. 6s....Guide du Marin pendant la Navigation Nocturne, &c.; by Mr. Coulier, 1 vol. 8vo....Meine Auswanderung nach Amerika, &c., Mr. Gudelius, 2 vols. 8vo. Hildesheim....Opisanie Tibeta, &c. translated from the Chinese by Abbé Hyacinthe, 8vo. with a Map of St. Petersburgh. The same author has translated a Description of Turkistan, and Notices on the Mongolians.

Letters and Communications (post paid,) Advertisements, and Books for Review, to be addressed to the Editors, at Mr. Lizars', 5. St. David Street, Edinburgh, or to the Agents in London and Dublin, where Contributions will be thankfully received and acknowledged.

W. Cartwright, Printer, Edinburgh.

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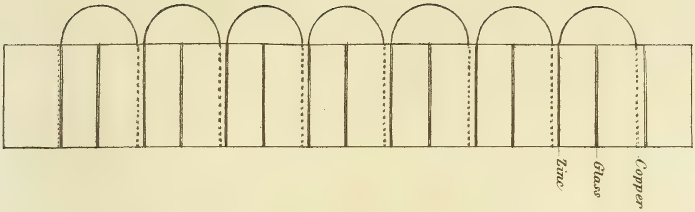
LIST OF ENGRAVINGS IN VOL. I.

Thos. Brown Delt. et Sculpt.

PL. II.

1



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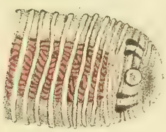

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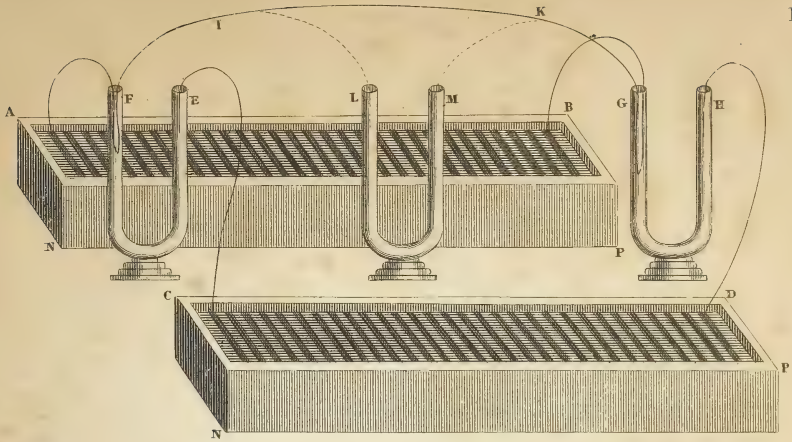
Drawn & Engraved by Capt. Brown

Fig. 2.



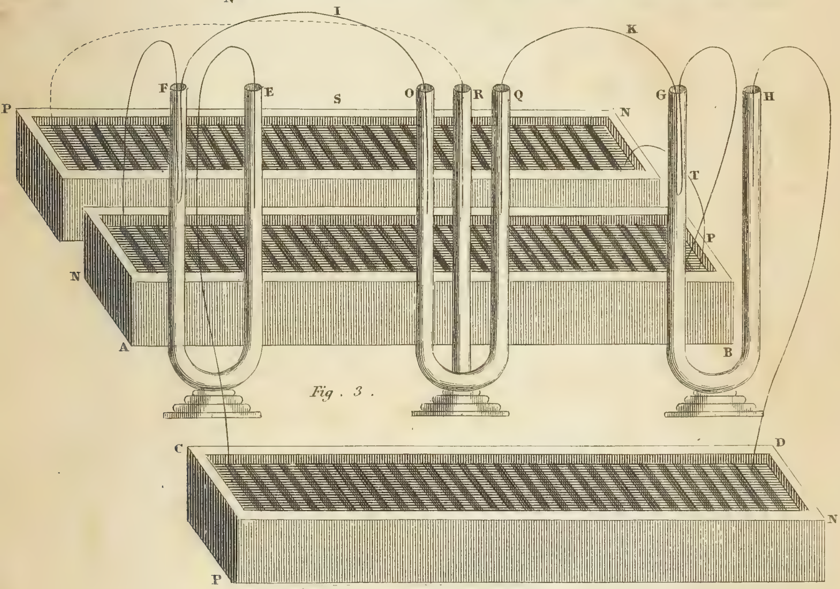
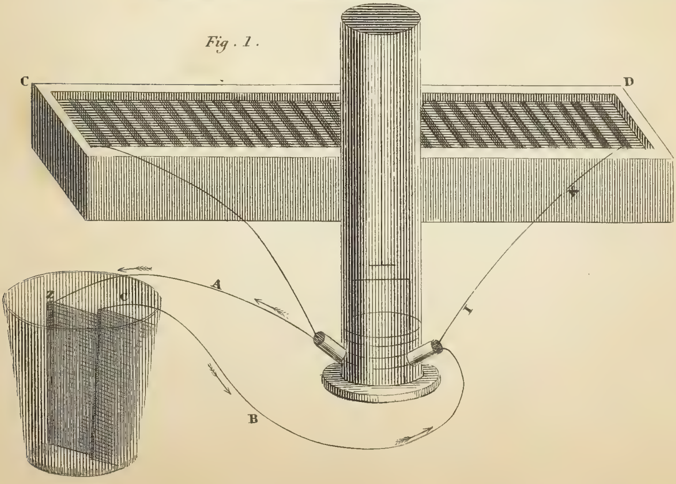


Fig. 3.

Fig. 1.



W.H.Lizars Sculp.t

Copied and Engraved for Edin.r Journal of Natural & Geographical Science.

PL. V.

Fig. 1.

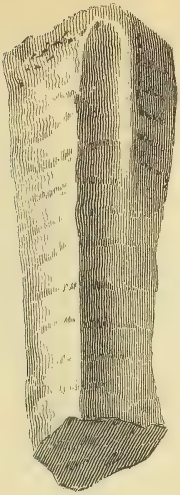


Fig. 2.

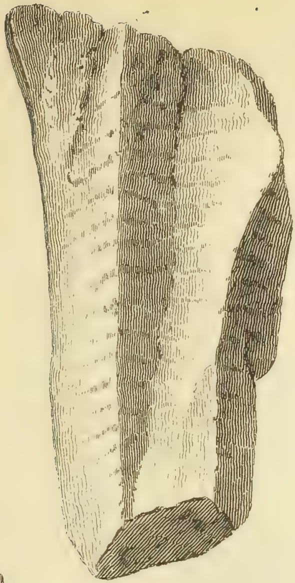
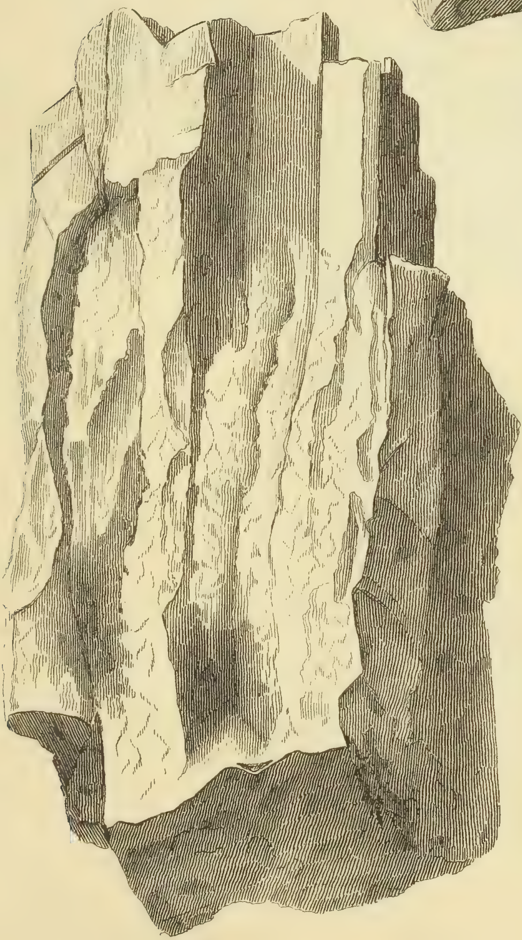


Fig. 3.



Drawn by W. Banks

PL.VI.

Cypselus unicolor

Drawn by Sir W. Jardine Bar.t

Eng.d by W.H. Lizars

Edin.r Journal of Natural & Geographical Science.

PL. VII.

Fig. 1.

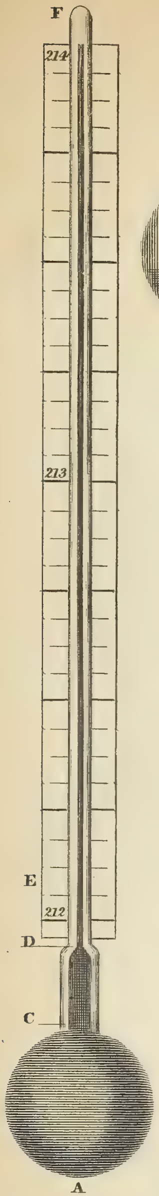
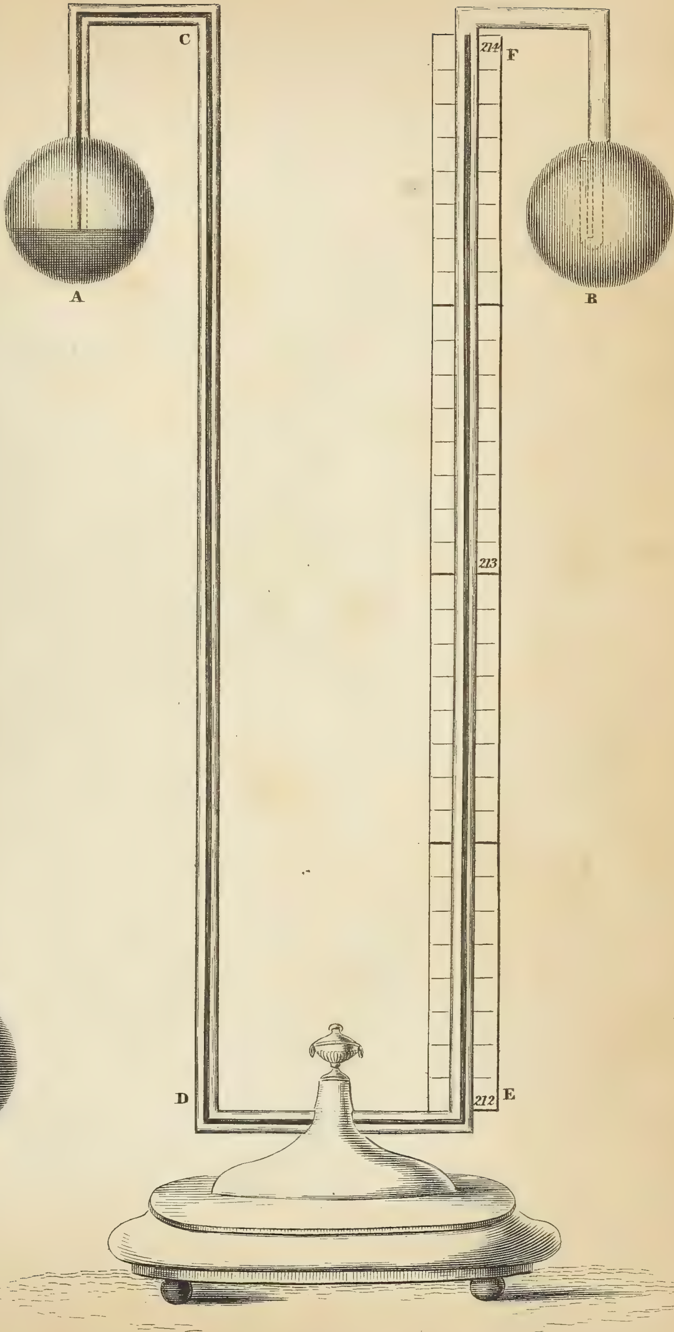


Fig. 2.



Engd. by W.H. Lizars

PL. VIII.

Emberiza paradisae.
Winter plumage.

Drawn by Captⁿ. Thoˢ. Brown

Engᵈ. by W.H. Lizars


CHART of the COLONY
of
SWAN RIVER,
Surveyed by
Captain James Stirling R.N.
1827.
Mountains from 1200 to 1500 feet in height
St. Anne Mountain
3000 feet in height
Mount William
very remarkable
3000 feet in height
Country undulating and open extending to the Base of the Chain
Swan River
Undulating Country & Pasture Lands.
Abounding with fresh water
Part allotted to Mr. Peel
Canning River
Mt. Eliza
Many Springs of fresh Water
Mineral Springs
Fine Plain, undulating and Covered with Grass.
All the Coast to Geographe Bay is composed of a Mass of Calcareous Rock varying in height from 20 to 600 feet & extending into the Interior from 1 to 5 Miles
R. Gages
Arthurs
Cockburn Sound
Pole Casnar
I. Rottenest
Port Lechenault
C. Casuarina
Part allotted to Capt. Stirling 90,000 Acres
Bri. Vasé
GEOGRAPHE BAY
C. Naturaliste
Nautical Miles.
5
10
15
20

State on 19th. Janr. 1830

Emberiza paradisae
Whidah Bunting.

Drawn by Captn. T. Brown State on 14th. Sepr. 1829 Engd by W.H. Lizars